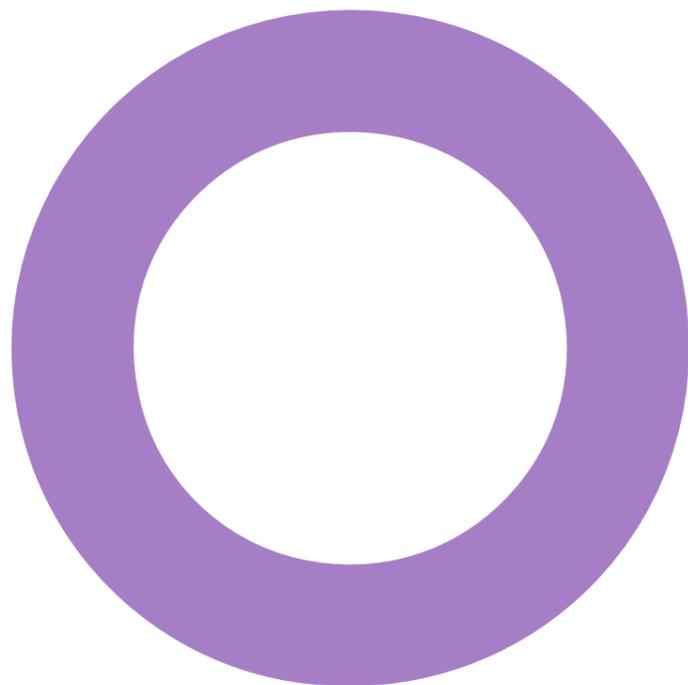


**Manor Farm.
Slough.**
Manor Farm Propco Limited.

SUSTAINABILITY
ENERGY AND SUSTAINABILITY STRATEGY

REVISION P06 – 12 DECEMBER 2024



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
P01	04/11/2024	DRAFT issue for comment	C. Grady	T. Brown	T. Brown
P02	12/11/2024	Updated DRAFT for comment	C. Grady	T. Brown	T. Brown
P03	18/11/2024	Final draft for comment	C. Grady	T. Brown	T. Brown
P04	22/11/2024	For draft	C. Grady	T. Brown	T. Brown
P05	02/12/2024	For submission	T. Brown	G. Jones	G. Jones
P06	12/12/2024	Updated Applicant name for submission	T. Brown	G. Jones	G. Jones

This document has been prepared for Manor Farm Propco Limited only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 56/25724

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Executive summary.

The following provides a summary of the energy and sustainability strategy developed for Manor Farm Propco Limited (hereafter known as ‘the applicant’) for the proposed new development in Slough, known as Manor Farm.

Development description.

Demolition of existing buildings and the redevelopment to comprise a Data Centre (Use Class B8) and Battery Energy Storage System (BESS) with ancillary sub station, welfare and guard buildings, offices, associated plant, emergency backup generators and associated fuel storage, landscaping, sustainable drainage systems, car and cycle parking, and new and amended vehicular and emergency access from Poyle Road.

Key drivers.

Local and regional planning policy

A policy review has been undertaken and is summarised at a high level in Section 2.0. Under each section of the sustainability strategy the relevant policy is summarised.

National drivers - Approved Document Part L of the Building Regulations.

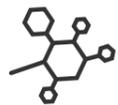
Part L of the Building Regulations is the mechanism by which government is driving reductions in the regulated CO₂ emissions from new buildings. The assessment of the Proposed Development against policy targets has been carried out using Building Regulations Part L 2021 methodology.

Sustainability strategy summary.

The Proposed Development’s design is based on sustainable design and construction principles as informed by planning requirements and industry best practice. The table below provides a summary of the sustainable measures to be implemented.

Table 1: Sustainable measures to be implemented at the Proposed Development.

Theme	Measures to be implemented
	<p>Energy and Carbon Reduction</p> <ul style="list-style-type: none"> - A BREEAM ‘Excellent’ rating is being targeted for by the Proposed Development. - The design will include high standards of energy efficiency and include low/zero carbon technologies including a high efficiency heat pumps and PV array. - Overall, a 16.7% reduction in CO₂ emissions will be achieved beyond the Building Regulations Part L2 2021 baseline.
	<p>Drainage</p> <ul style="list-style-type: none"> - The Proposed Development sits within Flood Zone 1. - A Flood Risk Assessment has been completed confirming the Proposed Development can be considered as ‘low risk’ for surface water flooding, and ‘very low risk’ of reservoir failure. - Sustainable drainage systems have been incorporated and these include permeable paving, rain gardens and detention basins.

Theme	Measures to be implemented
	<p>Water</p> <ul style="list-style-type: none"> - All water systems will be designed in compliance with relevant Code of Practice and industry/sector best practice guidance. - The Proposed Development will install low water consumption sanitary fittings which comply with BREEAM standards. - Water meter with a pulsed output to enable connection to a ‘Building Management System’ (BMS) for the monitoring of water consumption will be installed. - A mains water leak detection system will be installed, where feasible, to reduce the volume of potable water which may be lost due to leaking sub-surface pipework.
	<p>Waste</p> <ul style="list-style-type: none"> - A refuse store will be provided on the ground floor of the office to ensure ease of transport operational waste. Separate bins will be provided to allow for both municipal and recyclable waste to be separated. - A ‘Site Waste Management Plan’ will be produced for the Proposed Development for each phase of construction to define measures for how to minimise the volume of waste arising from demolition and construction activities, which is sent to landfill. The plan will include targets for minimising waste per 100m² and for diverting waste from landfill.
	<p>Materials</p> <ul style="list-style-type: none"> - Façade specification will be developed to contribute to local character of the area. - Materials will be specified to be durable, responsibly sourced, have environmental product declarations and locally manufactured where feasible to reduce the embodied carbon of the Proposed Development. - A Sustainable Procurement Plan will be adopted and inform the building specification and Contractors procurement strategy.
	<p>Green infrastructure and ecology</p> <ul style="list-style-type: none"> - An Ecological Assessment and Mitigation Strategy will be completed which features enhancement recommendations for wildlife. - The development layout will be designed to retain, protect and enhance the most valuable ecological features, namely the boundary hedgerows and wet ditch. - Overall, the development is expecting to achieve a minimum Biodiversity Net Gain of 50%.
	<p>Travel</p> <ul style="list-style-type: none"> - The site can be accessed via sustainable modes of transport, including walking, cycling, and bus. - 86 car parking spaces will be provided, of which 17 spaces (~20% of spaces) will be ‘EV ready’. - Cycle storage with 37 spaces will be provided in secure and sheltered storage. Suitable shower, changing and storage facilities will also be provided. - BREEAM credit ‘Tra 05: Travel plan’ will be adhered to.
	<p>Health and wellbeing and pollution control</p> <ul style="list-style-type: none"> - The design has ensured that the occupants will not be subject to excessive noise, high temperatures flickering lights. - BREEAM credit ‘Hea 08: Indoor Air Quality’ will be adhered to. - The principal contractor is required to align to the Outline Environmental Construction Management Plan (OECMP) to manage and mitigate pollution impacts. - The Proposed Development has followed an approach to fenestration (for the supporting accommodation) which balances the need for passive solar heating and daylighting whilst having regard to the potential implications for overheating.

Theme	Measures to be implemented
	<ul style="list-style-type: none"> All lighting is to be highly efficient and controlled appropriately. External lighting will be selected to reduce light spill and provide natural surveillance to maintain site security. The all-electric strategy means local air quality is not impacted by the new development and reduces the building user's exposure to harmful air pollution.
	<p>Noise</p> <ul style="list-style-type: none"> The Proposed Development will meet the standards for acoustic design and achieve the associated and targeted BREEAM criteria. The design and specification of equipment will be selected to adhere to the sustainable environmental noise limits determined. A noise survey has been undertaken by a suitably qualified acoustician. It has been determined that the noise effects of the Proposed Development will generally be localised and the impact on receptors negligible.
	<p>Community</p> <ul style="list-style-type: none"> The principal contractor will be required to sign up to the Considerate Constructors Scheme and achieve a best practice score. The principal contractor is required to align to the Outline Environmental Construction Management Plan (OECMP) to manage and mitigate pollution impacts. The principal contractor will also be required to implement responsible construction management techniques and contribute to achieving a BREEAM 'Excellent'. A robust security strategy has been developed for the Site and includes a combination of management and mitigation measures to ensure security is maintained. This comes in the form of access control and movement measures, surveillance and physical protection measures. Public consultation has been undertaken through a public exhibition and flyers showing the proposals. Further consultation will be undertaken once planning approval is granted. The Data Centre will support the digital economy and provide jobs which are easily commutable due to multiple public transport links surrounding the Site.

Energy strategy summary.

The Energy Strategy sets out the proposed approach to reducing regulated carbon dioxide (CO₂) emissions and optimising energy performance of the development. The Energy Strategy has been developed using a 'fabric first' approach and follows the 'Be Lean', 'Be Clean', 'Be Green', 'Be Seen' energy hierarchy.



Figure 1: Energy hierarchy

Building Regulation Compliance Overview - Part L 2021.

Overall, it is anticipated that the Proposed Development, with the inclusion of passive measures, efficient fabric and building services systems, supplemented with roof top PV array, will achieve a reduction in CO₂ emissions beyond the Part L 2021 baseline.

Energy Hierarchy

Table 2: Energy summary for proposed detailed development.

Manor Farm	
Be Lean	A fabric first approach and energy efficient building services will be utilised to reduce carbon emissions and energy demand through best practice passive design measures. This includes a targeted low fabric air permeability and improvement on fabric U-values beyond notional building and minimum standards.
Be Clean	An on site heat network or connection to an external heat network is not proposed.
Be Green	On site solar photovoltaics array will be provided and located on the supporting accommodation roof space. In addition, heating and cooling for the accommodation will be provided by variable refrigerant flow system.
Summary	Inclusive of the passive design, energy efficiency measures, alongside the variable refrigerant flow system and rooftop solar photovoltaics a 16.7% reduction in emissions on Part L 2021 is expected to be achieved.

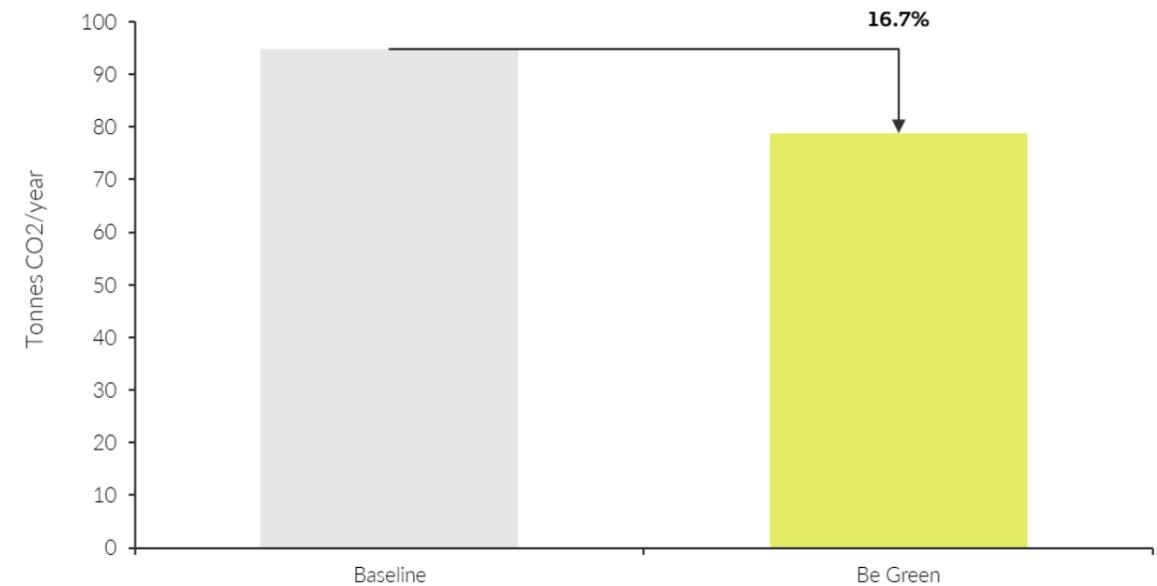


Figure 2: Percentage reduction in CO₂ emissions over Part L 2021 for the data hall supporting accommodation.

1. Introduction.

1.1 Site description and location.

Hoare Lea have been commissioned by Manor Farm Propco Limited (hereafter known as 'the applicant') to support on the design development of the proposed new data centre, known as Manor Farm. The Site is predominantly located in the Borough of Slough, to the west of Heathrow Airport outside of the M25. The westernmost extent of the Site encroaches into the RBWM. The Site extends to circa 70 acres in total, and is comprised of Green Belt land.

Figure 3 is a copy of the site layout and red line boundary.

