Building Services
Consulting Engineers

MECHANICAL & ELECTRICAL SERVICES
RIBA STAGE 2 : CONCEPT DESIGN REPORT

AT

BIRDWORLD
FARNHAM ROAD
HOLT POUND
GU10 4LD

FOR

BIRDWORLD LTD & HASKINS GARDEN CENTRES LTD

JANUARY 2024

DOCUMENT REVISION RECORD

Original Document

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Planning Submission	P1	19.01.2024	PS

CONTENTS

1 EXECUTIVE SUMMARY

ION Consulting have been employed by Haskins Garden Centres to provide mechanical and electrical design services for the redevelopment of Birdworld, Farnham Road, Holt Pound, GU10 4LD following a 'Design & Build' procurement route.

This RIBA Stage 2 'Concept Design' report is produced in advance of the final RIBA Stage 3 'Developed Design' tender pack to detail and agree the proposed M&E design strategy for the project. A Project Responsibility Matrix is provided in Appendix H of this report.

The proposed design described herein satisfies the local planning conditions, the client brief and incorporates appropriate design measures to ensure that the development complies with Part L of the Building Regulations and BREEAM.

Within the report proposals are provided for:

- New incoming electrical, water and telecoms utility infrastructure concept design to serve the development.
- Mechanical services concept design to serve the development.
- Electrical services concept design to serve the development.

Design Summary

The site will be provided with new electric, water and telecoms infrastructure; however no gas services will be provided to the development.

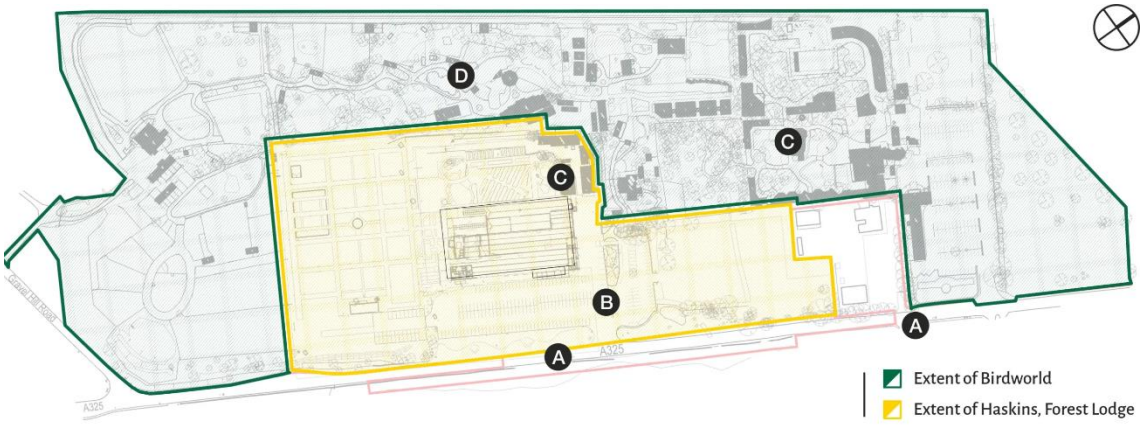
The proposed development will achieve full compliance with Building Regulations and achieve BREEAM Excellent.

2 PROJECT DESCRIPTION

2.1 THE WORKS

Haskins Garden Centres Forest Lodge Current Operations

Haskins Group Ltd recently purchased the existing garden centre and birdworld attraction located at Holt Pound in February 2020. Haskins currently operate the existing Garden Centre store and the Birdworld attraction. The existing Garden Centre store and Birdworld attraction are located adjacent to one another, the Birdworld site is located towards the north of the Garden Centre and extends down the west of the Garden Centre towards the farm area at the south of the Garden Centre, essentially wrapping the Garden Centre on three sides.



The existing garden centre comprises of a retail area, warehouse, restaurant, survey, external sales area and back of house areas.

Haskins Garden Centres are looking to redevelop the existing garden centre and birdworld sites.

Existing Site

The existing building condition across both the Garden Centre and Birdworld site are poor. The existing buildings are outdated and don't meet the modern standards expected of today's buildings in respect to insulation, energy performance and sustainability.

