

# ENERGY STATEMENT

CANMOOR

WINDRUSH PLOT B, WITNEY

CANMOOR DEVELOPMENTS LTD

Issued by:

Engineering Services Consultancy Ltd

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## ENERGY STATEMENT

### WINDRUSH PLOT B, WITNEY CANMOOR DEVELOPMENTS LTD

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## EXECUTIVE SUMMARY

This Energy Statement supports the detailed planning application for the construction of the new industrial buildings at Windrush Plot B, Witney.

Assessment was required to evaluate the buildings' compliance with Building Regulations L2 and Policy EH6: Decentralised and Renewable or Low Carbon Energy Development.

The Policy sets out a number of 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 comply with the guidance outlined in the above policies.

The results are as follows...

- PV will be utilised to achieve on site generation to comply with planning policies.
- All units **pass** Building Regulation's Part L2A criterion 1, 2 and 3 requirements.
- All units achieve an EPC rating of '**A**' using an assumed level of fit out at 'As-Designed' stage.
- All units achieve a minimum of four (**4**) credits under BREEAM ENE01 for an '**Excellent**' rating.

# INTRODUCTION

## CONTEXT

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.

## SITE LOCATION

The proposed development consisting of 7 commercial units ranging from 12,400ft<sup>2</sup> to 21,000ft<sup>2</sup> located on the outskirts of Witney, Oxfordshire.

The development is situated in the Windrush Industrial Park with commercial warehouse units of similar size immediately surrounding the development in all orientations.

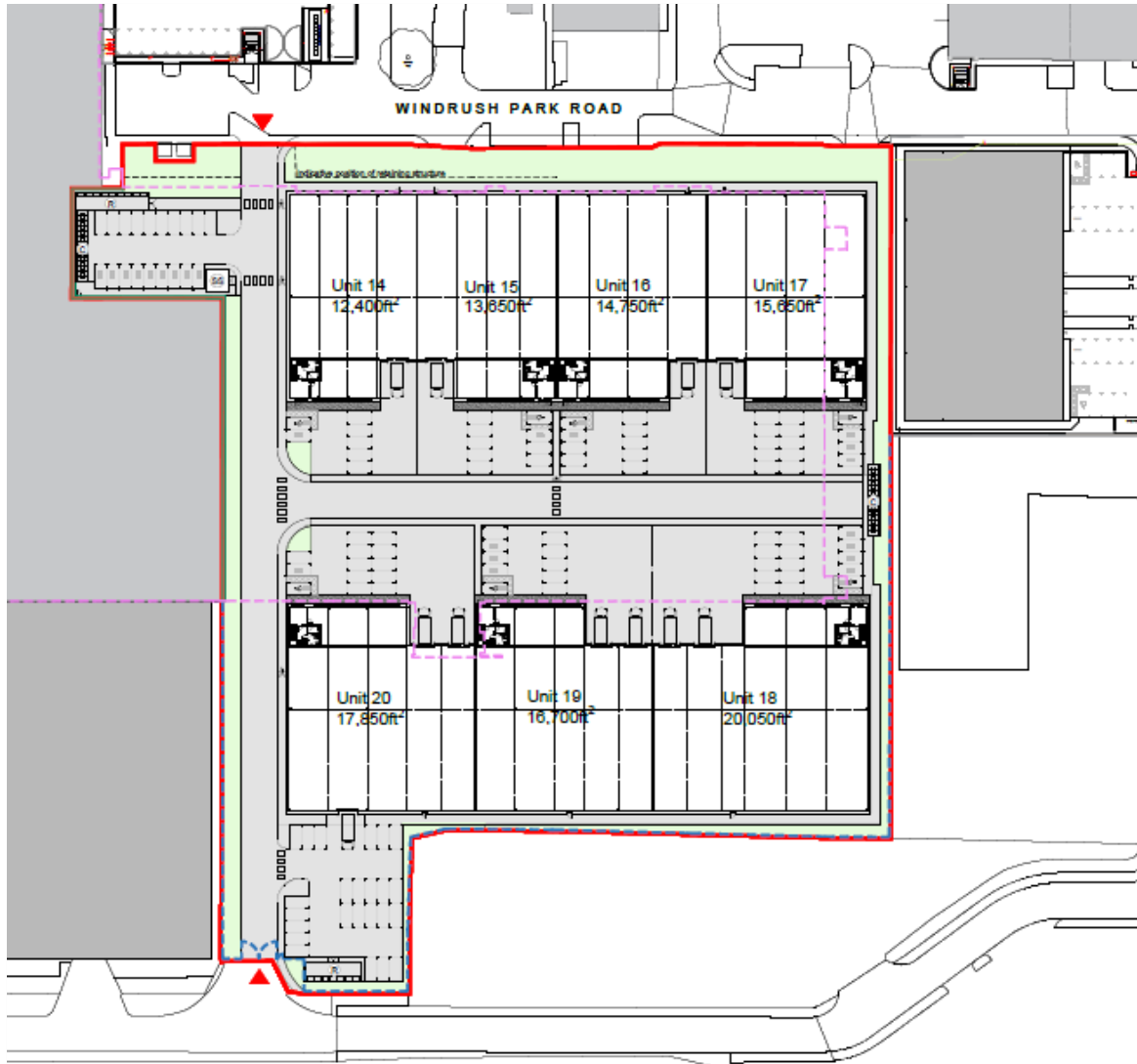
The wider surrounding of the area include greenbelt farming land to the north and west with the outskirts of the Oxfordshire town of Witney located to the south and east.



*Site Location*

## PROPOSED DEVELOPMENT

The proposed development will be comprised of 7 B2/B8 industrial units with ancillary offices, service yards and carparking.



Site plan



# CONSERVATION OF FUEL AND POWER REQUIREMENTS

The new development is required to be constructed in a certain manner to limit the predicted fuel and power requirements of the site. The benchmark requirements for this site are:

- Building Regulations
- EPC Rating of 'A'
- BREEAM NC 2018 Rating of 'Excellent'
- West Oxfordshire District Council Planning Policy EH6
- West Oxfordshire District Council Carbon Action Plan

## BUILDING REGULATIONS

The following criteria forms part of the design stage requirements of the Building Regulations Part L2A.

### APPROVED DOCUMENT L2A CRITERION ONE

Criterion One is concerned with the amount of carbon dioxide emitted from a building per annum. The amount of carbon dioxide emitted is calculated by an approved Energy Assessor, using approved software tools. Within the approved software, the Energy Assessor creates a virtual building model which reflects the actual building and incorporates actual design features including building envelope, building orientation, glazing, air permeability, geographical location, and building services. This particular virtual model is referred to as the "Actual Building". The Energy Assessor also applies a standard database of internal environmental conditions and activities which take place within, known as NCM templates.

When concerned with the Criterion One assessment, the Actual Building is compared against a "Notional Building". The Notional Building is generated automatically within the accredited software and mimics the physical size, shape, orientation, location, and layout of the Actual Building. However, the design features (fabric and building services) of the Notional Building are not related to the Actual Building and may be better in performance. In order to pass the Criterion One assessment for compliance with ADL2A 2021, the carbon emission of the Actual Building must be equal to, or less than, the carbon dioxide emission of the Notional Building.

The annual carbon dioxide emission per square metre of floor area calculated for the Actual Building is known as the Building Emission Rate (BER), whilst the annual carbon dioxide emission per square metre of floor area for the Notional Building is known as the Target Emission Rate (TER). Therefore, in order to satisfy Criterion One, the BER must be equal to or less than the TER.

## APPROVED DOCUMENT L2A CRITERION TWO

Criterion Two assesses the performance of the building fabric to ensure that reasonable provision is made to limit heat gains and heat losses. During the calculation, the software assesses building fabric U-values and building air permeability to ensure that minimum standards prescribed by the Building Regulations are met.

Criterion Two also requires M&E building services to meet minimum energy efficiency standards. Whilst the efficiency of such plant and equipment is entered into the software to calculate building carbon emission, it is not automatically checked during the assessment for compliance with Criterion Two. The BRUKL Output Document therefore provides a schedule of plant and equipment efficiency for review by the Building Control Officer (BCO).

## APPROVED DOCUMENT L2A CRITERION THREE

Criterion Three limits the effect of solar gains during the period of April to September, whether air conditioning is installed or not. The intention of Criterion Three is to reduce the need for air conditioning or reduce the installed capacity of air conditioning if present. Where comfort cooling is not provided, it is recommended that detailed thermal simulations are undertaken on a room-by-room basis to ensure that overheating criteria are satisfied, irrespective of Criterion Three results.

Similarly, to Criterion One, the Actual Building is compared to the Notional Building. The Notional Building is automatically created by the software to incorporate specific features which relate to a room's end use, the orientation of glazing, and specification of glazing in terms of g-value. To pass Criterion Three assessment, the Actual Building must have a solar heat gain less than or equal to the Notional Building benchmark.

## EPC

An Energy Performance Certificate (EPC) rates how energy efficient your building is using grades from A to G (with 'A' the most efficient grade).

An EPC is required:

- You rent out or sell the premises.
- A building under construction is finished.
- There are changes to the number of parts used for separate occupation and these changes involve providing or extending fixed heating, air conditioning or mechanical ventilation systems.

## BREEAM NC 2018

The BREEAM (Building Research Establishment Environmental Assessment Method) UK New Construction scheme is an environmental performance standard that new, non-domestic buildings in the UK can be assessed under.

Within the scheme, there are rating benchmarks which a building may achieve through good or best practice, these ratings are:

| BREEAM RATING | % SCORE |
|---------------|---------|
| Outstanding   | ≥ 85    |
| Excellent     | ≥ 70    |
| Very Good     | ≥ 55    |
| Good          | ≥ 45    |
| Pass          | ≥ 30    |
| Unclassified  | < 30    |

Each rating represents performance equivalent to:

- Outstanding: Less than the top 1% of UK new non-domestic buildings (innovator)
- Excellent: Top 10% of UK new non-domestic buildings (best practice)
- Very Good: Top 25% of UK new non-domestic buildings (advanced good practice)
- Good: Top 50% of UK new non-domestic buildings (intermediate good practice)
- Pass: Top 75% of UK new non-domestic buildings (standard good practice)

How a building achieves any of the above ratings is by assessing how it is managed, constructed and operated. This is broken down into categories, which are:

- Management,
- Health and Wellbeing,
- Energy,
- Transport,
- Water,
- Materials,
- Waste,
- Land Use and Ecology, and
- Pollution

Another optional category is 'Innovation'.