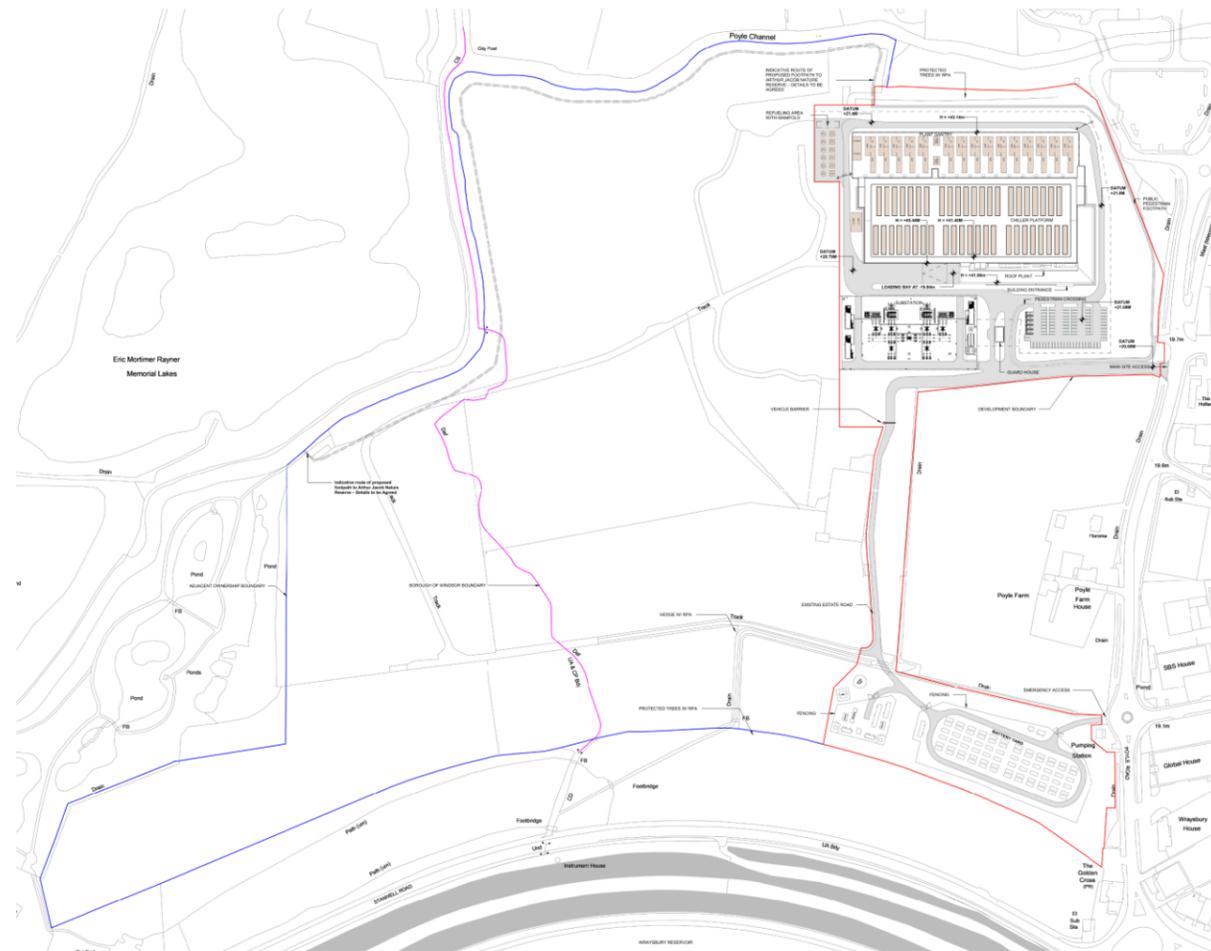


Figure 3: Location of Site (Source: Corgan – Masterplan Co-ordinated with Civil and Traffic P01)

1.2 Approach to energy.

The Energy Strategy sets out the proposed approach to reducing regulated carbon dioxide (CO₂) emissions and optimising energy performance of the development. The strategy summarises the pertinent regulatory and planning policies applicable to the Proposed development, and sets targets commensurate with these policies, which the Proposed Development will seek to achieve. The Energy Strategy has been developed using a 'fabric first' approach and follows the 'Be Lean', 'Be Clean', 'Be Green', 'Be Seen' energy hierarchy.



Figure 4: Energy hierarchy

Based on correspondence with the Chartered Institute of Building Services Engineers (CIBSE), closed air systems only serve process cooling and offer no benefit to occupiers. Therefore, it has been suggested that all spaces served by these systems can alternatively be modelled as an unheated/conditioned space. This therefore applies to the data hall and as such, the office supporting accommodation has been assessed for Part L 2021 compliance and the reported carbon performance in this strategy is based of these areas only.

1.3 Definitions and limitations.

Definitions:

The following definitions should be understood throughout this statement:

- **Energy demand:** The 'room-side' amount of energy which must be input to a space to achieve comfortable conditions. In the context of space heating, this is the amount of heat which is emitted by a radiator, or other heat delivery mechanism.
- **Energy requirement:** The 'system-side' requirement for energy (fuel). In the context of a space heating system, this is the amount of energy used of whichever fuel is appropriate (e.g., gas or electricity) to generate useful heat (i.e., the energy demand).
- **Regulated CO₂ emissions:** The CO₂ emissions emitted as a result of the energy consumption associated with regulated sources (those controlled by Part L of the Building Regulations) of whichever fuel type is appropriate.

Limitations:

The appraisals within this statement are based on Part L calculation methodology and should not be understood as a predictive assessment of likely future energy requirements or otherwise. Occupants may operate their systems differently, and / or the weather and external environment may be different from the assumptions made by Part L approved calculation methods leading to differing energy consumption than those experienced in reality.

2. Key drivers.

As a summary, the national planning policy applicable to the Proposed Development are outlined within this section.

2.1.1 Building Regulations Part L (2021)

Part L of the Building Regulations is the mechanism by which government is driving reductions in the regulated CO₂ emissions from new buildings relating to the conservation of fuel and power in buildings.

All new buildings must now meet the requirements of Part L (2021) unless captured by the traditional arrangements associated with the ability to use older versions of the regulations. All new non-domestic buildings must meet the requirements of Part L2 (Non-Domestic).

Schedule 1: Conservation of Fuel and Power.

Schedule 1 of the Building Regulations Part L (applicable to be domestic and non-domestic development) states that reasonable provisions shall be made for the conservation of fuel and power in building by:

Limiting heat gains and losses:

- through thermal elements and other parts of the building fabric; and
- from pipes, ducts and vessels used for space heating, space cooling and hot water services.

Providing fixed building services which:

- are energy efficient;
- have effective heat controls; and
- are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.

Demonstrating compliance – Part L2.

To demonstrate compliance with Part L, Volume 2, there are a number of regulations which must be met. Regulation 25 through to 26C detail the required energy performance of the new building.

Table 3: Part L2 Criteria

Regulation 25	Minimum energy performance requirements for new buildings These requirements are in the form of a target primary energy rate and a target emission rate.
Regulation 25B	Nearly zero-energy requirements for new buildings Where a building is erected, it must be a nearly zero-energy building
Regulation 26	CO₂ Emission rates for new buildings Where a building is erected, it shall not exceed the target CO ₂ emission rate (TER) for the building
Regulation 26C	Target Primary Energy rates for new buildings Where a building is erected, it must exceed the target primary energy rate (TPER) for the building

2.1.2 National Planning Policy Framework.



The updated National Planning Policy Framework (NPPF) was published in December 2023 and has superseded all Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) documents, with the exception of PPS10 (Waste). The NPPF sets out the Government's strategy on the delivery of sustainable development.

The NPPF places responsibility for policy making with the Local Planning Authority, who shall communicate their policies through Local Plans and facilitate the creation of Neighbourhood Plans. The NPPF states that there is a presumption in favour of sustainable development.

The following is extracted from paragraph 11 of the NPPF:

"Plans and decisions should apply a presumption in favour of sustainable development.

For decision-taking this means:

- a) *approving development proposals that accord with an up-to-date development plan without delay; or*
- b) *where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date⁷, granting permission unless:*
 - i. *the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed⁶; or*
 - ii. *any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."*

In respect of energy policy contained within the NPPF, paragraph 155 sets out that:

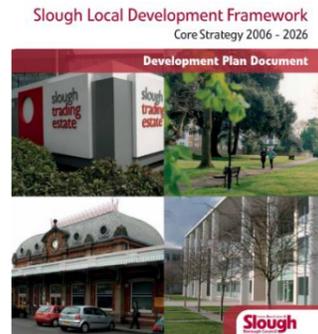
"To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) *provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*
- b) *consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*
- c) *identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."*

2.2 Relevant regional, local and site-specific policies.

As a summary of regional, local and site-specific planning policy documents applicable to the proposed development have been identified and include the below listed:

2.2.1 Slough Local Development Framework: Core Strategy 2006-2026



The Slough Local Development Framework Core Strategy outlines the policies and guidance to govern the spatial planning of Slough. It sets out the key issues to address and how they will be achieved particularly when addressing social, economic, and environmental issues for development across the Borough. Chapter 8 of the framework details a Sustainability Appraisal, which aims to promote sustainable development through better integration of sustainability considerations in the preparation and adoption of plans.

As a summary, planning policy applicable to the Proposed Development includes the following relevant targets related to energy and sustainability:

Table 4: High level policy summary for energy and sustainability policy relevant to the Proposed Development.

Slough Borough Council – Core strategy 2006-26 & Saved policies March 2004
<ul style="list-style-type: none"> - Building Regulations Part L 2021 - No loss of open space and maintain existing Green Belt. - Ensure new development is sustainable and located in accessible locations, reducing need for travel and the creation of congestion. - Minimise consumption and unnecessary use of energy - Recycle waste - Generate energy from renewable sources - Reduce water consumption - Incorporate sustainable construction techniques (recycled and energy efficient materials) - Respect location, provide public space, amenity space and landscaping. - Manage surface water arising from the site sustainably. - Protect and enhance water environment and its margins. - Design out crime through layout of the development, natural surveillance etc - BREEAM “Very Good” or “Excellent” (non domestic spaces) - Development will only be permitted where it can be demonstrated that there is minimal risk of flooding to the property and there is appropriate infrastructure. - Enhance and preserve natural habitats and the biodiversity of the Borough. - Development shall not give rise to unacceptable levels of noise, air and light pollution. - Relevant planning applications will have to be accompanied by light, noise pollution and odour studies. - Development not permitted where there is an increase in demand for off-site infrastructure. - Detailed landscaping plan is required. - Suitable on site cycle parking facilities and cycling access through the Site. - 10% Biodiversity net gain (Environment Bill)

2.3 Slough Borough Council – Climate change strategy & action plan.

- The Climate Change Strategy and Action Plan is a draft document which sets out how the borough can address sources of carbon emissions.
- Around 58% of emissions come from buildings, therefore the aim of the plan is to reduce emissions in Slough by 12.7% per year to achieve Paris Agreement pathway (only 1% per year 2005-2017).
- Data centre specific actions:
 - Data centre cooling software ‘Ekko Sense’
 - Implement strict energy efficiency standards
 - Utilise waste heat from data centres / heat network opportunities
 - Annual reporting on Power Utilisation Effectiveness
 - Re-use of data centre equipment
 - Green energy procurement

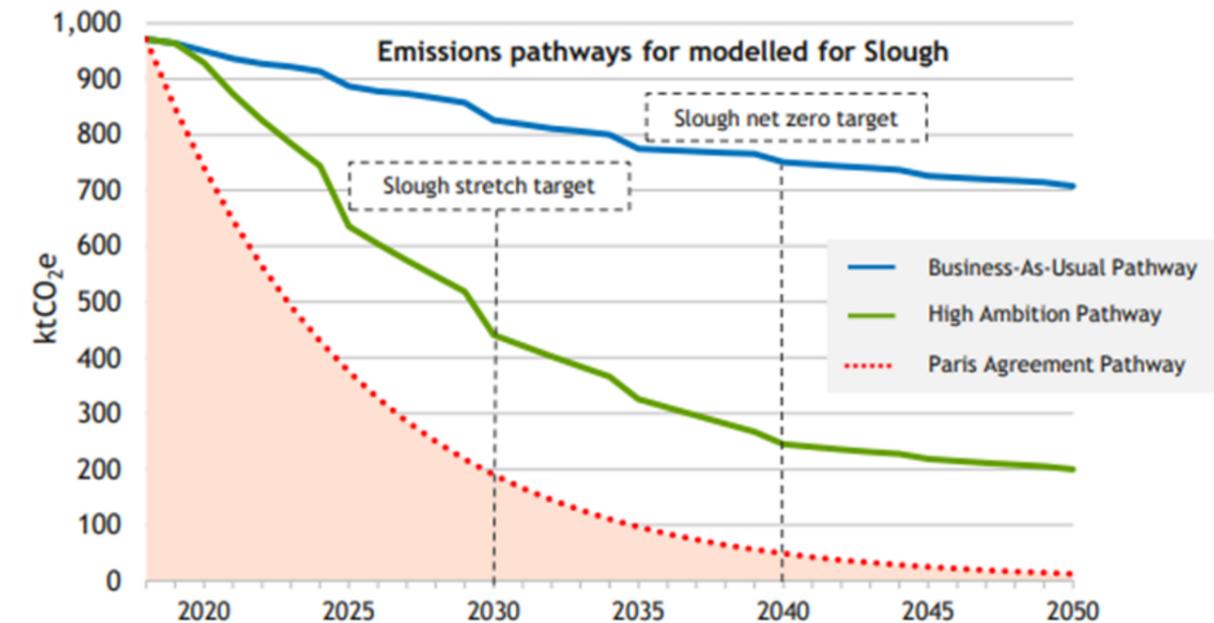


Figure 5: Slough Emissions Pathways (Source: Slough Borough Council – Climate Change Strategy & Action Plan)

3. Sustainability strategy.

3.1 Energy and carbon reduction.

The following sections detail the passive design and energy efficiency measures that have been considered, and those that will be implemented at the Proposed Development.