The access to each site is via separate entrances from the A325 without dedicated right turn entries.

The Garden Centre deliveries access the service yard via the main carpark creating conflict with pedestrians and customer parking. Long banks of parking encourage increased speed and impact on customer safety.

The existing shape and narrowness of the Birdworld site results in an 'out and back' path structure. This results in poor customer journey and overall experience.

Proposed Redevelopment

The proposed redevelopment will split the overall site layout north/south for the Birdworld attraction and Garden Centre respectively. The redevelopment comprises of a new play barn building within the bird world site, new garden centre and associated parking, new entrance building to bird world and associated parking, and new living collections buildings for birdworld.

The proposed Birdworld Entrance Building and Play Barn will be accessed via a new entrance roundabout from the A325, with a secondary roundabout providing access to either the Graden centre or Birdworld.

The Birdworld Entrance building and Play Barn building will comprise of new external car parking, offices, meeting rooms, WCs, main entrance, gift shop with till and store areas.

The Birdworld Play Barn building will comprise of entrance lobby, WCs, café seating, kitchen, play area and party alcoves, cold food storage spaces, office, store and plant areas.

The new Garden Centre building will have a floor area of 5,620m².

The new Birdworld Play Barn building will have a floor area of 1,545m².

The new Birdworld Entrance building will have a floor area of 722m².

The redevelopment works will be split into 3 phases as follows;

Phase 1. New Birdworld Play Barn Building.

Phase 2. New Garden Centre Building, carparking, access roundabout and new Birdworld Living Collections Buildings.

Phase 3. New Birdworld Entrance Building and carparking.

The works are anticipated to occur over the new 3-5 years.

2.2 SITE ADDRESS

Birdworld, Holt Pound Lane, Farnham, GU10 4LD.

2.3 THE CLIENT AND PROJECT TEAM

ION Consulting Engineers are employed by Birdworld & Haskins Garden Centre.

Current appointments:

Role	Company
Client	Haskins Group Ltd
Project Manager	RPS Group
Quantity Surveyor	RPS Group
Planning Consultant	MD Associates
Civil/Structural Engineer	Scott White & Hookins
Architect & Lead Design	Roberts Limbrick Limited
Highways Engineer	i-Transport LLP
Landscape Architect	The Richards Partnership
Ecology Consultant	Peter Hadfield
Mechanical Engineer	ION Consulting Engineers
Electrical Engineer	ION Consulting Engineers
CDM Principal Designer	Scott White & Hookins
BSA Principal Designer	Roberts Limbrick Limited (TBC)
BREEAM Assessor	RPS Group
Fire Consultant	Part B
Acoustic Consultant	Impact Acoustics

2.4 PROGRAMME

An initial programme for the project has been prepared by the Project Manager:

Activity	Date
Appointment	September 2023
Phase 1-3 M&E Stage 2 Design	September 2023 – January 2024
Phase 1 Start on Site	August 2024
Phase 1 Finish on Site	February 2025

Phase 2 Start on Site	January 2026
Phase 2 Finish on Site	December 2026
Phase 3 Start on Site	January 2027
Phase 3 Finish on Site	July 2027

2.5 DEVELOPMENT PLANNING STATUS

The planning submission will be made to East Hampshire District Council on 22nd January 2024. It's understood the development will need to achieve BREEAM Excellent and adhere to the requirements set within the EHDC Supplementary Planning Document. This document however does not list any absolute planning conditions, although it does advise conditions which may be implemented following the detailed planning submission, the items pertinent to the design of the M&E services are provided in Section 3 of this report.

2.6 SITE VISITS

Ryan Dorrington & James Hicks of ION Consulting Engineers have undertaken initial surveys of the Haskins Forest Lodge Garden Centre and Birdworld sites on 17/03/2022, and 27/04/2022.

2.7 RECORD INFORMATION

The following record information has been obtained for the site:

- Scottish and Southern Energy Networks Map
- South East Water Map
- South East Water Sewerage Map
- Openreach Telecoms Map
- SGN Gas Map
- Virgin Media Map

Master versions of the above maps are available separately from this document on request.