Each category includes criteria a building may meet to achieve one or more credits. These credits will add up to score an overall BREEAM rating.

For this development, the aim is for the building to achieve a BREEAM 2018 rating of 'Excellent', which can be supplemented by acquiring credits within the Energy category's ENE 01 criterion.

The minimum mandatory credits required for BREEAM 'Excellent' is four (4) credits.

# POLICY AND LEGISLATION

## NATIONAL

### NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF) was introduced in March 2012 and was revised on 5<sup>th</sup> September 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 on the basis of 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;
- To make provision about adaptation to climate change;
- Reduce domestic waste and recycle more;
- To amend the provisions of the Energy Act 2004 about renewable transport fuel obligations;
- To make provision about carbon emissions reduction targets;

The Act outlines a target to reduce net UK carbon account by at least 100% by 2050, over the 1990 baseline.

## **TOWN AND COUNTRY PLANNING ACT 1990**

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

## **ENERGY ACT 2013**

The Energy Act received Royal Assent on 18th December 2013 and makes provision to:

- Set a decarbonisation target;
- Review the electricity market and encourage low carbon electricity generation or ensure secure supply;
- Establish the Office of Nuclear Regulation;
- Protect the government pipe-line 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 13<sup>th</sup> November 2008 and enables local planning authorities to set requirements for energy use and energy efficiency in local plans.

## **ENVIRONMENTAL PROTECTION ACT 1990**

The Environmental Protection Act was published on 1<sup>st</sup> November 1990 and makes provision for a number of environmental issues including:

- Pollution;
- Waste;
- Hazardous substances.

## **NATURAL ENVIRONMENT AND RURAL COMMUNITIES ACT 2006**

The Act was published on 30<sup>th</sup> March 2006 and makes provision for bodies concerned with the natural environment and rural communities, in connection with wildlife, SSIs, National Parks and the Broads. The Act establishes laws for rights of way and waterways and provides administrative details for the environment and rural affairs.

## **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 and energy efficiency. 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 15<sup>th</sup> June 2022, there have since been some updates published in February 2023.

Part G of the Building Regulations seeks to limit the domestic use of water. The current 2016 edition came into effect on 1<sup>st</sup> March 2016.

## LOCAL

### WEST OXFORDSHIRE DISTRICT COUNCIL LOCAL PLAN 2031

The Local Plan for West Oxfordshire sets out a vision of the District in 2031 and provides an overarching framework to guide and deliver that vision. The plan has been shaped by extensive community engagement which has helped to ensure that it focuses on those issues of greatest significance to West Oxfordshire. Some of these issues are locally specific such as traffic congestion on the A40, whilst others are broader in nature including housing affordability, climate change and the need for economic growth.

This Local Plan covers the 20-year period 1 April 2011 – 31 March 2031. It will however be reviewed on a regular basis to ensure it remains relevant and appropriate typically every 5 years or so, unless circumstances dictate that this needs to happen sooner.

In line with the three-step ‘energy hierarchy’ (lean, clean, green) there is a need to give consideration to specific proposals relating to decentralised energy supply and the use of renewable and low carbon energy. An assessment of renewable and low carbon energy for West Oxfordshire (LDA 2016) concluded that, in the short term at least, the District has the potential to deliver greater carbon savings through new renewable energy infrastructure than can be achieved through the development of new low carbon buildings.

### POLICY EH6: DECENTRALISED AND RENEWABLE OR LOW CARBON ENERGY DEVELOPMENT

In principle, renewable and low-carbon energy developments, especially run-of-river hydropower and the use of biomass will be supported. Battery energy storage developments that aid the deployment of renewable and low carbon development across the wider electricity network will generally also be supported.

Renewable or low-carbon energy development should be located and designed to minimise any adverse impacts, with particular regard to conserving the District’s high valued landscape and historic environment. In assessing proposals, the following local issues will need to be considered and satisfactorily addressed:

- Impacts on landscape, biodiversity, historic environment, agricultural land, residential amenity, aviation activities, highway safety and fuel/energy security, including their cumulative and visual impacts.
- Opportunities for environmental enhancement. Environmental enhancements, in addition to those required to mitigate and compensate any adverse impacts, will be sought, especially where they will contribute to Conservation Target Areas and Nature Improvement Areas.
- Potential benefits to host communities (including job creation and income generation).

Any proposals for a solar farm involving best and most versatile agricultural land would need to be justified by the most compelling evidence which demonstrates why poorer quality land has not been used in preference to best and most versatile agricultural land.

Developments that are led by or meet the needs of local communities will receive particular support when considering the merits of renewable energy developments. Applicants should submit a written agreement between the applicant and a community energy enterprise demonstrating that the benefits of all or part of the project will flow to the community for the lifetime of the project.



The use of decentralised energy systems, including Combined Heat and Power (CHP) and District Heating (DH), especially woody biomass fuelled, will be encouraged in all developments. An energy feasibility assessment or strategy which assesses viability and practicability for decentralised energy systems, including consideration of the use of local wood fuel biomass and other renewable energy initiatives will be required for:

- Proposals on strategic development areas (SDAs)
- All residential development for 100 dwellings or more
- All residential developments in off-gas areas for 50 dwellings or more.
- All non-domestic developments above 1000m<sup>2</sup> floorspace

Where feasibility assessments demonstrate that decentralised energy systems are practicable and viable, such systems will be required as part of the development, unless an alternative solution would deliver the same or increased energy benefits.

# ENERGY

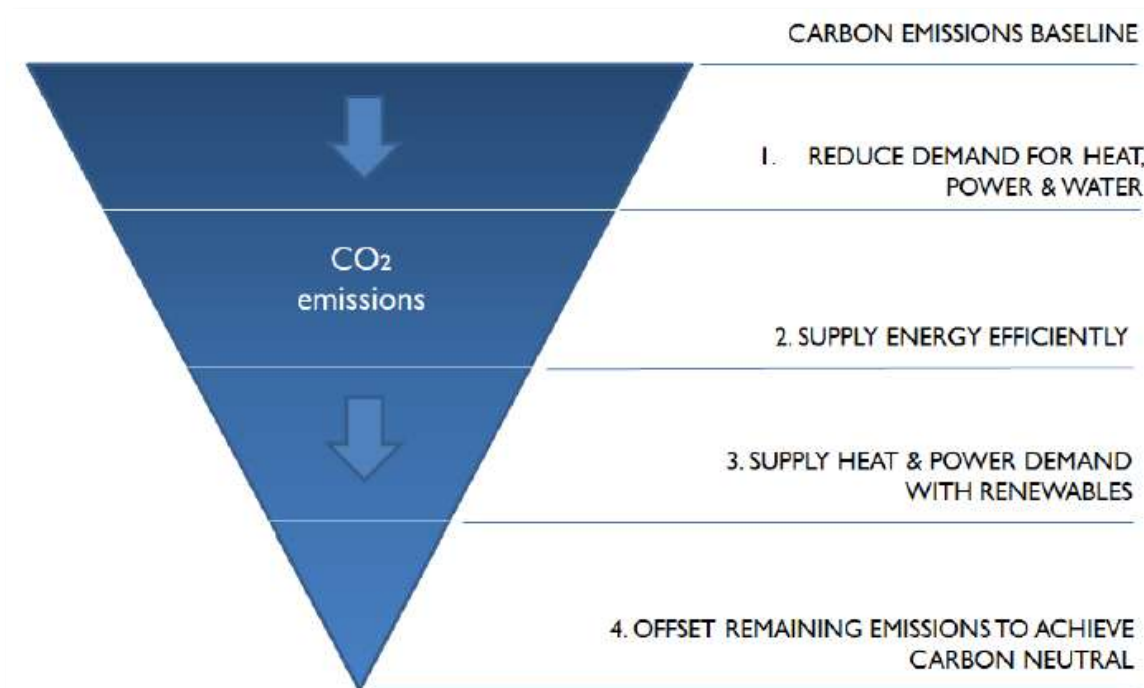
## CARBON ACTION PLAN

The Council has developed Guiding Principles within this Plan as a common reference for all projects planned as part of its trajectory for reaching carbon neutral.

| PRINCIPLE | DESCRIPTION   |
|-----------|---|
| GP1       | Target energy-efficiency and resource-efficiency measures as a first step to reducing heat, energy, fuel and water demand               |
| GP2       | Transition away from fossil fuels including gas and liquid fuel, and move to electricity-based and other low-carbon energy technologies |
| GP3       | Direct supply electricity using renewables either on-site or from another local energy source   |
| GP4       | All remaining CO <sub>2</sub> e that can not be reduced or removed in their entirety, to be offset using an agreed offsetting mechanism |

*Guiding Principles*

These principles align with the energy-hierarchy approach, illustrated in Figure 3, and will be applied as a consistent point of reference in the planning of work packages, projects and activities being taken forward to deliver this Plan.