3.1.1 Slough Borough Council policy summary.

Table 5 provides a summary of local policy requirements relating energy and carbon reduction.

Table 5: Slough Borough Council energy and carbon reduction planning policy.

Policy Reference	Target
CORE POLICY 8 (SUSTAINABILITY AND THE ENVIRONMENT)	<ul style="list-style-type: none"> All development should, where feasible, include measures to: <ul style="list-style-type: none"> Minimise the consumption and unnecessary use of energy, particularly from non renewable sources. Generate energy from renewable resources. Incorporate sustainable design and construction techniques, including the use of recycled and energy efficient building materials.
Policy 7.144	<ul style="list-style-type: none"> The Core Strategy has taken account of emerging Government policy on climate change and the aim of achieving zero carbon development. New development should be constructed in such a manner to minimise its impact on the environment both in the short and longer term. This will involve using sustainable design and construction techniques, minimising consumption and waste and incorporating renewable energy technology within development.
Policy 7.157	<ul style="list-style-type: none"> All major developments will be expected to demonstrate that they have explored the feasibility of a range of renewable energy and low carbon technologies including combined heat and power and shared renewable energy plant either within the site or adjacent to it.
Policy 7.158	<ul style="list-style-type: none"> Where appropriate, developers will be required to submit energy assessments with planning applications

3.1.2 Proposed Development response

The Energy Strategy (see Section 4) has been developed using a 'fabric first' approach and follows the 'Be Lean', 'Be Clean', 'Be Green', 'Be Seen' energy hierarchy. It sets out the proposed approach to reducing regulated carbon dioxide (CO₂) emissions and optimising energy performance of the development. The strategy summarises the pertinent regulatory and planning policies applicable to the Proposed development, and sets targets commensurate with these policies, which the Proposed Development will seek to achieve. This includes targeting Part L2 2021 compliance.

Table 6 provides a summary of the energy strategy for the Proposed Development.

Table 6: Energy strategy summary.

	Manor Farm
Be Lean	A fabric first approach and energy efficient building services will be utilised to reduce carbon emissions and energy demand through best practice passive design measures. This includes a targeted low fabric air permeability and improvement on fabric U-values beyond notional building and minimum standards.
Be Clean	An on site heat network or connection to an external heat network is not proposed.
Be Green	On site solar photovoltaics array will be provided and located on the supporting accommodation roof space. In addition, heating and cooling for the accommodation will be provided by variable refrigerant flow system.
Summary	Inclusive of the passive design, energy efficiency measures, alongside the variable refrigerant flow system and rooftop solar photovoltaics a 16.7% reduction in emissions on Part L 2021 is expected to be achieved.

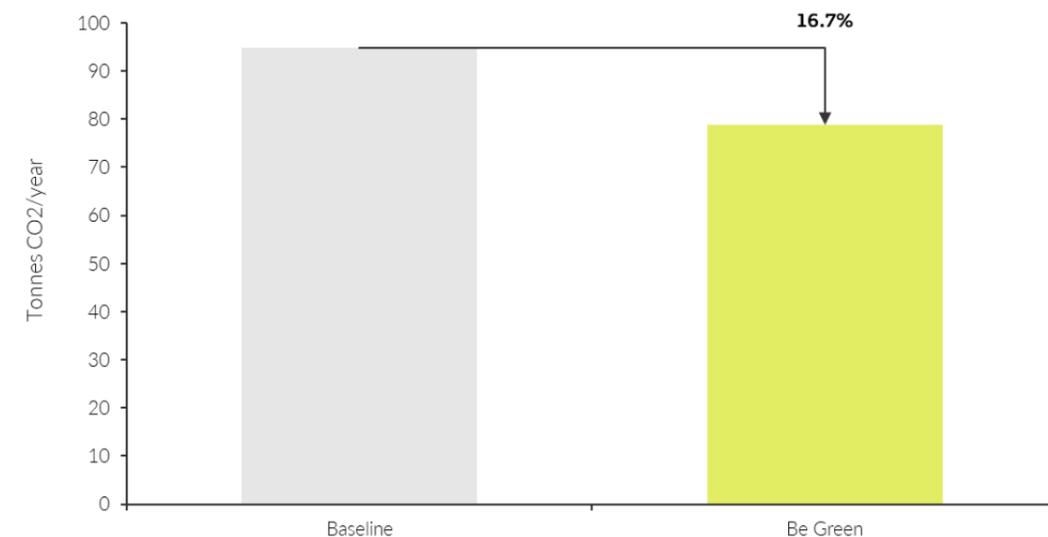


Figure 6: Sitewide regulated carbon reduction: Baseline vs Be Green.

BREEAM targets

In line with BREEAM, the Proposed Development is implementing several measures to contribute towards energy and carbon reduction. These measures include but are not limited to; adopting a PUE of less than 1.30, using Low Zero Carbon technology including photovoltaics, and installing energy efficient lifts. This will support in achieving the following credits and contribute to the overall BREEAM Excellent score:

- Ene 01 – Reduction of CO₂ emissions
- Ene 02 – Sub-metering of Substantial Energy Uses
- Ene 04 – External Lighting
- Ene 05 – Low or Zero Carbon Technologies
- Ene 08 – Lifts

3.2 Water and drainage.

Water is in increasingly short supply; a problem that is set only to exacerbate as a consequence of climate change, with concerns that we will not have enough water to supply our needs within 25 years if drastic action is not taken to reduce water consumption. Even today, being water efficient is key to minimising the Proposed Development’s footprint holistically.

The following sections detail the sustainability measures that have been considered, and those that will be implemented at the Proposed Development.

3.2.1 Slough Borough Council policy summary.

Table 7 provides a summary of local policy requirements relating water and drainage.

Table 7: Slough Borough Council water and drainage planning policy.

Policy Reference	Target
CORE POLICY 8 (SUSTAINABILITY AND THE ENVIRONMENT)	<ul style="list-style-type: none"> - New development should incorporate measures to reduce water consumption. - Development will only be permitted where it is safe and it can be demonstrated that there is minimal risk of flooding to the property and it will not impede the flow of floodwaters, increase the risk of flooding elsewhere or reduce the capacity of a floodplain. - Development must manage surface water arising from the site in a sustainable manner which will also reduce the risk of flooding and improve water quality.
CORE POLICY 9 (NATURAL AND BUILT ENVIRONMENT)	<ul style="list-style-type: none"> - Development will not be permitted unless it Protects and enhances the water environment and its margins.
CORE POLICY 10 (INFRASTRUCTURE)	<ul style="list-style-type: none"> - Development will only be allowed where there is sufficient existing, planned or committed infrastructure, including water, sewage and drainage utilities.
Policy 7.155	<ul style="list-style-type: none"> - New development should incorporate measures to manage surface water arising from the site. - Sustainable drainage systems should be used to attenuate surface water run-off and to minimise the risk of future sewer flooding where this is practical in terms of ground water levels, geology and land quality.
Policy 7.162	<ul style="list-style-type: none"> - Innovative solutions such as green and brown vegetated roofs will be promoted to address this issue and provide sustainable drainage systems, particularly in higher density development.
Policy 7.185	<ul style="list-style-type: none"> - Where Sustainable Drainage Systems (SUDS) are provided in accordance with Core Policy 8, developers will be expected to pay for the ongoing maintenance of this infrastructure.

3.2.2 Proposed Development response – flood risk and drainage

A Flood Risk assessment has been carried out by the drainage consultants. The likelihood of flooding has been determined for all flood sources. The following levels of flood risk (Table 8) have been identified for the project and proposed mitigation will be implemented.

The quantification of flood risk and proposed drainage measures include for a 40% allowance for climate change. It is proposed that the discharge rate from the Site will be limited to the greenfield rate, which will provide a significant reduction in run off to the public sewer system.

Table 8: Flood risk from sources and proposed mitigation (adapted from Price and Myers FRA/drainage report).

Flood source	Risk	Mitigation
Watercourses / tidal	Very low	- Proposed finished floor levels set above the 1 in 1000-year flood level.
Groundwater	-	<ul style="list-style-type: none"> - No basement or related lower ground floor levels. - Proposed site levels will be maintained or raised, excluding the proposed detention basins. - SUDs will be lined to prevent groundwater ingress and a new surface water drainage system will intercept and store run-off, reducing ground saturation.
Surface water and overland flows	-	- SUDs proposed to reduce peak run-off rates from site receiving sewers.
Reservoirs	Very low	- Whilst reservoir failure is considered very low, occupants should seek refuge on upper levels and wait for advice.
Sewers	-	- SUDs proposed to reduce peak run-off rates from site to receiving Thames Water infrastructure

Sustainable Urban drainage

As noted in the table above, there will be a number of Sustainable Urban Drainage (SUDs) systems implemented at the Proposed Development. The possibility of implementing SUDs was assessed using a hierarchy of preferred surface water management methods:



- **Permeable paving** – will provide attenuation storage and water quality benefits. It is to be maximised throughout the Site and provided in car parking areas, substation access road and within Parcel C.
- **Rain gardens** – these are proposed on the eastern and western elevations of the data centre. The rain gardens will provide attenuation and remove pollutants from water runoff.
- **Detention basins** – two detention basins are proposed in Parcel A and provide attenuation storage for storm events up to the 1 in 100-year storm, plus 40% allowance for Climate Change.

A comprehensive SUDs water maintenance strategy will also be implemented to ensure efficient operability throughout the lifetime of the Proposed Development. Please refer to the drainage strategy for further information.

BREEAM targets

The Proposed Development is targeting a BREEAM Excellent rating. The flood risk assessment will contribute to achieving this rating and the following credits are targeted. This is subject to ongoing review as the design progresses:

- Pol 05 – Flood Risk
- Pol 06 – Minimising Water Course Pollution.

3.2.3 Proposed Development response – water consumption



Low flow rate fittings will be explored to minimise water demand and enhance water efficiency measures within the building. The building services engineering design and architectural fit out specification will incorporate low flow rate and reduced capacity fittings. The exact nature of the water performance levels of the fittings will be specified and explored during the next design stages.

BREEAM targets

The following measures are to be adopted in line with the BREEAM assessment for the project. This includes targeting a reduction in water consumption through water efficient fixtures, fittings and controls, monitoring of consumption and water leaks to minimise losses. This will support in achieving the following credits and contribute to the overall BREEAM Excellent score:

- Wat 01 – Water Consumption
- Wat 02 – Water meter
- Wat 03 - Major Leak Detection
- Wat 04 - Sanitary Supply Shut Off

3.3 Waste and materials.

The Proposed Development will reduce the amount (volume and mass) of waste sent to landfill during construction and throughout the lifetime of the buildings, by effective management and with regard to the waste management hierarchy.

3.3.1 Slough Borough Council policy summary.

Table 9 provides a summary of local policy requirements relating waste and materials.

Table 9: Slough Borough Council waste and materials policy.

Policy Reference	Target
CORE POLICY 8 (SUSTAINABILITY AND THE ENVIRONMENT)	<ul style="list-style-type: none"> - All development in the Borough shall be sustainable, of a high quality design, improve the quality of the environment and address the impact of climate change. - All development should, where feasible, include measures to reduce waste and incorporate sustainable design and construction techniques, including the use of recycled and energy efficient building materials.
Policy 7.144	<ul style="list-style-type: none"> - Using sustainable design and consumption techniques, new developments should be constructed to minimise consumption and waste.

3.3.2 Proposed Development response



Materials

Materials which demonstrate robust environmental credentials and low impact will be considered and encouraged where possible. This could include consideration of the resilience and robustness over their lifetime, including in a changing, more extreme climate. The ability to reuse and recycle materials at the end of their life will also be considered when specifying materials.