The client has provided further record information for the site based upon knowledge of the staff; however this information has not been verified. Further surveys are required to determine the extent of the onsite services distribution, these will be undertaken through the Concept Design stage.

2.8 PROCUREMENT METHOD

ION Consulting are responsible for taking the project M&E design to RIBA Stage 3 following a design and build procurement route, as per the responsibility matrix in Appendix H of this report.

ION Consulting will prepare a 'Employers Requirements' M&E tender package. The tender package will comprise specifications and concept design drawings.

The services works will be tendered by the chosen Contractors who will engage experienced services Sub-Contractors to design and install the M&E services.

ION Consulting will remain 'Client side' in a 'Checking / Design Guardian' role to monitor the performance of the Contractor through to final project completion at RIBA Stage 6.

3 POLICY, REGULATION & CERTIFICATION

The following section describes the national and local, policy and regulations, and any certification schemes relevant to the project:

3.1 DEVELOPMENT PLANNING CONDITIONS

East Hampshire District Council have provided their 'Climate Change and Sustainable Construction Supplementary Planning Document – April 2022', for which the development must comply.

The development will comply with the minimum requirements for the following policies;

- CP24 – Sustainable Construction
- CP25 – Flood Risk
- CP26 – Water resource/Water Quality
- CP27 – Pollution
- CP28 – Green Infrastructure
- CP29 – Design
- CP31 – Transport
- CSWB5 – Design
- CSWB6 – Sustainable Construction
- CSWB7 – Waste
- CSWB8 – Sustainable Water Management
- CSWB10 – Green Infrastructure
- CSWB12 – Pedestrian and Cycle Routes
- CSWB13 – Public Transport
- CSWB18 – Low Carbon Vehicles

Other relevant local policy documents include;

- Climate and Environment Strategy 2020-2025
- Hampshire County Councils Climate Change Strategy 2020-2025
- Hampshire County Councils Minerals and waste Plan 2011-2030

3.2 BUILDING REGULATIONS

Approved Document L: Conservations of Power & Fuel

The UK is committed to reaching net-zero carbon emissions by 2050. New homes and buildings within England will have to produce significantly less CO2 to help the country move towards this net-zero target.

The target requirement for the reduction in carbon emissions for new buildings is set within the Building Regulations Approved Document L. Each update to the regulations sets a lower carbon emission target than the previous version to achieve compliance.

Emphasis within the latest 2021 revision to the Building Regulations is on the adoption of a fabric-first approach; with higher minimum fabric standards for the external envelope and improved airtightness. The regulation also introduces a new 'primary energy target' accounting for power station efficiency for electricity, and energy used to produce fuel and deliver it to the building. In addition, a reduction in the carbon factor for electricity means that the use of electrically powered heating systems such as heat pumps are incentivised.

The guidance applies as follows:

- The latest 2021 revision to the Part L Building Regulations applies to all work subject to a building notice, full plans application or initial notice submitted on or after 15th June 2022.
- The previous 2018 revision to the Part L Building Regulations applies to work subject to a building notice, full plans application or initial notice submitted before 15th June 2022, but only if the works subsequently start on-site before 15th June 2023.

Approved Document B: Fire Safety

The Building Regulations Approved Document B is intended to ensure a reasonable standard of life safety in a fire. The protection of property, including the building itself, often requires additional measures beyond that mandated within these regulations.

Additionally, insurers may set higher standards of fire safety before accepting the building insurance risk.

Approved Document F: Ventilation

The Building Regulations Approved Document F is intended to protect the health of occupants of the building by providing adequate ventilation. Without adequate ventilation, mould and internal air pollution may become hazardous to health and the risk of transmission of airborne infection is increased.

Approved Document G: Sanitation, Hot Water Safety and Water Efficiency

The Building Regulations Approved Document G is intended to ensure standards for cold water supply, water efficiency, hot water supply and systems, sanitary conveniences and washing facilities, bathrooms and kitchens and food preparation areas.