*Energy Hierarchy*

## DEVELOPMENT AIMS

Following a review of the West Oxfordshire councils local policies, legislation and Carbon Action Plan, the new development will aims to:

- Meet the challenges of climate change and ensure the development can withstand future pressures arising from changing conditions;
- Conserve and enhance the natural environment via the guidance of an appointed ecologist;
- Promote sustainable transport and electric vehicle infrastructure to encourage a reduction in car usage;
- Prevent and minimise pollution;
- Reduce waste and encourage reuse and recycling;
- Reduce energy use and greenhouse gas emissions through design, fabric, and service specification;
- Minimise carbon emissions
- Maximise renewable energy generation to offset any carbon emissions arising from building operations, ensuring that at least 10% of energy needs are met from renewable/and or other low carbon energy sources;
- Select materials with consideration of embodied carbon, environmental rating, and the principles of circular economy;
- Minimise potable water use through specification of water-efficient sanitaryware, rainwater systems and consideration of water re-use systems;
- Manage flood risk and promote sustainable drainage measures;
- Negate the performance gap between the designed and as-built development
- Achieve BREEAM 'Excellent';
- Achieve a minimum EPC rating of A;

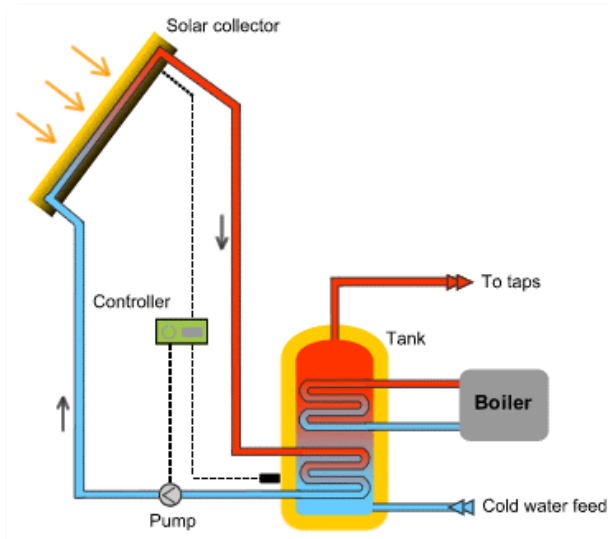
# LOW & ZERO CARBON TECHNOLOGY STUDY

## 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

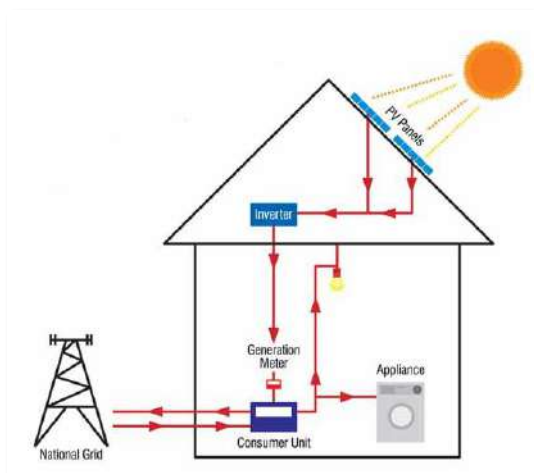
- Government Renewable Heat Incentive payments.
- Relies on a natural source (the sun).
- Low maintenance.

#### Disadvantages

- Panels ideally need to face South and at an incline of 30° to the horizontal.
- The system must be unshaded.

### PHOTOVOLTAICS (PV)

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



#### Advantages

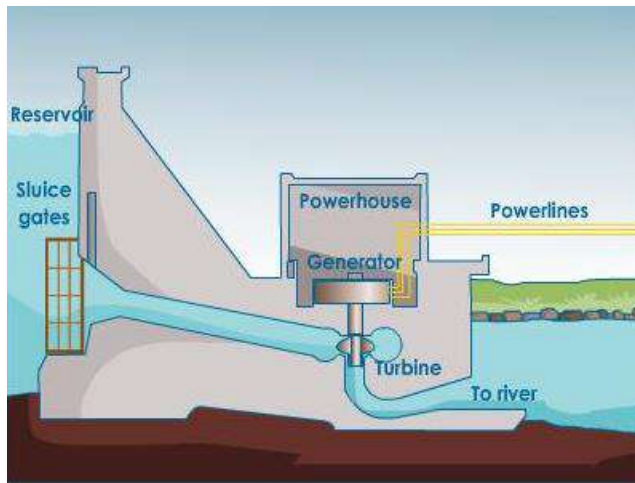
- Panels can be incorporated into the building.
- Feed in Tariff payments.
- Relies on a natural source (the sun).
- Low maintenance.
- Silent in operation.
- No emissions.

#### 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*

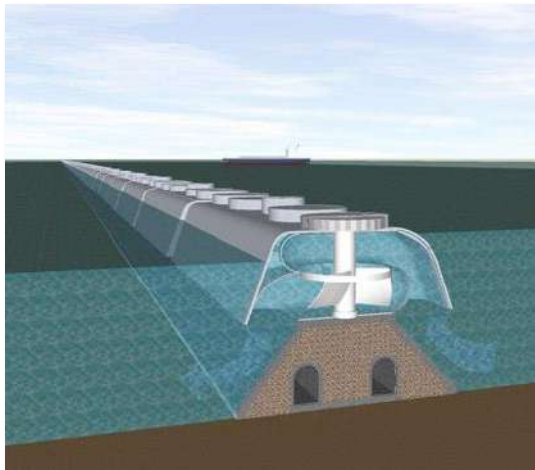
- Government Feed in Tariff payments.
- Surplus energy can be sold to the grid.
- Low running and maintenance costs.

### *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*

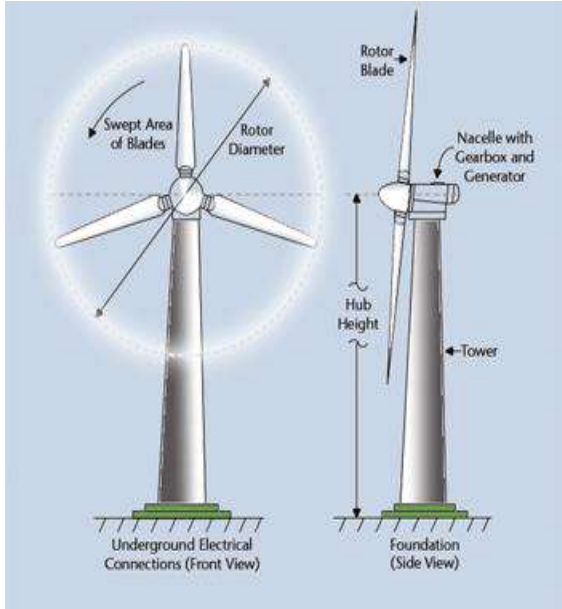
- Government Feed in Tariff payments.
- Surplus energy can be sold to the grid.
- Low running and maintenance costs.
- The tide moves a huge amount of water each day and has the potential to produce a lot of energy.

### *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

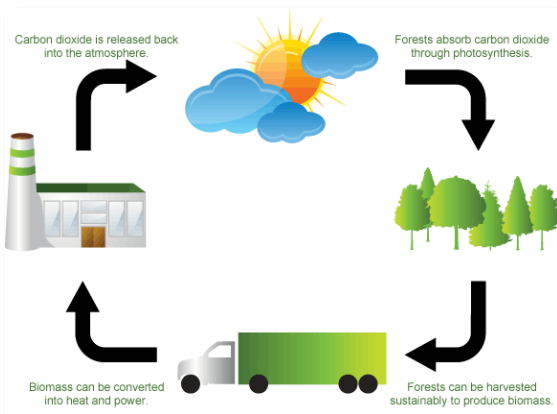
- Wind is free.
- Surplus energy can be sold to the grid.
- Extremely beneficial in exposed or coastal sites.

### 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

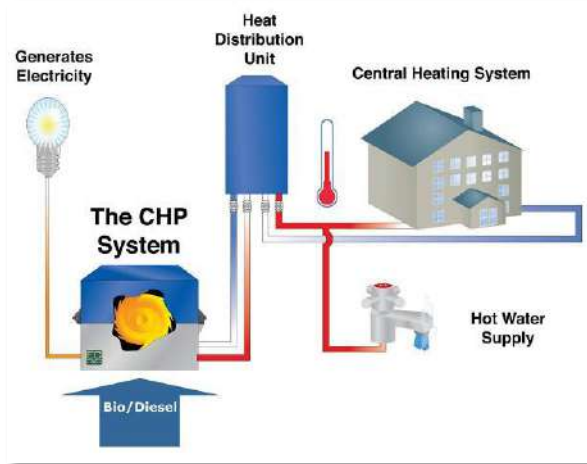
- May be eligible for Renewable Heat Incentives.
- Affordable fuel.

### 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.

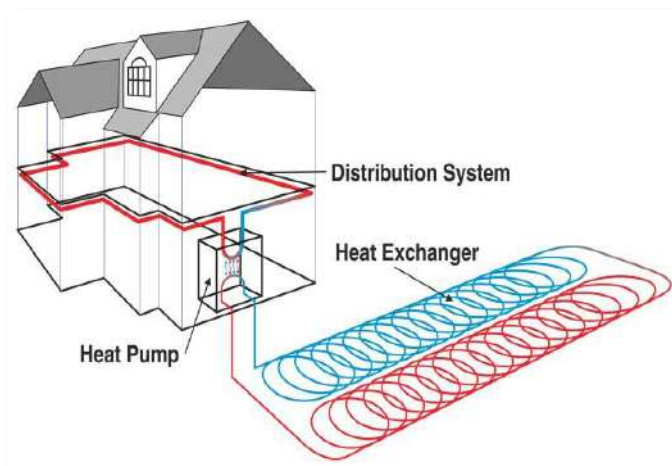
Cheap maintenance costs.

### 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*

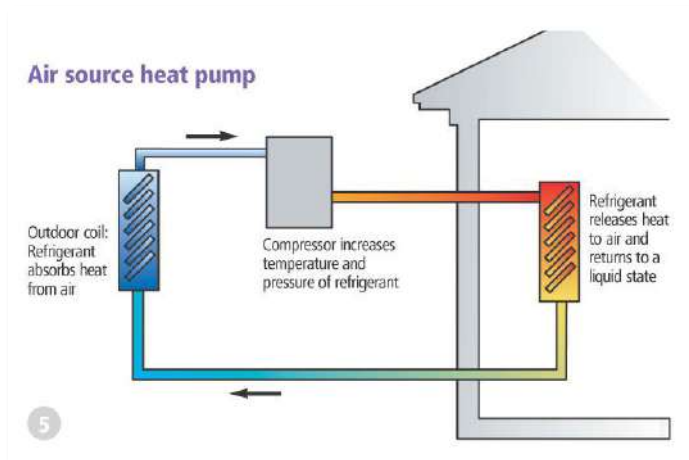
Require regular maintenance.

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*

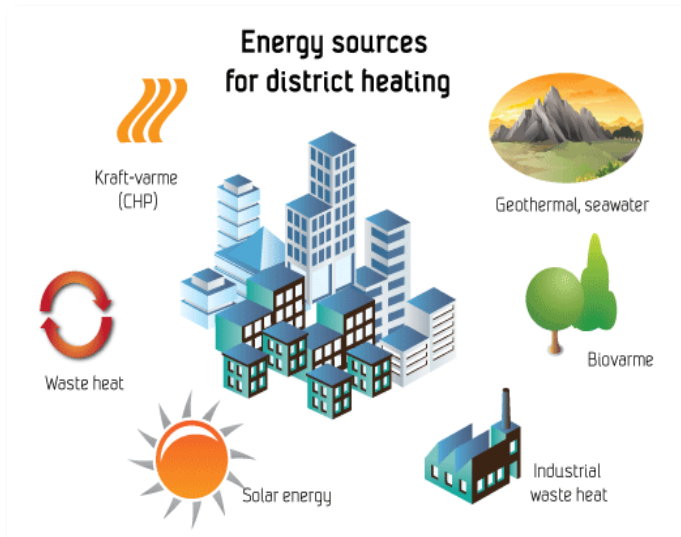
Require regular maintenance.