Procurement of materials used in construction will follow a Sustainable Procurement Plan, which could help to ensure materials are responsibly sourced where feasible to do so. Procurement of materials with environmental product declarations will also be considered and implemented where feasible to do so. Additionally, opportunities will be explored to source materials locally, reducing the emissions associated with transport materials to Site, whilst also supporting businesses in the local area.



Construction waste management

The Principal Contractor will be required to develop and implement a Site Waste Management Plan (SWMP). This will include targets for monitoring site waste, diverting waste from landfill and ensuring waste per m² of floor has been minimised. For example, for BREEAM, the Proposed Development is targeting waste arisings of 4.7-6.5 tonnes per 100m² of GIA. This is subject to review at future design stages.

A Construction Environmental Management Plan (CEMP) has been developed for the Proposed Development and is provided as part of this planning application.



Operational waste

Space provision has been allowed for an operational waste store as part of the proposed data centre. This will be sized to cater for a combination of recyclable waste streams and general waste.

BREEAM targets

The approach to the procurement of materials and management of waste will support in achieving the following credits and contribute to the overall BREEAM Excellent score:

- Wst 01 – Construction waste management
- Wst 03 – Recyclable Waste Storage
- Mat 01 - Life Cycle Impacts
- Mat 02 - Hard Landscaping and Boundary Protection
- Mat 05 - Responsible Sourcing of Structure
- Mat 06 – Insulation
- Mat 07 - Designing for Robustness

3.4 Green infrastructure and ecology.

Green space and infrastructure provide health and wellbeing benefits, but it is also important for increasing biodiversity and climate change mitigation. The following sections detail the sustainability measures that have been considered, and those that will be implemented at the Proposed Development.

3.4.1 Slough Borough Council policy summary.

Table 10 provides a summary of local policy requirements relating Green infrastructure and ecology.

Table 10: Slough Borough Council Green infrastructure and ecology planning policy.

Policy Reference	Target
CORE POLICY 9 (NATURAL AND BUILT ENVIRONMENT)	<ul style="list-style-type: none"> - Development will not be permitted unless it enhances and preserves natural habitats and the biodiversity of the Borough, including corridors between biodiversity rich features.
Policy 7.162	<ul style="list-style-type: none"> - Innovative solutions such as green and brown vegetated roofs will be promoted to address this issue and provide sustainable drainage systems, particularly in higher density development.
Policy 7.172	<ul style="list-style-type: none"> - Slough does not have any nature conservation sites of international or national significance. It does, however have two statutory Local Nature Reserves and a number of Wildlife Heritage Sites, which have been identified as being of local importance using the criteria established by the Berkshire Nature Conservation forum. - In addition to being important for wildlife and biodiversity, these, and other green areas have significant visual amenity and provide educational and leisure opportunities for local residents.
Policy 7.39	<ul style="list-style-type: none"> - New development will be expected to contribute to the provision of, or improvements to, the quality and accessibility of open spaces, playing fields, play areas, allotments and green spaces in accordance with the provisions of Planning Policy Guidance Note 17 - Planning for Open Space, Sport and Recreation (PPG17) and Core Strategy Policy 5 - Infrastructure.

3.4.2 Proposed Development response

Ecological surveys have been undertaken for the Proposed Development. This has been undertaken to establish the existing habitats on Site and to inform the design response to limit ecological impacts and maximise change in ecological value.

Existing ecological baseline

The existing ecological condition of the Site can be summarised as follows.



- As a former landfill site, Parcel A includes little vegetation comprising limited areas of scrub, poplars and hedgerows.
- There are no water bodies.
- There are no heritage assets within the boundary.

Proposed ecological and landscape response

Despite the expected loss of 11 trees, there is an opportunity for 50% increase in Biodiversity Net Gain, where existing hedgerows and wet ditches will be maintained in addition to planting over 76 urban trees.

Mitigation strategies will be implemented during construction and operational phases to minimize potential adverse effects. Retained and newly created habitats will enhance opportunities for wildlife, supporting an overall increase in biodiversity value and improving ecological connectivity.

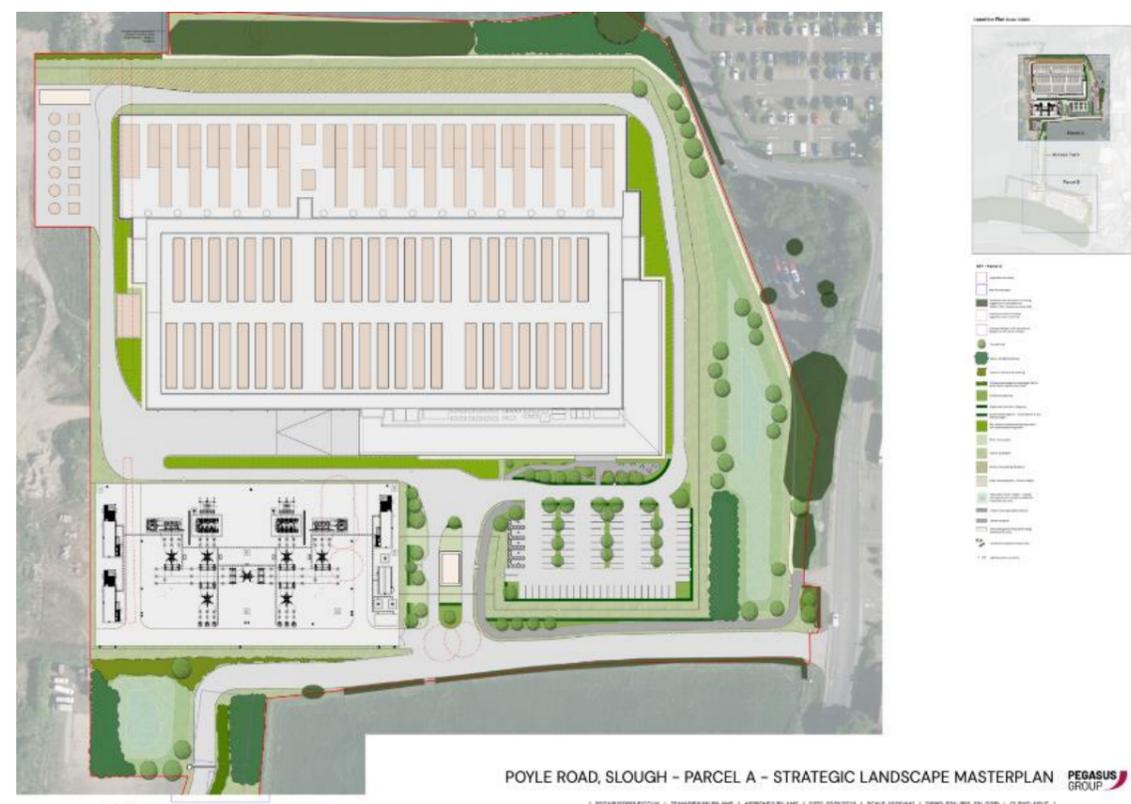


Figure 7: Proposed landscaping layout for Parcel A (Source: Strategic Landscape Masterplan by Pegasus Group).

BREEAM targets

In addition to the biodiversity net gain and ecological impact assessments, measures are to be adopted in line with the BREEAM assessment for the project. These include protecting site ecology and increasing the ecological value of the site of up to 6 species. The Applicant will also commit to creating a long term positive

impact on biodiversity. This will support in achieving the following credits and contribute to the overall BREEAM Excellent score (credits subject to ongoing review):

- LE 03 – Ecological Value of Site and Protection of Ecological Features.
- LE 04 – Enhancing Site Ecology
- LE 05 – Enhancing Site Ecology.

3.5 Travel.

According to the Department for Business, Energy and Industrial Strategy (BEIS), transport is the single greatest contributor to the UK's greenhouse gas emissions, accounting for 27% of annual emissions in 2018. Recognising the need to decarbonise this sector, future development must do everything possible to encourage a shift to sustainable modes.

The following sections detail the sustainability measures that have been considered, and those that will be implemented at the Proposed Development.

3.5.1 Slough Borough Council policy summary.

Table 11 provides a summary of local policy requirements relating to community.

Table 11: Slough Borough Council Community Policy Requirements

Policy Reference	Target
CORE POLICY 5 (EMPLOYMENT)	- The location, scale and intensity of new employment development must reinforce the Spatial Strategy and transport strategy, which seek to ensure that the scale of development is related to the accessibility of the site, and through the implementation of the Local Transport Plan, with the aim of reducing the need to travel and encouraging more sustainable modes of transport.
CORE POLICY 7 (TRANSPORT)	- All new development should reinforce the principles of the transport strategy as set out in the council's Local Transport Plan and Spatial Strategy, which seek to ensure that new development is sustainable and is located in the most accessible locations, thereby reducing the need to travel. - Development proposals will, either individually or collectively, have to make appropriate provisions for: - Reducing the need to travel - Widening travel choices and making travel by sustainable means of transport more attractive than the private car. - Improving road safety. - Improving air quality and reducing the impact of travel upon the environment, in particular climate change. - There will be no overall increase in the number of parking spaces permitted within commercial redevelopment schemes unless this is required for local road safety or operational reasons for e.g. industrial or warehouse developments.
Policy 7.124	- To effectively tackle congestion by widening travel choices by making public transport, cycling and walking more attractive than the private car.
Policy 7.133	- All major trip generating developments will be required to submit a Transport Assessment which will identify proposed mitigation measures. - Developers will then be expected to contribute towards improved traffic management schemes and improvements to public transport, walking and cycling routes.

3.5.2 Proposed Development response

The Proposed Development seeks to create a place where employees and visitors feel connected to the local area. This will be implemented through the delivery of a sustainable transport strategy that creates links for

active movement across and around the site by ensuring new links connect with existing routes and paths. Sustainable transport measures will encourage physical exercise within nature, reduce air pollution, discourage littering and other antisocial behaviours, can provide habitats and ecosystems, as well as reducing greenhouse gas emissions.



Existing transport connectivity

The existing transport connectivity and accessibility can be summarised as follows:

- Bus stops 100m north of the site which benefit from hourly services to local areas and other transport nodes such as Heathrow airport.
- National cycle routes approximately 1.2km to the Site provided access into the centre of Slough.
- Several nearby train stations accessible by bus, bike or vehicle.
- Existing road networks run to the north, west and south of the Site and the M25 junction 14 is immediately adjacent to the Site.
- The built up area surrounding the site would be considered suitable for pedestrians, though not for the mobility impaired due to the lack of formal crossing points, dropped kerbs and tactile paving. Cycling is also possible but favours more experienced cyclists



Sustainable transport provision

The Proposed Development will be accessed via the access road and this road will benefit from upgrades to improve safety and accessibility. This includes, but is not limited to, an island to separate inbound and outbound vehicles, new signage, new footway to provide access to bus stops, new pedestrian crossing and a left in left out arrangement to avoid conflicting turning movements.



In addition, elsewhere in the site, the following measures will be provided:

- Pedestrian and cycle access to the data centre building will be provided by a shared use path, 3m in width.
- 86 car parking spaces will be provided, reflective of the size and scale of the data centre.
- 20% of car parking spaces will be 'EV ready', equivalent to ~17 spaces, while the remaining spaces will provide a pathway for future charging points.
- Travel information packs and car sharing will be encouraged to highlight to employees how they can travel sustainably to the Site.
- 37 cycle parking spaces will be provided.

BREEAM targets

In line with BREEAM credit 'Tra 05 – Travel plan', a transport assessment has been produced for the Proposed Development. Additionally, cycle storage, cycle facilities and a maximum car parking capacity of one car for every three building users has been introduced to encourage sustainable means of transport. This will support in achieving the following credits and contribute to the overall BREEAM Excellent score:

- Tra 01 – Public Transport Accessibility
- Tra 03 – Cyclist facilities
- Tra 05 – Travel Plan
- Tra 06 – Maximum Car Parking Capacity

3.6 Health, wellbeing and pollution control.

The Proposed Development will seek to provide a sustainably focused energy and transport strategy that will endeavour to eliminate the risk of poorer air and noise quality as a result of the development's building and transport emission and noise generation. Part of this involves an air quality assessment being submitted alongside the planning application. The energy and transport strategies include measures for low/zero emission

heating systems to contribute to the net zero aspect of the development and encourage a shift to active modes of travel facilitating a transition to walking and cycling.

The following sections detail the sustainability measures that have been considered, and those that will be implemented at the Proposed Development.

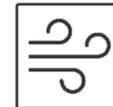
3.6.1 Slough Borough Council policy summary.

Table 12 provides a summary of local policy requirements relating to Health, Well-being and Pollution control.