Approved Document M: Accessibility to and Use of Buildings

The Building Regulations Approved Document M is intended to ensure that buildings are accessible and usable. Specifically, that people regardless of disability or age should be able to gain access to and within buildings, and use their facilities, both as visitors and as people who work within them.

Approved Document S: Infrastructure for Charging Electric Vehicles

The Building Regulations Approved Document S is intended to ensure that buildings are provided with a minimum level of electric vehicle charging provision.

3.3 BREEAM

BREEAM (Building Research Establishment Environmental Assessment Method) is a comprehensive sustainability assessment method used to evaluate the environmental performance and sustainability of buildings. It considers various factors such as energy efficiency, water usage, materials selection, waste management, and indoor environmental quality. BREEAM provides a framework for measuring and certifying the sustainability achievements of buildings, promoting sustainable design, construction, and operation practices to create more environmentally responsible and healthier built environments.

The proposed development is set to achieve a BREEAM ‘Excellent’ rating in accordance with EHDC’s ‘Climate Change and Sustainable Construction Supplementary Planning Document – April 2022’.

4 PROJECT DESIGN PRINCIPLES

The following section describes the design principles relevant to the project:

4.1 POLICY, REGULATION & CERTIFICATION

The M&E installation will comply with the full requirements of the following:

- Climate Change and Sustainable Construction Supplementary Planning Document – April 2022'
- BREEAM 'Excellent' rating.
- National Building Regulations Approved Documents.

4.2 INSURERS REQUIREMENTS

The building insurers will be consulted on the scheme to gain their approval as part of the design process, with particular attention to the fire safety requirements.

4.3 STANDARDS

The M&E installation will comply with the current versions of the following:

- Relevant British and European Standards
- Relevant CIBSE Design Guides.

4.4 CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

The M&E services design will eliminate foreseeable health and safety risks to anyone affected by the work and, where that is not possible, take steps to reduce or control those risks, including for the installation and future maintenance, repair or removal of fixed services.

4.5 DESIGN LIFE

The design life for the M&E services installation will be between 15 to 25 years, dependant on individual items of equipment. Reference life expectancy factors for various systems are provided in CIBSE Guide M, Maintenance Engineering and Management, 2014.

4.6 DESIGN FLEXIBILITY

The M&E services design will allow for flexibility in the arrangement of furniture and equipment within the offices, retail and the restaurant areas.

4.7 RESILIANCE

The mechanical and electrical systems will be simple to operate, robust in use and also be easy to maintain.

Provision of specialist systems that require unusual skills to operate and maintain will be avoided where possible.

5 BUILDING PERFORMANCE MODELLING

5.1 BUILDING REGULATIONS PART L

A thermal model of the building has been developed in the approved SBEM software, 'IES-VE Feature Pack 2 version 2023.2.0.0' to test compliance with Building Regulations Approved Document L (2021).

Compliance is achieved by performing analysis of the carbon emissions of two buildings:

- The actual building – The building as designed, but subject to standard patterns of occupancy and plant operation.
- The notional building – A version of the building that conforms to the standards defined in the National Calculation Methodology (NCM) Modelling Guide. The notional building is subject to the same occupancy and plant operation patterns as the actual building.

The analysis must demonstrate the following to satisfy compliance with the building regulations:

- That the actual building's carbon emissions and primary energy rates improve on those of the notional building.
- That the performance of building fabric and fixed building services achieve reasonable standards of overall efficiency.
- That spaces in the building have appropriate passive control measures to limit solar gains.

The resulting BRUKL report document is produced to evidence this compliance. It should be noted that the BRUKL report contained within this RIBA Stage 2 report is preliminary only.

A further preliminary BRUKL report will be produced throughout RIBA 'Stage 3 – Spatial Coordination' and RIBA 'Stage 4 - Technical Design' phase to validate the design approach (by the contractor), and a final 'as-built' BRUKL report will be produced (by the contractor) at the completion of RIBA 'Stage 6 - Handover' construction phase. This final report will be provided to building control as evidence of compliance.