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

The breakdown below summarises the technologies which could be considered feasible for use on this development:

### APPROPRIATE LZC TECHNOLOGY INFORMATION

#### PHOTOVOLTAICS (PV)

The building has large roof spaces available for installation. Should a building not achieve compliance with Building Regulation's ADL2A then implementing this technology is highly recommended.

Carbon Emissions associated with Electrical usage within the building will be reduced due to onsite generation.

### EXCLUDED TECHNOLOGIES

A number of technologies have been excluded due to location or resource availability; these have been summarised in the table below:

#### EXCLUDED LZC TECHNOLOGY INFORMATION

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. As the price difference between electricity and gas fuel can sometimes be a factor of three, payback will potentially be very long.

Solar Thermal Collectors: The nature of the building will benefit from the efficient generation of hot water. The usage profile of a warehouse is generally high-water usage.

Water Source Heat Pumps: There is no suitable water source to enable the installation of a water source heat pump system.

Wind Turbines: The average wind speed shown in RenSMART's wind map show it is generally below or equal to 5.0 m/s. Wind turbines require average wind speeds greater than 5.0 m/s to generate meaningful amount of energy.

Biomass: The buildings are speculative and assumed to have no industrial space heating and/or cooling applied. However, spare ducts shall be provided within site for future connections onto any future decentralised energy networks

Combined Heat and Power: The buildings are speculative and assumed to have no industrial space heating and/or cooling applied. However, spare ducts shall be provided within site for future connections onto any future decentralised energy networks.

Community / District Heating: The buildings are speculative and assumed to have no industrial space heating and/or cooling applied for this report. However, spare ducts shall be provided within site for future connections onto any nearby district heating network.

## IMPLEMENTATION

To maximise the social, economic and environmental opportunities the following actions shall be incorporated into the development of Windrush Plot B, Witney:

- Identification of low carbon and renewable energy sources
- Specification of water-efficient systems
- Implementation of green transport infrastructure
- Preservation and enhancement of site biodiversity
- A Life Cycle Assessment of material embodied carbon
- Affiliation with BREEAM, monitoring and assessing progress
- Appointment of an ecologist to advise on issues relating to biodiversity

## APPROVED DOCUMENT L2A (2021), BUILDING REGULATIONS

The current building regulations are concerned with 3 key criteria:

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. The amount of carbon dioxide emitted from a building per annum. The amount of carbon dioxide emitted 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 a “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. In order to pass the Criterion One assessment for compliance with ADL2A 2013, the carbon emission of the virtual building must be equal to, or less than, the carbon dioxide emission of the notional building.
2. The performance of the building fabric to ensure that reasonable provision is made to limit heat gains and heat losses. This assesses 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. The effect of solar gains during the period of April to September, whether air conditioning is installed or not. The intention is to reduce the need for air conditioning or reduced the installed capacity of air conditioning if present. Again, the virtual building model is compared to a notional building. The model must have a solar heat gain less than or equal to the notional building benchmark.

The principle of the building design is to use as little energy as possible and utilise low or zero carbon energy sources to deliver some of that energy.

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 AND CALCULATION PROCESS

All computer calculations will be undertaken using software programme IES Virtual Environment v7.0.20 which is a Dynamic Simulation Model (DSM) tool accredited by the Department of Communities and Local Government for the generation Energy Performance and BRUKL Certification. Table 1 lists the reference drawings and documents used to undertake the assessment.

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

*Table 1: Schedule of Drawings and Documents*

| TITLE  | FROM              |
|--|-------------------|
| <b>23052 - PL-1003_00</b> - Proposed Site Plan                           | Hale Architecture |
| <b>23052 - PL-1100_00 A</b> - Units 14 to 17 Proposed Ground Floor       | Hale Architecture |
| <b>23052 - PL-1101_00 A</b> - Units 14 to 17 Proposed First Floor Office | Hale Architecture |
| <b>23052 - PL-1103_00 A</b> - Units 14 to 17 Proposed Elevations         | Hale Architecture |
| <b>23052 - PL-1200_00 A</b> - Units 18 to 20 Proposed Ground Floor       | Hale Architecture |
| <b>23052 - PL-1201_00 A</b> - Units 18 to 20 Proposed First Floor Office | Hale Architecture |
| <b>23052 - PL-1203_00 A</b> - Units 18 to 20 Proposed Elevations         | Hale Architecture |

## 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 Table 2. In addition, the values and systems stated are based on the mechanical and electrical tender design.

Please refer to the BRUKL output document for Mechanical and Electrical Engineering Services performances not provided below.

Table 2: SBEM Building Envelope Performance

| ELEMENT  | PROPOSED/ASSUMED                               |
|--|--|
| External Wall U-value  | 0.26 W/m <sup>2</sup> .K                       |
| Internal Walls U-value   | 1.79 W/m <sup>2</sup> .K                       |
| Roof U-value   | 0.18 W/m <sup>2</sup> .K                       |
| Ground Floor U-value   | 0.18 W/m <sup>2</sup> .K                       |
| Opaque Door U-value (including doors between unheated shell and heated core areas) | 1.60 W/m <sup>2</sup> .K                       |
| Window U-value (frame & glass, including glazed doors)                             | 1.60 W/m <sup>2</sup> .K                       |
| Window Light Transmission and G-value  | LT: 0.71<br>G-value: 0.40                      |
| Rooflight U-value (frame & glass)  | 1.81 W/m <sup>2</sup> .K                       |
| Rooflight Light Transmission and G-value   | LT: 0.55<br>G-value: 0.4                       |
| Vehicle access doors & similar large doors U-value                                 | 1.30 W/m <sup>2</sup> .K                       |
| Air Permeability   | 3.0 m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50Pa |

Table 3: SBEM M&amp;E Building Services Strategy

| SYSTEM/ZONE                                | DESCRIPTION   |
|--|---|
| Office Spaces                              | VRF heat pump for heating and cooling, with mechanical ventilation via heat recovery unit                                     |
| Reception                                  | VRF heat pump for heating and cooling, with mechanical ventilation via heat recovery unit                                     |
| Staircase                                  | Electric Panel Heaters  |
| Toilets                                    | Electric panel heaters with remote central extract ventilation  |
| Toilet Extract Fans                        | SFP = 0.4 W/(l/s)   |
| Mechanical Ventilation Heat Recovery Units | Heat recovery efficiency = 75%<br>All Units: SFP = 1.5 W/(l/s)  |
| VRV/F Heating/Cooling Efficiencies         | Heating: SCOP = 4.0. Cooling: SEER = 5  |
| DHWS                                       | Local electric water heaters  |
| Electric Panel Heaters                     | Efficiency = 81%  |
| Photovoltaics                              | Each building will be provided with an PV system to satisfy requirements of Building Regulations, BREEAM & Planning policies. |
| Warehouse                                  | Unheated (Shell)  |

Table 4: SBEM Electrical Lighting Performance

| ROOM                  | LUMINAIRE EFFICACY (LLM/CW) | DESIGN ILLUMINANCE (LUX) | PARASITIC POWER (W/M <sup>2</sup> ) |
|-----------------------|-----------------------------|--------------------------|-------------------------------------|
| Office Spaces         | 110                         | 500                      | 0.30                                |
| Reception             | 110                         | 300                      | 0.30                                |
| Circulation           | 110                         | 150                      | N/A                                 |
| WC                    | 110                         | 200                      | N/A                                 |
| Warehouse, Undercroft | 95                          | 300                      | 0.1                                 |

Table 5: SBEM Minimum Lighting Control Performance

| ROOM          | AUTOMATIC DETECTION | DAYLIGHT CONTROL                                   |
|---------------|---------------------|--|
| Office Spaces | Absence             | Photocell controlled dimming (within 6m of window) |
| Reception     | Manual              | Photocell controlled dimming (within 6m of window) |
| Circulation   | Presence            | Photocell controlled dimming                       |
| Toilets       | Presence            | No daylight control                                |
| Warehouse     | Absence             | Photocell controlled dimming                       |



# COMPLIANCE WITH ENERGY & CARBON REQUIREMENTS

## BUILDING REGULATIONS CRITERION 1

Based on the compliance calculations carried out on at Windrush Plot B, Witney and using the performance criteria highlighted in Section 3, it was found that the building passes 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   |                               | 14    | 15    | 16    | 17    | 18    | 19    | 20    |
|--|-------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Emission Rate<br>(kg.CO <sub>2</sub> /m <sup>2</sup> .Annum) | Target<br>(TER)               | 1.64  | 1.63  | 1.63  | 1.63  | 1.57  | 1.55  | 1.49  |
|  | Building<br>(BER)             | 1.46  | 1.46  | 1.30  | 1.27  | 1.18  | 1.25  | 1.10  |
| Primary Energy<br>(KWh/m <sup>2</sup> .Annum)                | Target<br>(TPER)              | 17.32 | 17.24 | 17.20 | 17.28 | 16.59 | 16.37 | 15.83 |
|  | Building<br>(BPER)            | 15.06 | 15.08 | 13.30 | 13.02 | 11.97 | 12.74 | 11.25 |
| PV Generation  | kWh/m <sup>2</sup> .<br>annum | 3.70  | 3.32  | 4.29  | 4.46  | 4.70  | 4.61  | 4.35  |
|  | Reduction<br>over BPER        | 25%   | 22%   | 32%   | 34%   | 39%   | 36%   | 39%   |
| Building Regulations<br>Compliance?                          |                               | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| EPC Rating   |                               | A     | A     | A     | A     | A     | A     | A     |

## BUILDING REGULATIONS CRITERION 2

Using the performance criteria highlighted in this document, all units meet 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 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:

- West Oxfordshire District Council Planning Policy EH6
- West Oxfordshire District Council Carbon Action Plan
- Approved Document Part L2 of the Building Regulations (2021);

Photovoltaics will be introduced to provide onsite generation of electricity to offset the regulated electricity use of the building (at Practical Completion). Table 6 of this report highlight all units complying with the national and local planning policies. This is a result of achieving the necessary BREEAM credit for ENE01 and BREEAM New Construction 'Excellent' standard that requires a greater renewable generation than standard.