Table 12: Slough Borough Council Health, Well-being and Pollution control Policy Requirements

Policy Reference	Target
CORE POLICY 8 (SUSTAINABILITY AND THE ENVIRONMENT)	<ul style="list-style-type: none"> - Development shall not: <ul style="list-style-type: none"> - Give rise to unacceptable levels of pollution including air pollution, dust, and odour, artificial lighting or noise. - Be located on polluted land, areas affected by air pollution or in noisy environments unless the development incorporates appropriate mitigation measures to limit the adverse effects on occupiers and other appropriate receptors.
CORE POLICY 10 (INFRASTRUCTURE)	<ul style="list-style-type: none"> - Development will only be allowed where there is sufficient existing, planned or committed health-related infrastructure.
Policy 7.160	<ul style="list-style-type: none"> - Relevant planning applications will have to be accompanied by odour studies, which demonstrate that the proposed development will not have an unacceptable impact upon adjoining uses. - Developers will also have to carry out air quality modelling to show that the site is not affected by poor air quality and that the proposed activity will not make the air quality any worse.

3.6.2 Proposed Development response



Air Quality

The Proposed Development will implement an effective air quality strategy that addresses air pollution present during construction and during operation. The energy strategy is adopting an approach that is low and zero carbon, to minimise carbon emissions as far as possible.

The Air quality assessment, provided in support of the application, has assessed the air quality impact of the use of the 47 emergency diesel powered generators and additional traffic. It has been concluded that:

- Off-site human health impacts of the emissions from the generators will be negligible.
- Additional traffic on the local road network is shown to be below the relevant screening thresholds and will not result in significant impacts.
- Best practice mitigation will be implemented during construction to reduce dust emissions and the overall effect considered to be 'not significant' and a Dust Management Plan for the works will be produced.
- Overall, the operational air quality effects of the proposed development are judged to be 'not significant' for existing human health receptors.

In addition, the fit out will use products with low volatile organic compound content to ensure there is minimal detriment on internal air quality.



Lighting strategy

The external lighting design and strategy for the Proposed Development has considered the local context, the Applicant needs, aviation requirements and ecological concerns. The Proposed

Design will include a balanced approach between the security needs of the Site and the ecological and biodiverse features that must be maintained:

- Light spill past the Site boundary is to be kept to an absolute minimum to not disturb migration or foraging patterns for species.
- Brightest areas to be dimmed when not in use and lighting will include internal glare shield accessories to remove light spill onto the perimeter tree line.
- Luminaires to be chosen to be least disruptive to circadian rhythm.
- Lighting levels to access routes, loading bay, car parking etc to be designed and used to the required illumination during use, and dimmed down out of use.
- For security, final location and specification of luminaires will need to ensure sufficient illumination of people and routes.



Pollution prevention

As noted above, an air quality assessment has been undertaken for the Proposed Development. In addition, an Outline Construction Environmental Management Plan (OCEMP) has been produced for the Proposed Development which includes management and mitigation measures to ensure pollution from construction is minimised. This includes:

- Management of water contaminations – through measures such as a water management plan, silt traps and oil interceptors, non-hazardous cleaning materials.
- Construction waste – through measures such as segregation of hazardous and non-hazardous wastes, use of central waste storage areas and avoid overfilling, regular waste collections to avoid infestations.
- Noise and vibration – through measures such as works only undertaken during agreed hours, use of boundary acoustic barriers, exhaust silencers on mechanical plant.

Refer to the OCEMP for further information.

The drainage strategy includes measures to ensure water quality is maintained, through the use of SUDs as discussed in previous sections. This includes the use of full retention separators, detention basins and rain gardens to provide suitable prevention from pollution to the receiving public sewer systems and water courses.

BREEAM targets

In addition to the lighting strategy and air quality assessment, the office space will provide building users with an adequate view out, with suitable lighting levels in line with CIBSE Lighting Guide 7. Other health and well-being measures include thermal zoning, control of legionella bacteria in water systems, and building products meeting VOC emission levels. This will support in achieving the following credits and contribute to the overall BREEAM Excellent score:

- Hea 02 – View out.
- Hea 04 – High frequency lighting.
- Hea 05 – Internal and external lighting levels.
- Hea 06 – Lighting zones and controls.
- Hea 08 – Indoor Air Quality
- Hea 09 – Volatile Organic Compounds
- Hea 11 – Thermal Zoning
- Hea 12 – Microbial Contamination

3.7 Noise.

Unwanted noise can at best be a nuisance, but at worst can cause longer term health issues. Acoustic design and noise control are another key element for the design of stress-free restorative environments. Noise has been shown to elevate blood pressure and stress hormones in children.

The following sections detail the sustainability measures that have been considered, and those that will be implemented at the Proposed Development.

3.7.1 Slough Borough Council policy summary.

Table 13 provides a summary of local policy requirements relating to noise.

Table 13: Slough Borough Council Noise Policy Requirements

Policy Reference	Target
CORE POLICY 8 (SUSTAINABILITY AND THE ENVIRONMENT)	- Development shall not give rise to unacceptable levels of pollution including noise pollution.
Policy 7.160	- Relevant planning applications will have to be accompanied by noise pollution studies, which demonstrate that the proposed development will not have an unacceptable impact upon adjoining uses.

3.7.2 Proposed Development response

In line with BREEAM credit 'Hea 13 – Acoustic performance' a noise assessment has been produced for the proposed development.



Noise

A Noise Impact Assessment have been undertaken, which included an existing noise survey for the Site. During the day, existing noise levels are dominated by noise from London Heathrow airport. These flights continue until approximately 23:30 and start again at 06:00. In the absence of flights, the main noise impact comes from traffic on the M25.

The main noise consideration from the Proposed Development will be from the operation of plant, including chillers and standby generators. Noise limits will be designed in for external building services plant serving the Proposed Development to protect against adverse noise impacts at nearby sensitive receptors.

It has been concluded that the noise effects of the Proposed Development will be generally localised and the impact on receptors/properties to the north and south considered to be negligible.

As noted opposite, the OCEMP has been produced which includes a raft of measures to be adopted by the Contractor to minimise noise impact from the construction phase.

3.8 Community.

People are at the centre of the built environment, and it is vital that development supports all the communities who are impacted by it. Delivering social value as part of development projects is how we ensure that what we build serves the needs of these communities and contributes to the creation of a more equitable society.

The following sections detail the sustainability measures that have been considered, and those that will be implemented at the Proposed Development.

3.8.1 Slough Borough Council policy summary.

Table 14 provides a summary of local policy requirements relating to community.

Table 14: Slough Borough Council Community Policy Requirements

Policy Reference	Target
CORE POLICY 12 (COMMUNITY SAFETY)	<ul style="list-style-type: none"> All new development should be laid out and designed to create safe and attractive environments in accordance with the recognised best practice for designing out crime.
Policy 7.111	<ul style="list-style-type: none"> The provision of new community facilities to meet local needs will be encouraged. All existing community facilities/services should be retained unless it can be demonstrated that they are no longer required to serve local needs. Where community facilities/services are lost or reduced to accommodate new development, developers will be required to contribute towards new or enhanced facilities/services elsewhere.

3.8.2 Proposed Development response



Security

A crime prevention statement has been produced and is provided in support of the application. A site Security Risk Assessment (SRA) has been undertaken for the Proposed Development to form the foundation of the security strategy. The Site has been designed with the principles and best practices from Secured by Design in mind. The following measures are proposed to enhance site security.

Access control and movement

Access control will be in the form of formal (checks by third parties) and mechanical access control (barriers, gates, access controlled doors):

- Pedestrian and vehicle access to be controlled via the site primary entrance and exit point, which will be under 24/7 security guard occupation.
- The Site will have a secure fence line enclosing the entire Site and building assets within.
- Security technically system to deter, detect, delay and respond to potential incidents.

Surveillance

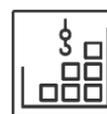
Both informal (design of spaces and natural surveillance) and formal surveillance (e.g. video) measures will also be provided:

- Uniform lighting strategy to external spaces to design out dark spaces and create a feeling of safety.
- Potential to include infra-red / thermal cameras.
- CCTV could also be used
- Video surveillance to be coordinated with lighting and landscape design to avoid blind spots.

Physical protection

For a robust approach to security, in addition to the above measures, physical protection will also be provided to the Site:

- Physical security boundary and clear demarcation of owned land areas.
- Physical landscaping designs to be adapted to increase security posture to deter and maintain levels of natural surveillance.



Construction management

All Contractors will be required to sign up to the Considerate Constructors Scheme (CCS) and demonstrate best practice performance during the construction phase. The credits under the BREEAM assessment are targeted, which ensures responsible construction practises will be

implemented by the Principal Contractor, including consideration of best practice pollution policies, monitoring of energy and water use and deliveries to and from the site.

Measures that the Contractor would be required to implement, cover the breadth of construction impacts and enable the Contractor to be a 'good neighbour' through construction and include:

- Vehicle movement – e.g. management access and egress, dedicated routes for heavy vehicles.
- Pollution management – e.g. minimise risks of air, land, light, noise and vibration pollution.
- Tidiness – e.g. the construction site is clean and clear and safe access is provided around the buildings.
- Health and wellbeing – e.g. processes and practices to promote health and wellbeing of site operatives, robust safety measures are in place.
- Security processes – e.g. minimise risk of site becoming focus of antisocial behaviour such as through CCTV, perimeter fencing

In addition, an Outline Construction Environmental Management Plan (OCEMP) has been produced with proposes mitigation and management techniques to limit the impact of the construction phase. This includes measures to manage noise, air quality, water impact, lighting and contaminated land, to name a few.



Public engagement

Consultation and community involvement has been considered an essential element in the process of developing the proposals for the Proposed Development. Key stakeholders, including local councillors, business groups and neighbours were consulted in advance of a public exhibition. There were public consultant events, and exhibition and a two page flyer. It is proposed that there is further consultation and public engagement post planning permission being achieved.



Socio-economic benefit

The Data Centre sector is a rapidly growing investment class that has been targeted as an area of economic growth by the UK Government. With an estimated turnover of £18.5 million per year, the local business tax revenue from the development is expected to generate £3.56m of which £1.49m will be retained locally.



The Proposed Development will initially provide a minimum of 430 full-time construction jobs, following with approximately 65 full-time operational roles, supporting the growth and function of the digital economy within Slough, London and the UK. In addition to this, training opportunities will be provided through engagement with schools and colleges.

BREEAM targets

In line with BREEAM, the principal contractor will be required to sign up to the Considerate Constructors Scheme as well as implement responsible construction management techniques. In addition, the community engagement report and security statement will also support in achieving the BREEAM Excellent score for the following credits:

- Man 02 – Considerate Constructors
- Man 03 – Construction waste impacts
- Man 08 – Security.

4. Energy strategy.

4.1 Approach to energy strategy.

The Energy Strategy sets out the proposed approach to reducing regulated carbon dioxide (CO₂) emissions and optimising energy performance of the development. The strategy summarises the pertinent regulatory and planning policies applicable to the Proposed development, and sets targets commensurate with these policies, which the Proposed Development will seek to achieve. The Energy Strategy has been developed using a 'fabric first' approach and follows the 'Be Lean', 'Be Clean', 'Be Green', 'Be Seen' energy hierarchy.



Figure 8: Energy hierarchy

4.2 Building Fabric Specifications

Optimising the development's fabric is seen to be the most robust and effective way to improve energy efficiency and in turn reduce carbon emissions whilst also impacting thermal comfort. The performance of the envelope i.e., material performance is unlikely to deteriorate significantly with time and therefore the benefits of these measures will continue at a similar performance for the duration of their installation. The current target U values and fabric performance parameters used are detailed below.

Table 15: Fabric Performance.

Parameter	Part L 2021 Limiting U-values (W/m ² .K)	Target U-values – office (W/m ² .K)
Fabric Air Permeability (m ³ /m ² .h @ 50Pa)	3.00	3.00
External Wall U-value (W/m ² .K)	0.26	0.18
External Wall – Perimeter to Data Hall U-value (W/m ² .K)	0.26	0.26
Exposed Floor U-value (W/m ² .K)	0.18	0.15
Exposed Roof U-value (W/m ² .K)	0.18	0.15
Glazing U-value (W/m ² .K) (glazed doors / windows)	1.60	1.40
Glazing g-value	0.40	0.40
Solid Door & Opaque Panel U-value (W/m ² .K)	1.60	1.40
High Usage Door U-value (W/m ² .K)	1.6	1.30

4.3 Power Usage Effectiveness (PUE) Calculations

Power Usage Effectiveness (PUE) a measure of operational energy efficiency tailored specifically to data centres. PUE measures the ratio of power required to operate the data centre including servers, building services such as cooling and lighting and other necessary energy uses, compared with the power required to run only the servers. This in effect measures the additional energy needed to operate the infrastructure which houses and maintains the servers.