Data Input

The fabric values utilised within the preliminary model are as follows:

Construction Elements U-Values – **Play Barn**		
	Proposed Building	Notional Building
Floor	0.12W/m^2.k	0.15W/m^2.k
Wall	0.15W/m^2.k	0.18W/m^2.k
Roof	0.12W/m^2.k	0.15W/m^2.k
Windows Glazing	1.20W/m^2.k	1.60W/m^2.k
Doors	1.30W/m^2.K	1.60W/m^2.k
Solar Transmittance (G-Value)		
	Proposed Building	Notional Building
Window Glazing	0.69	0.28
Light Transmittance		
	Proposed Building	Notional Building
Window Glazing	0.78	0.6

Air Permeability		
	Proposed Building	Notional Building
Permeability	5m³/hr/m² @ 50Pa	3m³/hr/m² @ 50Pa
Construction Elements U-Values – **Entrance Building**		
	Proposed Building	Notional Building
Floor	0.12W/m².k	0.15W/m².k
Wall	0.15W/m².k	0.18W/m².k
Roof	0.15W/m².k	0.15W/m².k
Windows Glazing	1.20W/m².k	1.60W/m².k
Doors	1.30W/m².K	1.60W/m².k
Solar Transmittance (G-Value)		
	Proposed Building	Notional Building
Window Glazing	0.73	0.28
Light Transmittance		
	Proposed Building	Notional Building
Window Glazing	0.78	0.6

Results

The preliminary RIBA Stage 2 'concept design' BRUKL documents are provided in Appendix C & D of this report.

5.2 PHOTOVOLTAIC

A model of each building has been developed to analyse the viability of the rooftop areas to accommodate photovoltaic panels with respect to orientation and shading.

Result

Play Barn

The analysis is based on a monocrystalline panel with an efficiency of 21.1% mounted at a pitch matching that of the roof (15°). It is proposed that PV panels are installed on the south facing roof elevations (29° from south).

A visual representation of the viability of each roof elevation is provided in Appendix A of this report.

The client has a desire to cover the entire roof where viable with PV to ensure maximum energy yield. As a result the building will have approximately 300m² of PV installed, providing a 27% reduction in BER over TER, therefore providing compliances with Building regulations Part L. The BREEAM pre-assessment requires minimum ENE 01 credits of 7, the proposed PV array for this building, along with the Entrance building & Garden Centre achieves 8 credits for ENE01.

The quantity of PV to be installed for the building will be such that the building achieves compliance with Building Regulations Part L with the actual Building Carbon Emissions being 27% below that of the Notional to allow for build tolerances and changes to the fabric properties and also such that the BREEAM ENE01 calculator achieves the targeted credits of 7. The initial BRUKL output document suggests that 300m² of PV will be required on the roof, to achieve compliance with building Regulations Part L & achieve a minimum of 7 BREEAM credits for ENE 01.

Entrance Building

The analysis is based on a monocrystalline panel with an efficiency of 21.1% mounted at a pitch matching that of the roof (28°). It is proposed that PV panels are installed on the south west facing roof elevations (75° from south).

A visual representation of the viability of each roof elevation is provided in Appendix A of this report.

The client has a desire to cover the roof where viable with PV to ensure maximum energy yield. As a result the building will have approximately 100m² of PV installed, providing a 49% reduction in BER over TER, therefore providing compliances with Building regulations Part L. The BREEAM pre-assessment requires minimum ENE 01 credits of 7, the proposed PV array for this building, along with the Play Barn & Garden Centre achieves 8 credits for ENE01.

The quantity of PV to be installed for the building will be such that the building achieves compliance with Building Regulations Part L with the actual Building Carbon Emissions being 49% below that of the Notional to allow for build tolerances and changes to the fabric properties and also such that the BREEAM ENE01 calculator achieves the targeted credits of 7. The initial BRUKL output document suggests that 100m² of PV will be required on the roof, to achieve compliance with building Regulations Part L & achieve a minimum of 7 BREEAM credits for ENE 01.

6 MECHANICAL SERVICES CONCEPT DESIGN

6.1 GAS

No new incoming gas services will be provided to the new Play Barn building or Entrance building.