## BREEAM NC 2018

Acquiring BREEAM ENE 01 credits for the unit will supplement its environmental performance rating of 'Excellent'. Using the building fabric and M&E services highlighted previously in Section 5, the unit achieves the minimum of 4 credits under ENE 01.

## 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, economy and society. 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.

With any new building there will be unavoidable negative impacts resulting from energy, water and resource use however the planning, design, construction and operation of the Proposed Development has been and will be managed so that the effect is minimised and mitigated where possible.

Engineering Services Consultancy Ltd

07 March 2024

# APPENDIX

## UNIT 14 – 2021 REGULATIONS BRUKL

Project name

Shell and Core

Plot B - Windrush - Unit 14

As designed

Date: Wed Mar 06 14:01:18 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## 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: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m<sup>2</sup>]: 87.94The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.64                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.46                      |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 17.32                     |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 15.06                     |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|--|
| Walls*                               | 0.26                 | 0.26                | 0.26                | FF000000:Surf[0]                         |
| Floors                               | 0.18                 | 0.18                | 0.18                | HW000000:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | WC000006:Surf[0]                         |
| Windows** and roof windows           | 1.6                  | 1.6                 | 1.6                 | FF000000:Surf[2]                         |
| Rooflights***                        | 2.2                  | 1.81                | 1.81                | HW000009:Surf[1]                         |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | HW000009:Surf[4]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | HW000009:Surf[7]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>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.  
<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K  
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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID   | System type in the Approved Documents                                 |
|--|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |
| NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |   |

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |

### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting |                       | General luminaire | Display light source |                                   |
|---------------------------------------|-----------------------|-------------------|----------------------|-----------------------------------|
| Zone name                             |                       | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
|                                       | <b>Standard value</b> | 95                | 80                   | 0.3                               |
| Circulation Lobby                     |                       | 110               | -                    | -                                 |
| Kitchenette                           |                       | 110               | -                    | -                                 |
| Office Open                           |                       | 110               | -                    | -                                 |
| Reception                             |                       | 110               | 110                  | 1.227                             |
| Staircase                             |                       | 110               | -                    | -                                 |
| Warehouse                             |                       | 95                | -                    | -                                 |
| Warehouse Undercroft                  |                       | 95                | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC Acc                                |                       | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-56.1%)                    | NO                    |
| Reception            | NO (-82.1%)                    | NO                    |
| Warehouse            | NO (-23.9%)                    | NO                    |
| Warehouse Undercroft | NO (-23.6%)                    | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|   |     |
|---|-----|
| <b>Were alternative energy systems considered and analysed as part of the design process?</b> | YES |
| Is evidence of such assessment available as a separate submission?                            | YES |
| Are any such measures included in the proposed design?  | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual | Notional |
|---|--------|----------|
| Floor area [m <sup>2</sup> ]                          | 1140.2 | 1140.2   |
| External area [m <sup>2</sup> ]                       | 3178.1 | 3178.1   |
| Weather   | SWI    | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 5        |
| Average conductance [W/K]                             | 836.71 | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26   | 0        |
| Alpha value* [%]                                      | 25     | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

### % Area Building Type

Retail/Financial and Professional Services  
 Restaurants and Cafes/Drinking Establishments/Takeaways  
 Offices and Workshop Businesses  
 General Industrial and Special Industrial Groups

### 100 Storage or Distribution

Hotels  
 Residential Institutions: Hospitals and Care Homes  
 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/m<sup>2</sup>]

|                | Actual       | Notional     |
|----------------|--------------|--------------|
| Heating        | 3.92         | 3.24         |
| Cooling        | 0.19         | 0.23         |
| Auxiliary      | 0.76         | 1.75         |
| Lighting       | 4.11         | 4.44         |
| Hot water      | 4.37         | 3.92         |
| Equipment*     | 30.96        | 30.96        |
| <b>TOTAL**</b> | <b>13.35</b> | <b>13.58</b> |

\* 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/m<sup>2</sup>]

|                              | Actual     | Notional |
|------------------------------|------------|----------|
| Photovoltaic systems         | 3.7        | 2        |
| Wind turbines                | 0          | 0        |
| CHP generators               | 0          | 0        |
| Solar thermal systems        | 0          | 0        |
| <i>Displaced electricity</i> | <i>3.7</i> | <i>2</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 27.6   | 24.9     |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 15.06  | 17.32    |
| Total emissions [kg/m <sup>2</sup> ]                | 1.46   | 1.64     |



## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 119.8                         | 18.4                          | 9                              | 1.6                            | 6.1                           | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 102.2                         | 19.4                          | 10.2                           | 1.9                            | 14.3                          | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 326.8                         | 0                             | 85.1                           | 0                              | 0.7                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 305.6                         | 0                             | 60.2                           | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
| Cool dem [MJ/m <sup>2</sup> ]  | = Cooling energy demand   |
| Heat con [kWh/m <sup>2</sup> ] | = Heating energy consumption  |
| Cool con [kWh/m <sup>2</sup> ] | = Cooling energy consumption  |
| Aux con [kWh/m <sup>2</sup> ]  | = 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   |

## UNIT 14 – 2021 REGULATIONS EPC

# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
0301-9262-0881-2929-9641

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions

◀ 11 This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1140.147                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.46                      |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 15.06                     |

## Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

50 If typical of the existing stock

## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 2232-9252-4571-5706-0475

## About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at [www.ndepcregister.com](http://www.ndepcregister.com). The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at [www.opendatacommunities.org](http://www.opendatacommunities.org).

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit [www.ndepcregister.com](http://www.ndepcregister.com). To opt out of having information about your building made publicly available, please visit [www.ndepcregister.com/optout](http://www.ndepcregister.com/optout).

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at:

[www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates). It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

## Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

## UNIT 15 – 2021 REGULATIONS BRUKL

Project name

Shell and Core

Plot B - Windrush - Unit 15

As designed

Date: Wed Mar 06 14:05:16 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## 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: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m<sup>2</sup>]: 97.77The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.63                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.46                      |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 17.24                     |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 15.08                     |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|--|
| Walls*                               | 0.26                 | 0.26                | 0.26                | HW000014:Surf[1]                         |
| Floors                               | 0.18                 | 0.18                | 0.18                | RC000000:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | HW000013:Surf[0]                         |
| Windows** and roof windows           | 1.6                  | 1.6                 | 1.6                 | HW000014:Surf[3]                         |
| Rooflights***                        | 2.2                  | 1.81                | 1.81                | HW00000A:Surf[1]                         |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | HW00000A:Surf[4]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | HW00000A:Surf[7]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>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.  
<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K  
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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID   | System type in the Approved Documents                                 |
|--|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |
| NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |   |

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |

### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting<br>Zone name | General luminaire | Display light source |                                   |
|--|-------------------|----------------------|-----------------------------------|
|  | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
| <b>Standard value</b>                              | 95                | 80                   | 0.3                               |
| Circulation Lobby                                  | 110               | -                    | -                                 |
| Kitchenette  | 110               | -                    | -                                 |
| Office Open  | 110               | -                    | -                                 |
| Reception  | 110               | 110                  | 1.227                             |
| Staircase  | 110               | -                    | -                                 |
| Warehouse  | 95                | -                    | -                                 |
| Warehouse Undercroft                               | 95                | -                    | -                                 |
| WC   | 110               | -                    | -                                 |
| WC   | 110               | -                    | -                                 |
| WC Acc   | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-59.6%)                    | NO                    |
| Reception            | NO (-82.1%)                    | NO                    |
| Warehouse            | NO (-17.1%)                    | NO                    |
| Warehouse Undercroft | NO (-36.5%)                    | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|   |     |
|---|-----|
| <b>Were alternative energy systems considered and analysed as part of the design process?</b> | YES |
| Is evidence of such assessment available as a separate submission?                            | YES |
| Are any such measures included in the proposed design?  | YES |



# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual | Notional |
|---|--------|----------|
| Floor area [m <sup>2</sup> ]                          | 1272.4 | 1272.4   |
| External area [m <sup>2</sup> ]                       | 3452.6 | 3452.6   |
| Weather   | SWI    | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 5        |
| Average conductance [W/K]                             | 911.45 | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26   | 0        |
| Alpha value* [%]                                      | 25     | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area     | Building Type   |
|------------|---|
|            | Retail/Financial and Professional Services                      |
|            | Restaurants and Cafes/Drinking Establishments/Takeaways         |
|            | Offices and Workshop Businesses                                 |
|            | General Industrial and Special Industrial Groups                |
| <b>100</b> | <b>Storage or Distribution</b>                                  |
|            | Hotels  |
|            | Residential Institutions: Hospitals and Care Homes              |
|            | 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/m<sup>2</sup>]

|                | Actual    | Notional    |
|----------------|-----------|-------------|
| Heating        | 3.59      | 3.03        |
| Cooling        | 0.19      | 0.24        |
| Auxiliary      | 0.77      | 1.77        |
| Lighting       | 4.07      | 4.43        |
| Hot water      | 4.38      | 3.94        |
| Equipment*     | 31.12     | 31.12       |
| <b>TOTAL**</b> | <b>13</b> | <b>13.4</b> |

\* 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/m<sup>2</sup>]

|                              | Actual      | Notional    |
|------------------------------|-------------|-------------|
| Photovoltaic systems         | 3.32        | 1.87        |
| Wind turbines                | 0           | 0           |
| CHP generators               | 0           | 0           |
| Solar thermal systems        | 0           | 0           |
| <i>Displaced electricity</i> | <i>3.32</i> | <i>1.87</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 26.22  | 23.81    |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 15.08  | 17.24    |
| Total emissions [kg/m <sup>2</sup> ]                | 1.46   | 1.63     |

## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 115.6                         | 17.9                          | 8.7                            | 1.6                            | 6                             | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 98.7                          | 19.4                          | 9.9                            | 1.9                            | 14.1                          | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 327.1                         | 0                             | 85.2                           | 0                              | 0.6                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 309.6                         | 0                             | 61                             | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
| Cool dem [MJ/m <sup>2</sup> ]  | = Cooling energy demand   |
| Heat con [kWh/m <sup>2</sup> ] | = Heating energy consumption  |
| Cool con [kWh/m <sup>2</sup> ] | = Cooling energy consumption  |
| Aux con [kWh/m <sup>2</sup> ]  | = 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   |

## UNIT 15 – 2021 REGULATIONS EPC

# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
2774-7456-3205-9030-7240

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions

◀ 11 This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1272.364                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.46                      |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 15.08                     |

## Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

51 If typical of the existing stock

## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 6413-4485-4455-7978-5851

## About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at [www.ndepcregister.com](http://www.ndepcregister.com). The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at [www.opendatacommunities.org](http://www.opendatacommunities.org).