The Proposed Development aims to achieve a PUE of below 1.30.

4.4 Be Lean.

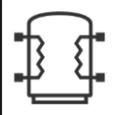
Passive design and energy efficient features.

Passive design measures are those which reduce the demand for energy within buildings, without consuming energy in the process.

These are the most robust and effective measures for reducing CO₂ emissions as the performance of these solutions, such as façade insulation, are unlikely to deteriorate significantly with time, or be subject to change by future property owners. In this sense, it is possible to have confidence that the benefits these measures will continue at a similar level for the duration of their installation.

Table 16: Be Lean Summary.

	<p>Fabric performance</p> <p>Data centre office accommodation A 'fabric first' approach has been taken to reduce the energy demand and CO₂ emissions across of the Proposed Development. The overriding objective for the façade design of the office will be to achieve the optimum balance between providing natural daylighting benefits to reduce the use of artificial lighting, the provision of passive solar heating to limit the need for space heating in winter and limiting summertime solar gains to reduce space cooling demands.</p> <p>The Proposed Development will benefit from a highly efficient thermal envelope. Heat losses and gains will be controlled by the optimisation of the fabric of the building, i.e., ensuring appropriate levels of glazing to control winter heat loss and summer heat gain. Reducing the thermal transmittance of the building envelope where appropriate will help to reduce both heating and cooling requirement and result in lower energy requirements.</p> <p>Data hall Although a 'fabric first' approach is typically taken in order to reduce energy demand and CO₂ emissions, such an approach can actually have the opposite effect with spaces emitting high internal sensible gains such as data centre. Heat loss from the space is actually desired to help lower cooling demands, as such, lower performing U-values may have a positive effect on performance. However, for compliance reasons, Part L 2021 Limiting values have been selected for these spaces.</p>
	<p>Space heating Low space heating demands are achieved by optimised building form factors, low fabric u-values and glazing g-values. Heat loss through thermal bridges to be minimised through design and construction.</p> <p>Data hall Data Centres will have minimal requirement for heating as the largest element of the building will be the data halls which will require cooling into the space to offset the significant heat gains from the servers and associated equipment.</p> <p>Data centre office accommodation The primary means of heating to the office space will be via a variable refrigerant flow system. Electrical panel heaters will be used for back of house areas, such as WCs.</p>

	<p>Mechanical ventilation</p> <p>Data Centre The fit out of the data hall will be the responsibility of the incoming tenant.</p> <p>Data centre office accommodation To reduce the electrical energy associated with fans, for areas in the Proposed Development with supply and extract, demand-controlled units with low specific fan powers will be targeted. Mechanical ventilation is an important addition to the building services to maintain good indoor air quality by providing fresh air to all spaces and extracting stale air. Coupled to a heat exchanger, the warmth in extracted air can be recovered and delivered to the supply air. In this mode, the ventilation system reduces space heating and cooling demand. During times where the external air is cooler than internal the system can deliver "free cooling" to maintain comfort conditions.</p>
	<p>Space cooling</p> <p>Data Centre The fit out of the data centre will be for the incoming data centre provider / tenant. For the planning stage, it is assumed that fan wall units would be provided, linked to the central cooling plant.</p> <p>Data centre office accommodation Due to the internal heat gains within the offices, cooling will also be necessary. The cooling will be provided via an energy efficient variable refrigerant flow system.</p>
	<p>Domestic hot water (DHW) system The proposed development will feature water efficient fixtures and fittings including WCs with low flush volumes and flow restrictors on wash hand basins taps and showers to limit overall water consumption in line with the Building Regulations Part G. Low flow water fittings will be installed throughout in line with targeted BREEAM criteria to reduce consumption and therefore thermal energy demands. All occupied spaces will be served by local point of direct electric point of use water heaters.</p>
	<p>Natural daylight and lighting strategy In the context of commercial spaces, artificial lighting tends to provide a significant contribution to regulated CO₂ emissions. As such, the implementation of energy efficient lighting design is paramount to reducing overall emissions for these spaces. Therefore, it is anticipated that the Proposed Development will be supplied with high efficiency lighting installations representing best practice. Full lighting control systems including daylight linkage and presence detection will also be incorporated into the design where applicable. As well as the reduced energy requirement that will be achieved by implementing these strategies, the contribution to internal heat gains and associated cooling requirements will be reduced. This will further reduce the total energy requirements and CO₂ emissions of the buildings.</p> <p>Low-energy, efficient light fittings are recommended throughout. Any external lighting will also feature low-energy efficient fittings and will be linked to daylight sensors and/ or presence detectors to prevent unnecessary use.</p>

4.5 Be Clean.

This stage of the energy hierarchy includes consideration of connection to available district heat networks, or the use of on-site heat networks and decentralised energy production such as Combined Heat and Power (CHP) in order to provide energy and reduce consumption from the national grid and gas networks, through the generation of electricity, heating and cooling on-site.



Figure 9: Be Clean.

District/decentralised heat network.

There are numerous factors limiting the opportunity to connect to a district / decentralised heat network (DHN), specifically:

- No DHN existent in feasible proximity to the site.
- A gas led heat network would have higher carbon intensity than grid electricity.
- A combustion based heat network would be a detriment local air quality.

Combined heat and power (CHP).

Changes to the carbon factor of grid electricity have meant that previously favoured systems such as Combined Heat and Power (CHP) are becoming much less carbon efficient. In fact, CHP systems are now expected to lead to greater carbon emissions than conventional gas-fired boilers due to their lower thermal efficiency.

Due to the decarbonisation of the electricity grid, schemes using CHP engines for the delivery of thermal energy will lead to a net increase carbon emissions (over the gas boiler baseline and certainly when compared to electrically fuelled heat pump systems). Based on indicative calculations on other schemes, if a CHP were to be utilised for the Proposed Development, a regulated CO₂ emission increase of ~10% over the Be Lean stage would be demonstrated and it is for this reason that CHP, or connections to a DHN fed by CHP, are not proposed.

Furthermore, CHP engines are an on-site source of particulate pollutants which will adversely affect local air quality. In light of grid decarbonisation and increased focus on air quality, CHP is therefore not proposed.

4.6 Be Green.

This section explores the feasibility of Low and Zero Carbon (LZC) technologies to allow the production of renewable energy onsite in order to deliver further reduction in carbon emissions.



Figure 10: Be Green.

Low and zero carbon (LZC) technology assessment.

Renewable or zero carbon technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available, however, not all of these are commercially viable or suitable for rural locations.

Table 17: Be Green Summary.

	<p>Energy from Waste Energy from waste (EfW) is the process of generating electricity and/or heat from the primary treatment and processing of waste usually by incineration.</p> <p>It is generally placed higher in the waste hierarchy than throwing waste into landfill as described above. Further, where an EfW facility is in place to generate electricity, with heat generation essentially a by-product, it can be considered a low carbon heat source.</p> <p>Suitability to proposed development: There is currently no EfW facility in the area of the development.</p> <p>Therefore, connection to an EfW DHN is not proposed for the development</p>
	<p>Air source heat pumps Air source heat pumps (ASHP) use thermodynamic principles to convert heat from the air into useable heat within the building. Unlike some other sources of renewable energy, heat pumps require energy (typically electricity or gas) to pump and compress refrigerant through the system. However, under the Renewable Energy Directive 2009/28/EC they are classified as renewable technologies provided that the final energy output significantly exceeds the primary energy input required to drive the heat pump. ASHP need to be located externally with access to the ambient air, typically at roof level.</p> <p>They can typically operate at an efficiency of around 350% when delivering heating for space conditioning. Efficiencies drop significantly however when a heat pump is used to deliver domestic hot water due to the greater temperature required.</p> <p>Suitability to proposed development: A dedicated heat pump system, in the form of a variable refrigerant flow system, will serve the development. As the grid continues to decarbonise, ASHPs would provide a future low or zero carbon solution for thermal energy generation.</p> <p>Therefore, this technology is proposed for the development.</p>
	<p>Ground Source Heat Pumps (GSHPs) GSHPs work similarly to ASHP, except they extract heat from the ground. GSHPs are best suited to developments with a balanced heating and cooling load, to avoid long-term heating or cooling of the ground /ground water and associated decreased efficiency of the heat pump.</p> <p>Suitability to proposed development: There will be a large cooling demand for the Proposed Development, In addition, the groundworks for a GSHP system are significant, and would not likely be able to meet the cooling demands of the development alone.</p> <p>Therefore, this technology is not proposed for the development.</p>
	<p>Photovoltaics Photovoltaic (PV) panels harness energy from sunlight and convert this into useful energy in the form of electricity. A PV system requires viable roof space in order for the system array to be installed and function effectively.</p>

	<p>Suitability to proposed development: Solar irradiance analysis on the site has shown a good opportunity for the implementation of Photovoltaic technologies for on-site electricity generation and will be provided on the roofscape of the office accommodation.</p> <p>Therefore, Photovoltaics are proposed for the development. An annual yield of ~60 MWh/yr is anticipated based on a solar photovoltaic array on the supporting accommodation roof space.</p>
	<p>Solar thermal Solar Thermal Panels are similar to PV Panels in that they harness energy from solar energy. This technology however converts solar energy into thermal energy that can offset the demand on hot water generation systems.</p> <p>Suitability to proposed Development: Given the minimal hot water requirement of the proposed development, solar PVs will be prioritised over solar thermal panels since the electrical output from PV panels will be more suitable for implementation.</p> <p>Therefore, solar thermal is not proposed for the development.</p>
	<p>Wind turbine For efficient operation and to yield high energy output, wind turbines require a consistent flow of air to generate electricity using wind energy.</p> <p>Suitability to proposed development: The Proposed Development is located within a semi-urban environment. The wind flow profile is more likely to be conducive to high annual yields from a turbine compared to a fully urban location. However, mounting wind turbines on the roof of the any of the buildings could result in unacceptable vibration and resonance being felt within occupied spaces. This could also impact the local villages with light flicker and noise from any installation.</p> <p>Therefore, given the complexities of installing this technology, the use of wind turbines is not proposed at the Proposed Development.</p>
	<p>Biomass Biomass boilers burn wood fuel or other bio-fuel sources to generate heat. These boilers can operate at high efficiencies, comparable to condensing gas boilers. However, they require a large fuel store to maintain continuous operation during the winter months. As such, area take for such plant is high. Furthermore, fuel deliveries in countryside locations can prove difficult and security of fuel supply is an important consideration.</p> <p>Suitability to proposed development: The reasons listed above alongside high maintenance implications and air quality implications mean that biomass boilers are not considered a suitable technology for the scheme.</p> <p>Therefore, given the implications associated, the use of biomass boiler technology is not proposed at the Proposed Development.</p>

4.7 Battery energy storage.

Grid-scale energy storage is the large-scale storage of electricity within an energy grid, used to balance supply and demand, increase grid resilience, and support the integration of renewable energy sources. Battery Energy Storage Systems (BESS) are an increasingly important component of the UK energy system. They offer storage for intermittent energy systems, like wind power and solar, where the energy can be stored and then released when the power is needed most, rather than wasted, or not collected at all. It is estimated that Britain will need over 25 GW of battery storage by 2050, 25 times that which currently exists today.

Broadly, energy storage provides the following benefits:

- **Enhances grid reliability and resilience** – provide back up power during outages or disruptions.
- **Facilitates renewable energy integration** - surplus energy, such as that from wind or solar power, can be stored for future use.
- **Reduces need for fossil fuel peaking plant** – supply power during peak periods, reducing emissions.
- **Supports decarbonisation** – reduce the need for fossil fuel power and enhance effectiveness of renewable energy.

The Proposed Development seeks to support the transition over to a zero carbon energy system, and achieve net zero carbon emissions by 2050, by providing a large scale BESS on the Site, in addition to the data centre critical infrastructure.

The location of the BESS will be in the SE corner of the Site. A section of the masterplan layout showing the BESS is in Figure 11.