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There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at:

[www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates). It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

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The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

## UNIT 16 – 2021 REGULATIONS BRUKL

Project name

Shell and Core

Plot B - Windrush - Unit 16

As designed

Date: Wed Mar 06 14:07:10 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## 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: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m<sup>2</sup>]: 106.5The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.63                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.3                       |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 17.2                      |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 13.3                      |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|--|
| Walls*                               | 0.26                 | 0.26                | 0.26                | HW00000F:Surf[1]                         |
| Floors                               | 0.18                 | 0.18                | 0.18                | RC000001:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | HW000010:Surf[0]                         |
| Windows** and roof windows           | 1.6                  | 1.6                 | 1.6                 | HW00000F:Surf[3]                         |
| Rooflights***                        | 2.2                  | 1.81                | 1.81                | HW00000B:Surf[1]                         |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | HW00000B:Surf[4]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | HW00000B:Surf[7]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>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.  
<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K  
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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID   | System type in the Approved Documents                                 |
|--|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |
| NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |   |

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |



### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting |                       | General luminaire | Display light source |                                   |
|---------------------------------------|-----------------------|-------------------|----------------------|-----------------------------------|
| Zone name                             |                       | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
|                                       | <b>Standard value</b> | 95                | 80                   | 0.3                               |
| Circulation Lobby                     |                       | 110               | -                    | -                                 |
| Kitchenette                           |                       | 110               | -                    | -                                 |
| Office Open                           |                       | 110               | -                    | -                                 |
| Reception                             |                       | 110               | 110                  | 1.227                             |
| Staircase                             |                       | 110               | -                    | -                                 |
| Warehouse                             |                       | 95                | -                    | -                                 |
| Warehouse Undercroft                  |                       | 95                | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC Acc                                |                       | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-56.3%)                    | NO                    |
| Reception            | NO (-82.1%)                    | NO                    |
| Warehouse            | NO (-10.3%)                    | NO                    |
| Warehouse Undercroft | NO (-33.2%)                    | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|   |     |
|---|-----|
| <b>Were alternative energy systems considered and analysed as part of the design process?</b> | YES |
| Is evidence of such assessment available as a separate submission?                            | YES |
| Are any such measures included in the proposed design?  | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual | Notional |
|---|--------|----------|
| Floor area [m <sup>2</sup> ]                          | 1376.9 | 1376.9   |
| External area [m <sup>2</sup> ]                       | 3664.1 | 3664.1   |
| Weather   | SWI    | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 5        |
| Average conductance [W/K]                             | 979.75 | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.27   | 0        |
| Alpha value* [%]                                      | 25     | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

### % Area Building Type

Retail/Financial and Professional Services  
Restaurants and Cafes/Drinking Establishments/Takeaways  
Offices and Workshop Businesses  
General Industrial and Special Industrial Groups

### 100 Storage or Distribution

Hotels  
Residential Institutions: Hospitals and Care Homes  
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/m<sup>2</sup>]

|                | Actual       | Notional     |
|----------------|--------------|--------------|
| Heating        | 3.4          | 2.85         |
| Cooling        | 0.21         | 0.24         |
| Auxiliary      | 0.79         | 1.8          |
| Lighting       | 3.99         | 4.45         |
| Hot water      | 4.39         | 3.95         |
| Equipment*     | 31.23        | 31.23        |
| <b>TOTAL**</b> | <b>12.78</b> | <b>13.29</b> |

\* 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/m<sup>2</sup>]

|                              | Actual      | Notional    |
|------------------------------|-------------|-------------|
| Photovoltaic systems         | 4.29        | 1.78        |
| Wind turbines                | 0           | 0           |
| CHP generators               | 0           | 0           |
| Solar thermal systems        | 0           | 0           |
| <i>Displaced electricity</i> | <i>4.29</i> | <i>1.78</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 25.85  | 22.94    |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 13.3   | 17.2     |
| Total emissions [kg/m <sup>2</sup> ]                | 1.3    | 1.63     |

## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 114                           | 19.4                          | 8.5                            | 1.7                            | 6                             | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 95.2                          | 19.7                          | 9.5                            | 1.9                            | 14                            | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 323.1                         | 0                             | 84.1                           | 0                              | 0.6                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 302.9                         | 0                             | 59.7                           | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
| Cool dem [MJ/m <sup>2</sup> ]  | = Cooling energy demand   |
| Heat con [kWh/m <sup>2</sup> ] | = Heating energy consumption  |
| Cool con [kWh/m <sup>2</sup> ] | = Cooling energy consumption  |
| Aux con [kWh/m <sup>2</sup> ]  | = 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   |

## UNIT 16 – 2021 REGULATIONS EPC

# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
4143-1917-0066-1203-8719

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions



This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1376.849                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.3                       |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 13.3                      |

## Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

51 If typical of the existing stock

## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 5370-6766-5852-3259-4258

## About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at [www.ndepcregister.com](http://www.ndepcregister.com). The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at [www.opendatacommunities.org](http://www.opendatacommunities.org).

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit [www.ndepcregister.com](http://www.ndepcregister.com). To opt out of having information about your building made publicly available, please visit [www.ndepcregister.com/optout](http://www.ndepcregister.com/optout).

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at:

[www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates). It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

## Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

## UNIT 17 – 2021 REGULATIONS BRUKL

Project name

Shell and Core

Plot B - Windrush - Unit 17

As designed

Date: Wed Mar 06 14:08:55 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## 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: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m<sup>2</sup>]: 113.24The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.63                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.27                      |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 17.28                     |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 13.02                     |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|--|
| Walls*                               | 0.26                 | 0.26                | 0.26                | HW000019:Surf[1]                         |
| Floors                               | 0.18                 | 0.18                | 0.18                | RC000002:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | HW000018:Surf[0]                         |
| Windows** and roof windows           | 1.6                  | 1.6                 | 1.6                 | HW000019:Surf[3]                         |
| Rooflights***                        | 2.2                  | 1.81                | 1.81                | HW00000C:Surf[1]                         |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | HW00000C:Surf[4]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | HW00000C:Surf[7]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>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.  
<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K  
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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID   | System type in the Approved Documents                                 |
|--|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |
| NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |   |

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |

### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting |                       | General luminaire | Display light source |                                   |
|---------------------------------------|-----------------------|-------------------|----------------------|-----------------------------------|
| Zone name                             |                       | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
|                                       | <b>Standard value</b> | 95                | 80                   | 0.3                               |
| Circulation Lobby                     |                       | 110               | -                    | -                                 |
| Kitchenette                           |                       | 110               | -                    | -                                 |
| Office Open                           |                       | 110               | -                    | -                                 |
| Reception                             |                       | 110               | 110                  | 1.227                             |
| Staircase                             |                       | 110               | -                    | -                                 |
| Warehouse                             |                       | 95                | -                    | -                                 |
| Warehouse Undercroft                  |                       | 95                | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC Acc                                |                       | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-52.8%)                    | NO                    |
| Reception            | NO (-82.1%)                    | NO                    |
| Warehouse            | NO (-24.8%)                    | NO                    |
| Warehouse Undercroft | NO (-33.9%)                    | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|   |     |
|---|-----|
| <b>Were alternative energy systems considered and analysed as part of the design process?</b> | YES |
| Is evidence of such assessment available as a separate submission?                            | YES |
| Are any such measures included in the proposed design?  | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual | Notional |
|---|--------|----------|
| Floor area [m <sup>2</sup> ]                          | 1450.5 | 1450.5   |
| External area [m <sup>2</sup> ]                       | 3809.7 | 3809.7   |
| Weather   | SWI    | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 5        |
| Average conductance [W/K]                             | 995.31 | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26   | 0        |
| Alpha value* [%]                                      | 25     | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area     | Building Type   |
|------------|---|
|            | Retail/Financial and Professional Services                      |
|            | Restaurants and Cafes/Drinking Establishments/Takeaways         |
|            | Offices and Workshop Businesses                                 |
|            | General Industrial and Special Industrial Groups                |
| <b>100</b> | <b>Storage or Distribution</b>                                  |
|            | Hotels  |
|            | Residential Institutions: Hospitals and Care Homes              |
|            | 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/m<sup>2</sup>]

|                | Actual       | Notional     |
|----------------|--------------|--------------|
| Heating        | 3.29         | 2.78         |
| Cooling        | 0.22         | 0.25         |
| Auxiliary      | 0.8          | 1.84         |
| Lighting       | 4.04         | 4.46         |
| Hot water      | 4.4          | 3.96         |
| Equipment*     | 31.32        | 31.32        |
| <b>TOTAL**</b> | <b>12.75</b> | <b>13.28</b> |

\* 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/m<sup>2</sup>]

|                              | Actual      | Notional    |
|------------------------------|-------------|-------------|
| Photovoltaic systems         | 4.46        | 1.72        |
| Wind turbines                | 0           | 0           |
| CHP generators               | 0           | 0           |
| Solar thermal systems        | 0           | 0           |
| <i>Displaced electricity</i> | <i>4.46</i> | <i>1.72</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 25.63  | 22.67    |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 13.02  | 17.28    |
| Total emissions [kg/m <sup>2</sup> ]                | 1.27   | 1.63     |

## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 113.4                         | 19.2                          | 8.5                            | 1.7                            | 6                             | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 93.7                          | 19.6                          | 9.4                            | 1.9                            | 14                            | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 320.1                         | 0                             | 83.3                           | 0                              | 0.7                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 303.2                         | 0                             | 59.7                           | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
| Cool dem [MJ/m <sup>2</sup> ]  | = Cooling energy demand   |
| Heat con [kWh/m <sup>2</sup> ] | = Heating energy consumption  |
| Cool con [kWh/m <sup>2</sup> ] | = Cooling energy consumption  |
| Aux con [kWh/m <sup>2</sup> ]  | = 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   |

## UNIT 17 – 2021 REGULATIONS EPC

# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
0630-5571-9122-1696-3412

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions



This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1450.517                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.27                      |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 13.02                     |

## Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

51 If typical of the existing stock

## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 3587-7862-9319-4214-8374

## About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at [www.ndepcregister.com](http://www.ndepcregister.com). The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at [www.opendatacommunities.org](http://www.opendatacommunities.org).