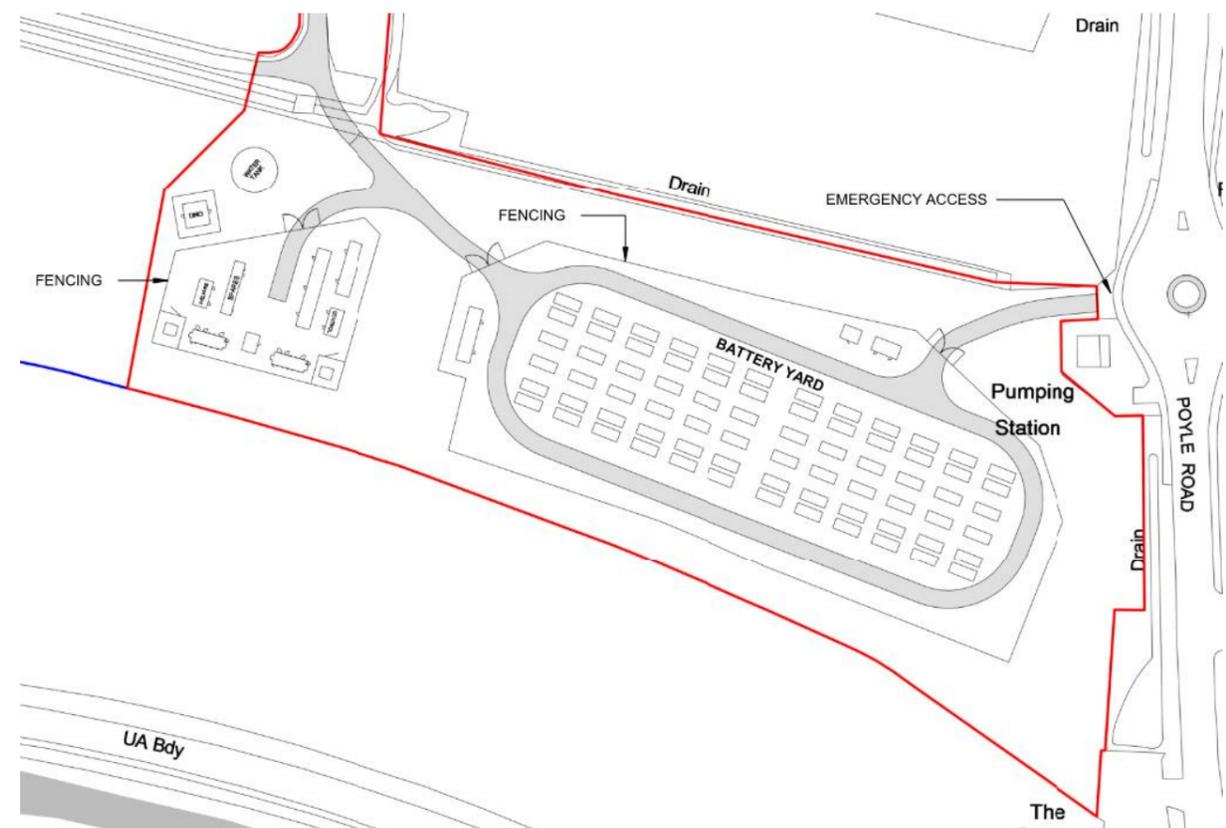


Figure 11: Battery Energy Storage Systems (BESS) at the Site (Source: Corgan masterplan layout).

5. Results summary.

The cumulative effect of the energy hierarchy approach to design of the Office area has resulted in the following emissions reduction over Part L2 2021.

Table 18: Anticipated Be Green Office Results.

	Manor Farm – Parcel A
Baseline emission rate:	94.7 tCO ₂ /year
Development emission rate:	78.85 tCO ₂ /year
Percentage Reduction:	16.7 %

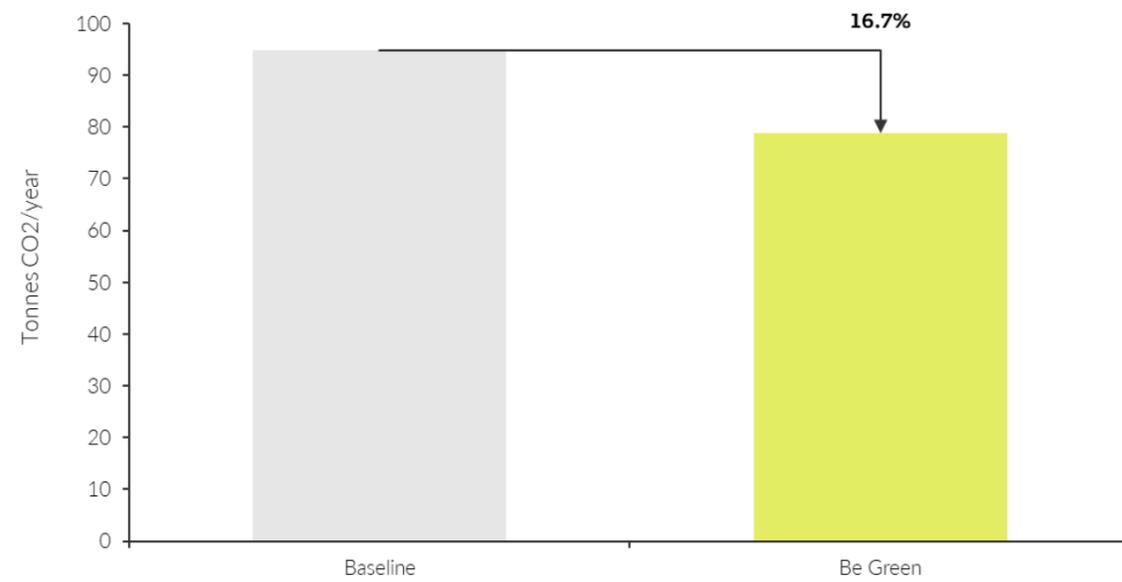


Figure 12: Offices Reduction in Regulated Carbon Emissions, including PV.

6. Conclusion.

This strategy has been prepared to demonstrate that the Applicant and design team have given due consideration to the principles of energy and sustainability, and how these can be implemented for the Proposed Development.

How planning policy has been addressed within the design response has been covered under each heading in Sections 3 and 4 and is also summarised within section 6.1 and 6.2 below.

6.1 Energy strategy.

Data Centres are highly energy intensive operations which can make predictions of energy use substantial. This analysis and calculations outlined within this report confirm that the proposed energy strategy is targeting an energy efficient, low-carbon scheme. An energy efficient fabric first approach combined with high efficiency servicing equipment will look to minimise the regulated energy usage across the data hall and supporting office accommodation. Using the energy hierarchy, the strategy has been developed to ensure that the Proposed Development is efficient and economical in the delivery of energy.

The carbon emissions associated with regulated energy use at the Proposed Development have been compared against targets set by the building regulations and have been shown to comply.

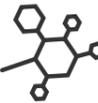
Based on correspondence with CIBSE, closed air systems only serve process cooling and offer no benefit to occupiers. Therefore, it has been suggested that all spaces served by these systems can alternatively be modelled as an unheated/conditioned space. This therefore applies to the data hall and as such, the office supporting accommodation has been assessed for Part L 2021 compliance and the reported carbon performance are based of these areas only.

Table 15: Energy summary for proposed detailed development.

	Manor Farm
Be Lean	A fabric first approach and energy efficient building services will be utilised to reduce carbon emissions and energy demand through best practice passive design measures. This includes a targeted low fabric air permeability and improvement on fabric U-values beyond notional building and minimum standards.
Be Clean	An on site heat network or connection to an external heat network is not proposed.
Be Green	On site solar photovoltaics array will be provided and located on the supporting accommodation roof space. In addition, heating and cooling for the accommodation will be provided by variable refrigerant flow system.
Summary	Inclusive of the passive design, energy efficiency measures, alongside the variable refrigerant flow system and rooftop solar photovoltaics a 16.7% reduction in emissions on Part L 2021 is expected to be achieved.

6.2 Sustainability strategy.

Table 19: Sustainability strategy summary.

Theme	Measures to be implemented
	<p>Energy and Carbon Reduction</p> <ul style="list-style-type: none"> - A BREEAM 'Excellent' rating is being targeted for by the Proposed Development. - The design will include high standards of energy efficiency and include low/zero carbon technologies including a high efficiency heat pumps and PV array. - Overall, an 16.7% reduction in CO₂ emissions will be achieved beyond the Building Regulations Part L2 2021 baseline.
	<p>Drainage</p> <ul style="list-style-type: none"> - The Proposed Development sits within Flood Zone 1. - A Flood Risk Assessment has been completed confirming the Proposed Development can be considered as 'low risk' for surface water flooding, and 'very low risk' of reservoir failure. - Sustainable drainage systems have been incorporated and these include permeable paving, rain gardens and detention basins.
	<p>Water</p> <ul style="list-style-type: none"> - All water systems will be designed in compliance with relevant Code of Practice and industry/sector best practice guidance. - The Proposed Development will install low water consumption sanitary fittings which comply with BREEAM standards. - Water meter with a pulsed output to enable connection to a 'Building Management System' (BMS) for the monitoring of water consumption will be installed. - A mains water leak detection system will be installed, where feasible, to reduce the volume of potable water which may be lost due to leaking sub-surface pipework.
	<p>Waste</p> <ul style="list-style-type: none"> - A refuse store will be provided on the ground floor of the office to ensure ease of transport operational waste. Separate bins will be provided to allow for both municipal and recyclable waste to be separated. - A 'Site Waste Management Plan' will be produced for the Proposed Development for each phase of construction to define measures for how to minimise the volume of waste arising from demolition and construction activities, which is sent to landfill. The plan will include targets for minimising waste per 100m² and for diverting waste from landfill.
	<p>Materials</p> <ul style="list-style-type: none"> - Façade specification will be developed to contribute to local character of the area. - Materials will be specified to be durable, responsibly sourced, have environmental product declarations and locally manufactured where feasible to reduce the embodied carbon of the Proposed Development. - A Sustainable Procurement Plan will be adopted and inform the building specification and Contractors procurement strategy.
	<p>Green infrastructure and ecology</p> <ul style="list-style-type: none"> - An Ecological Assessment and Mitigation Strategy will be completed which features enhancement recommendations for wildlife. - The development layout will be designed to retain, protect and enhance the most valuable ecological features, namely the boundary hedgerows and wet ditch. - Overall, the development is expecting to achieve a minimum Biodiversity Net Gain of 50%.

Theme	Measures to be implemented
	<p>Travel</p> <ul style="list-style-type: none"> - The site can be accessed via sustainable modes of transport, including walking, cycling, and bus. - 86 car parking spaces will be provided, of which 17 spaces (~20% of spaces) will be 'EV ready'. - Cycle storage with 37 spaces will be provided in secure and sheltered storage. Suitable shower, changing and storage facilities will also be provided. - BREEAM credit 'Tra 05: Travel plan' will be adhered to.
	<p>Health and wellbeing and pollution control</p> <ul style="list-style-type: none"> - The design has ensured that the occupants will not be subject to excessive noise, high temperatures flickering lights. - BREEAM credit 'Hea 08: Indoor Air Quality' will be adhered to. - The principal contractor is required to align to the Outline Environmental Construction Management Plan (OECMP) to manage and mitigate pollution impacts. - The Proposed Development has followed an approach to fenestration (for the supporting accommodation) which balances the need for passive solar heating and daylighting whilst having regard to the potential implications for overheating. - All lighting is to be highly efficient and controlled appropriately. External lighting will be selected to reduce light spill and provide natural surveillance to maintain site security. - The all-electric strategy means local air quality is not impacted by the new development and reduces the building user's exposure to harmful air pollution.
	<p>Noise</p> <ul style="list-style-type: none"> - The Proposed Development will meet the standards for acoustic design and achieve the associated and targeted BREEAM criteria. - The design and specification of equipment will be selected to adhere to the sustainable environmental noise limits determined. - A noise survey has been undertaken by a suitably qualified acoustician. It has been determined that the noise effects of the Proposed Development will generally be localised and the impact on receptors negligible.
	<p>Community</p> <ul style="list-style-type: none"> - The principal contractor will be required to sign up to the Considerate Constructors Scheme and achieve a best practice score. - The principal contractor is required to align to the Outline Environmental Construction Management Plan (OECMP) to manage and mitigate pollution impacts. - The principal contractor will also be required to implement responsible construction management techniques and contribute to achieving a BREEAM 'Excellent'. - A robust security strategy has been developed for the Site and includes a combination of management and mitigation measures to ensure security is maintained. This comes in the form of access control and movement measures, surveillance and physical protection measures. - Public consultation has been undertaken through a public exhibition and flyers showing the proposals. Further consultation will be undertaken once planning approval is granted. - The Data Centre will support the digital economy and provide jobs which are easily commutable due to multiple public transport links surrounding the Site.

Appendix A: BREEAM pre-assessment overview.

Manor Farm, Parcel A falls under the BREEAM Datacentres 2010 category. The Proposed Development, Parcel A, is targeting a BREEAM 'Excellent' rating as a minimum.

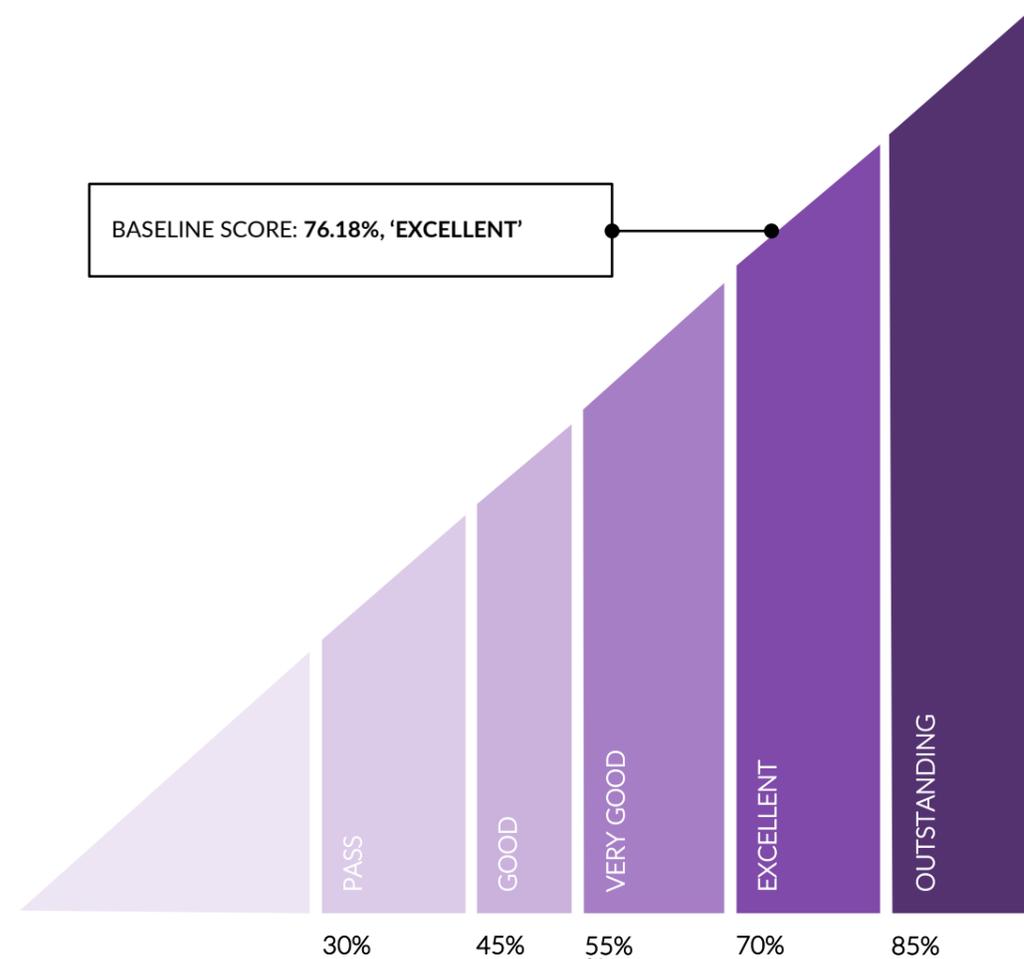


Figure 13: BREEAM Datacentres 2010 Scale and Anticipated performance scores

Summary of targeted credits: score sheet.

The summary table below highlights the list of targeted credits for the current BREEAM 2010 pre-assessment. Mandatory credits to achieve a 'Excellent' rating and above are highlighted by (M).

Table 20: BREEAM Target Summary

Category	Issue	Credits	
		Available	Targeted
Management	Man 01: Commissioning – Programme, Design Stage Input and Specialist Commissioning (M)	2	2
	Man 02: Considerate Constructors	2	2
	Man 03 – Construction Site Impacts	4	4

	Man 04 – Building User Guide	1	1
	Man 08 – Security	1	1
	Man 12 – Life Cycle Costing	2	2
Health & Wellbeing	Hea 01 – Daylighting	1	-
	Hea 02 – View Out	1	1
	Hea 03 – Glare Control	1	-
	Hea 04 – High Frequency Lighting (M)	1	1
	Hea 05 – Internal & External Lighting Levels	1	1
	Hea 06 – Lighting Zones and Controls	1	1
	Hea 07 – Potential for Natural Ventilation	1	-
	Hea 08 – Indoor Air Quality	1	1
	Hea 09 – Volatile Organic Compounds	1	1
	Hea 10 – Thermal Comfort	1	-
	Hea 11 – Thermal Zoning	1	1
	Hea 12 – Microbial Contamination (M)	1	1
	Hea 13 – Acoustic Performance	1	1
	Hea 14 – Office Space	-	-
Energy	Ene 01 – Reduction of CO ₂ Emissions	15	12
	Ene 02 – Sub-Metering of Substantial Energy Uses (M)	2	2
	Ene 04 – External Lighting	1	1
	Ene 05 – Low or Zero Carbon Technologies	3	3
	Ene 08 – Lifts	2	2
	Ene 21 – Transport CO ₂	-	-
	Ene 22 – Procurement of Sustainable IT Equipment	2	0-
Transport	Tra 01 – Provision of Public Transport	3	1
	Tra 02 – Proximity to Amenities	1	-
	Tra 03 – Cyclist Facilities	2	2
	Tra 04 – Pedestrian and Cyclist Safety	1	-
	Tra 05 – Travel Plan	1	1
	Tra 06 – Maximum Car Parking Capacity	2	1
Water	Wat 01 – Water Consumption (M)	3	3
	Wat 02 – Water Meter (M)	1	1
	Wat 03 – Water Leak Detection System	1	1
	Wat 04 – Sanitary Supply Shut Off	1	1
	Wat 05 – Water Recycling	1	-

	Wat 06 – Irrigation Systems	1	-
Materials	Mat 01 – Material Specification	6	4
	Mat 02 – Hard Landscaping & Boundary Protection	1	1
	Mat 03 – Re-use of Façade	1	-
	Mat 04 – Re-use of Structure	1	-
	Mat 05 – Responsible Sourcing of Materials	3	1
	Mat 06 – Insulation	2	2
	Mat 07 – Designing for Robustness	1	1
Waste	Wst 01 – Construction Site Waste Management	4	3
	Wst 02 – Recycled Aggregates	1	-
	Wst 03 – Recyclable Waste Storage	1	1
	Wst 04 – Compactor / Baler	1	-
Land Use and Ecology	Le 01 – Reuse of Land	1	-
	Le 02 – Contaminated Land	1	-
	Le 03 – Ecological Value of Site and Protection of Ecological Features	1	1
	Le 04 – Mitigating Ecological Impact (M)	2	2
	Le 05 – Enhancing Site Ecology	3	2
	Le 06 – Long Term Impact of Biodiversity	2	2
Pollution	Pol 01 – Refrigerant GWP – Building Services	1	-
	Pol 02 – Preventing Refrigerant Leaks	2	2
	Pol 04 – Nox Emissions from Heating Source	2	-
	Pol 05 – Flood Risk	3	3
	Pol 06 – Minimising Water Course Pollution	1	1
	Pol 07 – Reduction of Night Time Light Pollution	1	1
	Pol 08 – Noise Attenuation	1	1
	Innovation	Innovation	10

Appendix B: Energy assessment modelling software details.

Compliance software and procedure.

The proposed development has been assessed using the National Calculation Methodology to demonstrate compliance with Approved Document Part L.

Part L Volume 2 Compliance.

Simulation models were created to assess the design of the development.

Part L Volume 2 Non-Residential

Integrated Environmental Solutions Virtual Environment (IESve) is an approved Dynamic Simulations Modelling (DSM) software package which has the capabilities of enabling the user to create a virtual representation of a building. The results presented in this report for the Non-residential aspects were calculated using the approved compliance software IESve 2023 (v2023.4.0.0).

The IESve models were drawn using information provided by the relevant architects.

IESve modelling disclaimer.

The calculations produced by Hoare Lea have been carried out with the information provided by others to determine whether the proposed development can achieve compliance with Approved Document Part L Volume 2 2021 of the Building Regulations.

It should be noted that the data generated by this work is obtained using approved calculations and computer simulations. These simulations are the best means of predicting the performance of the buildings at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

The actual energy usage for the buildings once occupied may vary from the calculated values submitted to Building Control. These differences will occur due to a number of variable parameters between the modelled building and the actual building. Such differences will include the hours, levels of occupancy, how the plant is used and the design criteria with regards to how the rooms are environmentally controlled.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, Hoare Lea can take no responsibility for differences between the computer simulations and the actual performance of the completed buildings due to the inherent complexity and variability of the physics in a building and its environment.

Appendix C: energy assessment modelling input parameters.

The following tables give the parameters used to conduct the Part L compliant modelling for the Proposed Development.

Fabric parameters

The fabric performance parameters used to model the Proposed Development are as follows.

Table 21: Building fabric performance targets.

Parameter	New-build Office U-Values (W/m ² .K)
Fabric Air Permeability (m ³ /m ² .h @ 50Pa)	3.00
External Wall U-value (W/m ² .K)	0.18
External Wall – Perimeter to Data Hall U-value (W/m ² .K)	0.26
Exposed Floor U-value (W/m ² .K)	0.15
Exposed Roof U-value (W/m ² .K)	0.15
Glazing U-value (W/m ² .K) (glazed doors / windows)	1.40
Glazing g-value	0.40
Solid Door & Opaque Panel U-value (W/m ² .K)	1.40
High Usage Door U-value (W/m ² .K)	1.30

System parameters

The following tables give the building services parameters used to conduct the Part L compliance modelling for the Proposed Development

Table 22: Building services parameters.

Parameter	Value
Heating/ Cooling	
Variable Refrigerant Flow	Office, tenant space, lobby, WC / changing areas SCoP – 4.10 SEER – 5.50 Comms rooms SCoP – 4.00 SEER – 5.40
Electric Panel Heaters	Circulation, 100% efficient
Ventilation	
Air Handling Unit	Office, lobby, comms room, central stores and corridors: – SFP 1.6 W/l/s
Zonal extract system with remote fan	WCs, Shower, Changing – SFP – 0.5 W/l/s Extract flow rate:

Parameter	Value
	– 100 l/s – toilets and showers – 30 l/s – accessible toilet
Ductwork and leakage testing	– Yes, class B
AHU meet CEN leakage standards	– Yes, class L2
Metering	
Does system have provision for metering?	– Yes
Does the metering warn 'out of range' values?	– Yes
Hot Water	
– Direct electric water heater	– Efficiency 100% – Delivery efficiency 95%
Lighting	
Performance: – Lamp efficacy (lm/W) – Light output ratio (LOR)	– Stair Cores: – 100 lux – 3.00 W/m ² /(100lux) – Office areas: – 500 lux – 1.50 W/m ² /100lux – WC's: – 200 lux – 2.15 W/m ² /(100lux) – Plant space: – 150 - 300 lux – 1.8 W/m ² /100lux – Stores: – 150 lux – 1.5 W/m ² /100lux
Daylight Controls	– Daylight dimming to glazed areas
Manual lighting controls	– Plant rooms
Display lighting: – Lamp efficacy (lm/W)	– N/A
Occupancy sensing	All areas PIR controlled (auto-on-off) except for plant rooms (manual switching only) Parasitic power: 0.10 W/m ²
Adjustment management factors	

Parameter	Value
Power Factor Correction	>0.90
Lighting systems have provision for metering?	Yes
Lighting systems metering warns of 'out of range' values?	Yes
Renewables	Solar photovoltaic - Annual yield ~60MWh

Appendix D: BRUKL.

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

Project name
5625724 Manor Farm - Part L 2021 18 Nov 24 As designed

Date: Mon Nov 18 21:00:42 2024

Administrative information

<p>Building Details Address: Parcel A - data centre offices, Slough,</p> <p>Certifier details Name: Hoare Lea Telephone number: Address: , ,</p>	<p>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</p>
--	---

Foundation area [m²]: 2070.94

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

Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	14.39
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	11.98
Target primary energy rate (TPER), kWh _{tp} /m ² .annum	157.29
Building primary energy rate (BPER), kWh _{tp} /m ² .annum	130.73
Do the building's emission and primary energy rates exceed the targets?	BER <= TER BPER <= TPER

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

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	T3000005:Surf[0]
Floors	0.18	0.15	0.15	M0000012:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	M0000002:Surf[0]
Windows** and roof windows	1.6	1.45	2.97	L0000028:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors ^Δ	1.6	1.4	1.4	M0000015:Surf[0]
Vehicle access & similar large doors	1.3	1.3	1.3	L0000005:Surf[4]
High usage entrance doors	3	2.97	2.97	L0000028:Surf[0]

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

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

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HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	5.7	204	0.4	14.9	4.8	4.21	3.8	4.1	5.5
Notional	0.4	246	0	14.8	16.3	2.78	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	20.5	0	6.8	0	10.6	0.84	0	1	0
Notional	8.9	0	1.8	0	5.2	1.41	0	----	----
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Natural Gas, [CFT] Electricity									
Actual	116.6	29.4	6.2	2.1	42.6	5.23	3.8	5.1	5.5
Notional	53.8	49.9	11.3	3	52.1	1.33	4.63	----	----
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	0	1456.6	0	108.3	12.8	4.1	3.73	4	5.4
Notional	0	1476.6	0	88.6	30	2.78	4.63	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

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