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit [www.ndepcregister.com](http://www.ndepcregister.com). To opt out of having information about your building made publicly available, please visit [www.ndepcregister.com/optout](http://www.ndepcregister.com/optout).

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at:

[www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates). It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

## Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

## UNIT 18 – 2021 REGULATIONS BRUKL



Project name

Shell and Core

Plot B - Windrush - Unit 18

As designed

Date: Wed Mar 06 14:11:06 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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  
1DWFoundation area [m<sup>2</sup>]: 113.24The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.57                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.18                      |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 16.59                     |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 11.97                     |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|--|
| Walls*                               | 0.26                 | 0.26                | 0.26                | FF000004:Surf[1]                         |
| Floors                               | 0.18                 | 0.18                | 0.18                | RC000003:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | CR000002:Surf[0]                         |
| Windows** and roof windows           | 1.6                  | 1.6                 | 1.6                 | FF000004:Surf[3]                         |
| Rooflights***                        | 2.2                  | 1.81                | 1.81                | WR000009:Surf[3]                         |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | WR000009:Surf[5]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | WR000009:Surf[8]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>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.  
<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K  
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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID   | System type in the Approved Documents                                 |
|--|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |
| NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |   |

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |

### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting |                       | General luminaire | Display light source |                                   |
|---------------------------------------|-----------------------|-------------------|----------------------|-----------------------------------|
| Zone name                             |                       | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
|                                       | <b>Standard value</b> | 95                | 80                   | 0.3                               |
| Circulation Lobby                     |                       | 110               | -                    | -                                 |
| Kitchenette                           |                       | 110               | -                    | -                                 |
| Office Open                           |                       | 110               | -                    | -                                 |
| Reception                             |                       | 110               | 110                  | 1.227                             |
| Staircase                             |                       | 110               | -                    | -                                 |
| Warehouse                             |                       | 95                | -                    | -                                 |
| Warehouse Undercroft                  |                       | 95                | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC Acc                                |                       | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-66.6%)                    | NO                    |
| Reception            | NO (-84.8%)                    | NO                    |
| Warehouse            | NO (-39.8%)                    | NO                    |
| Warehouse Undercroft | NO (-53.3%)                    | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|   |     |
|---|-----|
| <b>Were alternative energy systems considered and analysed as part of the design process?</b> | YES |
| Is evidence of such assessment available as a separate submission?                            | YES |
| Are any such measures included in the proposed design?  | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual | Notional |
|---|--------|----------|
| Floor area [m <sup>2</sup> ]                          | 1719.3 | 1719.3   |
| External area [m <sup>2</sup> ]                       | 4491.5 | 4491.5   |
| Weather   | SWI    | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 5        |
| Average conductance [W/K]                             | 1153   | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26   | 0        |
| Alpha value* [%]                                      | 25     | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area     | Building Type   |
|------------|---|
|            | Retail/Financial and Professional Services                      |
|            | Restaurants and Cafes/Drinking Establishments/Takeaways         |
|            | Offices and Workshop Businesses                                 |
|            | General Industrial and Special Industrial Groups                |
| <b>100</b> | <b>Storage or Distribution</b>                                  |
|            | Hotels  |
|            | Residential Institutions: Hospitals and Care Homes              |
|            | 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/m<sup>2</sup>]

|                | Actual      | Notional     |
|----------------|-------------|--------------|
| Heating        | 3.1         | 2.55         |
| Cooling        | 0.12        | 0.17         |
| Auxiliary      | 0.68        | 1.55         |
| Lighting       | 3.99        | 4.21         |
| Hot water      | 4.41        | 3.97         |
| Equipment*     | 31.1        | 31.1         |
| <b>TOTAL**</b> | <b>12.3</b> | <b>12.44</b> |

\* 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/m<sup>2</sup>]

|                              | Actual     | Notional    |
|------------------------------|------------|-------------|
| Photovoltaic systems         | 4.7        | 1.34        |
| Wind turbines                | 0          | 0           |
| CHP generators               | 0          | 0           |
| Solar thermal systems        | 0          | 0           |
| <i>Displaced electricity</i> | <i>4.7</i> | <i>1.34</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 24.11  | 20.52    |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 11.97  | 16.59    |
| Total emissions [kg/m <sup>2</sup> ]                | 1.18   | 1.57     |

## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 138.6                         | 12.7                          | 10.4                           | 1.1                            | 6                             | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 109.1                         | 15.4                          | 10.9                           | 1.5                            | 14                            | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 340.1                         | 0                             | 88.5                           | 0                              | 0.7                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 310.1                         | 0                             | 61.1                           | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
| Cool dem [MJ/m <sup>2</sup> ]  | = Cooling energy demand   |
| Heat con [kWh/m <sup>2</sup> ] | = Heating energy consumption  |
| Cool con [kWh/m <sup>2</sup> ] | = Cooling energy consumption  |
| Aux con [kWh/m <sup>2</sup> ]  | = 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   |

## UNIT 18 – 2021 REGULATIONS EPC

# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
3064-0302-0050-1632-2738

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions

◀ 10 This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1719.257                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.18                      |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 11.97                     |

## Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

51 If typical of the existing stock

## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 5084-4189-0900-9978-7571

## About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at [www.ndepcregister.com](http://www.ndepcregister.com). The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at [www.opendatacommunities.org](http://www.opendatacommunities.org).

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit [www.ndepcregister.com](http://www.ndepcregister.com). To opt out of having information about your building made publicly available, please visit [www.ndepcregister.com/optout](http://www.ndepcregister.com/optout).

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[www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates). It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

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## UNIT 19 – 2021 REGULATIONS BRUKL

Project name

Shell and Core

Plot B - Windrush - Unit 19

As designed

Date: Wed Mar 06 14:13:46 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## 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: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m<sup>2</sup>]: 79.87The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.55                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.25                      |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 16.37                     |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 12.74                     |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|--|
| Walls*                               | 0.26                 | 0.26                | 0.26                | FF000005:Surf[1]                         |
| Floors                               | 0.18                 | 0.18                | 0.18                | RC000004:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | CR000001:Surf[0]                         |
| Windows** and roof windows           | 1.6                  | 1.6                 | 1.6                 | FF000005:Surf[2]                         |
| Rooflights***                        | 2.2                  | 1.81                | 1.81                | WR000002:Surf[3]                         |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | WR000002:Surf[5]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | WR000002:Surf[7]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]  
U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>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.  
<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K  
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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID   | System type in the Approved Documents                                 |
|--|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |
| NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |   |

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |

### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting |                       | General luminaire | Display light source |                                   |
|---------------------------------------|-----------------------|-------------------|----------------------|-----------------------------------|
| Zone name                             |                       | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
|                                       | <b>Standard value</b> | 95                | 80                   | 0.3                               |
| Circulation Lobby                     |                       | 110               | -                    | -                                 |
| Kitchenette                           |                       | 110               | -                    | -                                 |
| Office Open                           |                       | 110               | -                    | -                                 |
| Reception                             |                       | 110               | 110                  | 1.227                             |
| Staircase                             |                       | 110               | -                    | -                                 |
| Warehouse                             |                       | 95                | -                    | -                                 |
| Warehouse Undercroft                  |                       | 95                | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC Acc                                |                       | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-74.5%)                    | NO                    |
| Reception            | NO (-84.8%)                    | NO                    |
| Warehouse            | NO (-23.6%)                    | NO                    |
| Warehouse Undercroft | NO (-54.6%)                    | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|   |     |
|---|-----|
| <b>Were alternative energy systems considered and analysed as part of the design process?</b> | YES |
| Is evidence of such assessment available as a separate submission?                            | YES |
| Are any such measures included in the proposed design?  | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual | Notional |
|---|--------|----------|
| Floor area [m <sup>2</sup> ]                          | 1282.3 | 1282.3   |
| External area [m <sup>2</sup> ]                       | 3587.8 | 3587.8   |
| Weather   | SWI    | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 5        |
| Average conductance [W/K]                             | 928.9  | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26   | 0        |
| Alpha value* [%]                                      | 25     | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

### % Area Building Type

Retail/Financial and Professional Services  
Restaurants and Cafes/Drinking Establishments/Takeaways  
Offices and Workshop Businesses  
General Industrial and Special Industrial Groups

### 100 Storage or Distribution

Hotels  
Residential Institutions: Hospitals and Care Homes  
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/m<sup>2</sup>]

|                | Actual      | Notional     |
|----------------|-------------|--------------|
| Heating        | 3.67        | 3.01         |
| Cooling        | 0.1         | 0.14         |
| Auxiliary      | 0.6         | 1.35         |
| Lighting       | 3.96        | 4.13         |
| Hot water      | 4.37        | 3.93         |
| Equipment*     | 30.63       | 30.63        |
| <b>TOTAL**</b> | <b>12.7</b> | <b>12.57</b> |

\* 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/m<sup>2</sup>]

|                              | Actual      | Notional    |
|------------------------------|-------------|-------------|
| Photovoltaic systems         | 4.61        | 1.63        |
| Wind turbines                | 0           | 0           |
| CHP generators               | 0           | 0           |
| Solar thermal systems        | 0           | 0           |
| <i>Displaced electricity</i> | <i>4.61</i> | <i>1.63</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 24.98  | 22.55    |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 12.74  | 16.37    |
| Total emissions [kg/m <sup>2</sup> ]                | 1.25   | 1.55     |

## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 143.9                         | 11.7                          | 10.8                           | 1                              | 6.1                           | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 123.7                         | 15.1                          | 12.4                           | 1.5                            | 14                            | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 346.4                         | 0                             | 90.2                           | 0                              | 0.6                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 318.1                         | 0                             | 62.7                           | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
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| 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   |

## UNIT 19 – 2021 REGULATIONS EPC

# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
7558-9420-3921-1359-3979

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions



This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1282.267                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.25                      |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 12.74                     |

## Benchmarks

Buildings similar to this one could have ratings as follows:

12 If newly built

50 If typical of the existing stock



## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 4889-3928-0603-8139-1330

## About this document and the data in it

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To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

## UNIT 20 – 2021 REGULATIONS BRUKL

Project name

Shell and Core

Plot B - Windrush - Unit 20

As designed

Date: Wed Mar 06 14:16:21 2024

## Administrative information

## Building Details

Address: Address 1, Witney, OX28

## Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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  
1DWFoundation area [m<sup>2</sup>]: 112.46The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|   |                           |
|---|---------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 1.49                      |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 1.1                       |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 15.83                     |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 11.25                     |
| 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 <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|---|----------------------|---------------------|---------------------|--|
| Walls*  | 0.26                 | 0.26                | 0.26                | FF000001:Surf[0]                         |
| Floors  | 0.18                 | 0.18                | 0.18                | RC000005:Surf[0]                         |
| Pitched roofs   | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs  | 0.18                 | 0.18                | 0.18                | CR000000:Surf[0]                         |
| Windows** and roof windows  | 1.6                  | 1.6                 | 1.6                 | FF000001:Surf[3]                         |
| Rooflights***   | 2.2                  | 1.81                | 1.81                | WR000001:Surf[3]                         |
| Personnel doors <sup>^</sup>  | 1.6                  | 1.6                 | 1.6                 | WR000001:Surf[5]                         |
| Vehicle access & similar large doors  | 1.3                  | -                   | -                   | No vehicle access doors in building      |
| High usage entrance doors   | 3                    | -                   | -                   | No high usage entrance doors in building |
| U <sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m <sup>2</sup> K)]<br>U <sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m <sup>2</sup> K)]<br>U <sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m <sup>2</sup> K)]<br>* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.<br>** Display windows and similar glazing are excluded from the U-value check.      *** Values for rooflights refer to the horizontal position.<br>^ For fire doors, limiting U-value is 1.8 W/m <sup>2</sup> K<br>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 <sup>3</sup> /(h.m <sup>2</sup> ) 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.

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

### 1- Electric Panel Heaters

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 0.81               | -                  | 0                  | -             | -             |
| <b>Standard value</b>  | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- VRF & MVHR

|  | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|--|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>   | 4                  | 5                  | 0                  | 1.5           | 0.75          |
| <b>Standard value</b>  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | YES           |
| * 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. |                    |                    |                    |               |               |

### 1- Electric DHW Point of use

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|---|
| <b>This building</b>  | 1                        | 0.005                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### Zone-level mechanical ventilation, exhaust, and terminal units

| ID | System type in the Approved Documents                                 |
|----|---|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units   |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units  |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |

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

| Zone name | SFP [W/(l/s)]         |     |     |     |     |   |     |     |     |   | HR efficiency |          |
|-----------|-----------------------|-----|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
|           | ID of system type     | A   | B   | C   | D   | E | F   | G   | H   | I | Zone          | Standard |
|           | <b>Standard value</b> | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 |               |          |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC        |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |
| WC Acc    |                       | -   | -   | 0.4 | -   | - | -   | -   | -   | - | -             | N/A      |

### Shell and core configuration

| Zone              | Assumed shell? |
|-------------------|----------------|
| Circulation Lobby | NO             |
| Kitchenette       | NO             |
| Office Open       | NO             |
| Reception         | NO             |

### Shell and core configuration

| Zone                 | Assumed shell? |
|----------------------|----------------|
| Staircase            | NO             |
| Warehouse            | NO             |
| Warehouse Undercroft | NO             |
| WC                   | NO             |
| WC                   | NO             |
| WC Acc               | NO             |

| General lighting and display lighting |                       | General luminaire | Display light source |                                   |
|---------------------------------------|-----------------------|-------------------|----------------------|-----------------------------------|
| Zone name                             |                       | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m <sup>2</sup> ] |
|                                       | <b>Standard value</b> | 95                | 80                   | 0.3                               |
| Circulation Lobby                     |                       | 110               | -                    | -                                 |
| Kitchenette                           |                       | 110               | -                    | -                                 |
| Office Open                           |                       | 110               | -                    | -                                 |
| Reception                             |                       | 110               | 110                  | 1.227                             |
| Staircase                             |                       | 110               | -                    | -                                 |
| Warehouse                             |                       | 95                | -                    | -                                 |
| Warehouse Undercroft                  |                       | 95                | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC                                    |                       | 110               | -                    | -                                 |
| WC Acc                                |                       | 110               | -                    | -                                 |

**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? |
|----------------------|--------------------------------|-----------------------|
| Kitchenette          | N/A                            | N/A                   |
| Office Open          | NO (-66.5%)                    | NO                    |
| Reception            | NO (-84.8%)                    | NO                    |
| Warehouse            | NO (-12.8%)                    | NO                    |
| Warehouse Undercroft | NO (-56.6%)                    | 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?                     | YES |
| Are any such measures included in the proposed design?                                 | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|   | Actual  | Notional |
|---|---------|----------|
| Floor area [m <sup>2</sup> ]                          | 1940.3  | 1940.3   |
| External area [m <sup>2</sup> ]                       | 5057    | 5057     |
| Weather   | SWI     | SWI      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3       | 5        |
| Average conductance [W/K]                             | 1309.25 | 0        |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26    | 0        |
| Alpha value* [%]                                      | 25      | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

### % Area Building Type

Retail/Financial and Professional Services  
Restaurants and Cafes/Drinking Establishments/Takeaways  
Offices and Workshop Businesses  
General Industrial and Special Industrial Groups

### 100 Storage or Distribution

Hotels  
Residential Institutions: Hospitals and Care Homes  
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/m<sup>2</sup>]

|                | Actual       | Notional     |
|----------------|--------------|--------------|
| Heating        | 2.69         | 2.25         |
| Cooling        | 0.12         | 0.15         |
| Auxiliary      | 0.59         | 1.35         |
| Lighting       | 3.68         | 4.06         |
| Hot water      | 4.42         | 3.97         |
| Equipment*     | 30.94        | 30.94        |
| <b>TOTAL**</b> | <b>11.51</b> | <b>11.79</b> |

\* 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/m<sup>2</sup>]

|                              | Actual      | Notional    |
|------------------------------|-------------|-------------|
| Photovoltaic systems         | 4.35        | 1.19        |
| Wind turbines                | 0           | 0           |
| CHP generators               | 0           | 0           |
| Solar thermal systems        | 0           | 0           |
| <i>Displaced electricity</i> | <i>4.35</i> | <i>1.19</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|   | Actual | Notional |
|---|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 21.13  | 18.15    |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 11.25  | 15.83    |
| Total emissions [kg/m <sup>2</sup> ]                | 1.1    | 1.49     |

## HVAC Systems Performance

| System Type  | Heat dem<br>MJ/m <sup>2</sup> | Cool dem<br>MJ/m <sup>2</sup> | Heat con<br>kWh/m <sup>2</sup> | Cool con<br>kWh/m <sup>2</sup> | Aux con<br>kWh/m <sup>2</sup> | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------|---------------|------------------|------------------|
| <b>[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity</b>   |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 136.6                         | 14.7                          | 10.2                           | 1.3                            | 6                             | 3.71          | 3.18          | 4                | 5                |
| <b>Notional</b>  | 108.9                         | 16.2                          | 10.9                           | 1.6                            | 13.9                          | 2.78          | 2.84          | ----             | ----             |
| <b>[ST] Central heating using air distribution, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity</b> |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 335.1                         | 0                             | 87.2                           | 0                              | 0.6                           | 1.07          | 0             | 0.81             | 0                |
| <b>Notional</b>  | 312                           | 0                             | 61.4                           | 0                              | 0.6                           | 1.41          | 0             | ----             | ----             |
| <b>[ST] No Heating or Cooling</b>  |                               |                               |                                |                                |                               |               |               |                  |                  |
| <b>Actual</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | 0                | 0                |
| <b>Notional</b>  | 0                             | 0                             | 0                              | 0                              | 0                             | 0             | 0             | ----             | ----             |

### Key to terms

|                                |   |
|--------------------------------|---|
| Heat dem [MJ/m <sup>2</sup> ]  | = Heating energy demand   |
| Cool dem [MJ/m <sup>2</sup> ]  | = Cooling energy demand   |
| Heat con [kWh/m <sup>2</sup> ] | = Heating energy consumption  |
| Cool con [kWh/m <sup>2</sup> ] | = Cooling energy consumption  |
| Aux con [kWh/m <sup>2</sup> ]  | = 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   |

## UNIT 20 – 2021 REGULATIONS EPC



# Energy Performance Certificate

Non-Domestic Building



Address 1  
Address 2  
Address 3  
Address 4  
Witney  
OX28

Certificate Reference Number:  
7113-6268-6700-4931-1573

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at [www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates).

## Energy Performance Asset Rating

More energy efficient



Less energy efficient

Net zero CO<sub>2</sub> emissions



This is how energy efficient the building is.

## Technical information

|  |                           |
|--|---------------------------|
| Main heating fuel:   | Grid Supplied Electricity |
| Building environment:  | Air Conditioning          |
| Total useful floor area (m <sup>2</sup> ):                           | 1940.292                  |
| Building complexity:   | Level 5                   |
| Building emission rate (kgCO <sub>2</sub> /m <sup>2</sup> per year): | 1.1                       |
| Primary energy use (kWh <sub>PE</sub> /m <sup>2</sup> per year):     | 11.25                     |

## Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

51 If typical of the existing stock

## Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

|                                  |  |
|----------------------------------|--|
| <b>Assessment Software:</b>      | Virtual Environment v7.0.25 using calculation engine ApacheSim v7.0.25 |
| <b>Property Reference:</b>       | UPRN-000000000000  |
| <b>Assessor Name:</b>            | James Tickle   |
| <b>Assessor Number:</b>          | ABCD123456   |
| <b>Accreditation Scheme:</b>     | Information not available  |
| <b>Assessor Qualifications:</b>  | NOS5   |
| <b>Employer/Trading Name:</b>    | Trading Name   |
| <b>Employer/Trading Address:</b> | Trading Address  |
| <b>Issue Date:</b>               | 06 Mar 2024  |
| <b>Valid Until:</b>              | 05 Mar 2034 (unless superseded by a later certificate)                 |
| <b>Related Party Disclosure:</b> | Not related to the owner   |

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 0138-1938-1090-3589-4660

## About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Information not available. You can obtain contact details of the Accreditation Scheme at Information not available.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at [www.ndepcregister.com](http://www.ndepcregister.com). The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at [www.opendatacommunities.org](http://www.opendatacommunities.org).

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit [www.ndepcregister.com](http://www.ndepcregister.com). To opt out of having information about your building made publicly available, please visit [www.ndepcregister.com/optout](http://www.ndepcregister.com/optout).

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at:

[www.gov.uk/government/collections/energy-performance-certificates](http://www.gov.uk/government/collections/energy-performance-certificates). It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

## Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.