There is an existing incoming gas supply serving a number of Birdworld buildings which enters from the A325, this supply is to be retained for the existing buildings. The supply is in close proximity to the new play barn building, and therefore it is imperative to undertake a below ground services scan to ensure the gas services does not impose within 1m on the building footprint, otherwise it will require re-routing.

6.2 INCOMING MAINS COLD WATER

Existing

The Birdworld and Garden centre site is currently provided with multiple water supplies, splits as follows;

- An existing Birdworld supply enters the site from Gravel Hill Road from the south.
- An existing Birdworld supply enters the site from the A325 just south of the Birdworld main entrance.
- An existing Birdworld supply enters the site from the A325 and serves the Birdworld office building – the supply is un-metered.
- An existing Garden Centre supply enters the site from the A325 towards the south of the Garden Centre car park.
- An existing Garden Centre supply enters the site from the A325 adjacent to the Garden Centre car park entrance.

It should be noted that the 2No. birdworld supplies are cross-connected within the back of the toilet block located within the centre of the site, such that if one supply is disconnected the other will continue to serve the site, subject to flow rate and pressure available. This theory should be tested prior to any permanent disconnections being made.

It's not yet understood exactly which parts of the Garden Centre are served by each supply, further investigations are therefore required.

A below ground services scan of the site is required prior to any works commencing to understand exact services routes.

Proposed – Phase 1 (Play Barn)

In Phase 1 a new incoming mains cold water supply and firefighting supply will be taken from the infrastructure within the A325. The incoming mains cold water supply will serve the new Play Barn building but be suitably sized to meet the needs to the entire Birdworld attraction at completion of all phases. A MCWS supply will be extended to the boundary of Phase 3 to serve the entire Birdworld site and the new entrance building in Phase 3 complete with suitable flushing arrangement.

The firefighting supply will be suitable for 25l/s (1500l/min) for a minimum of 30 minutes. A separate supply will enter the site from the A325 to serve a fire hydrant positioned locally to the building and at 90m intervals on the supply. The fire hydrant supply will continue to the boundary of the phase 3 works for future extension.

Proposed – Phase 2 (Garden Centre)

In Phase 2 the existing incoming Birdworld supply which enters the site from Gravel Hill Road will be stripped out and disconnected. As a result the existing birdworld infrastructure will now be served from the single incoming mains water supply from the north of the site. As detailed above, due to the cross-connection on site, the distribution should continue to operate without disruption, subject to adequate flow and pressure from the single remaining supply.

The existing incoming water supply located towards the south of the Garden Centre car park will be stripped out prior to commencement of Phase 2 to allow construction of the new roundabout and entrance. As detailed above, it's not understood which areas of the existing Garden centre this supply serves, ongoing investigations are being undertaken and therefore, a temporary supply may be required from the other existing Garden Centre supply to serve any areas cut off when this supply is removed.

A new incoming mains cold water supply and firefighting supply will be taken from the infrastructure within the A325 and Gravel Hill Road respectively. The incoming mains cold water supply will serve the new Garden Centre building.

The firefighting supply will be suitable for 25l/s (1500l/min) for a minimum of 30 minutes. A separate supply will enter the site from the Gravel Hill Road (subject to confirmation from the water authority) to serve a fire hydrant positioned locally to the building and at 90m intervals on the supply. The fire hydrant supply will continue to the boundary of the phase 3 works for future extension.

Proposed – Phase 3 (Entrance Building & Living Collections)

In Phase 3 the existing incoming water supply serving the Graden Centre from the A325 adjacent to the car park entrance will be disconnected and removed.

The mains cold water service left ready for extension in phase 1 will be extended to serve the new entrance building.

The firefighting supply left ready for extension at the boundary of Phase 1 & 2 will be extended throughout phase 3 to create a private ring main throughout all phases, with a new fire hydrant installed adjacent to the entrance building and at 90m intervals on the ring main.

The Living Collections buildings will be connected to the existing site infrastructure in the local vicinity of the buildings.

The existing Birdworld incoming mains water supply located adjacent to the existing car park entrance will be retained until such time in the future as the remaining buildings are connect to the new supply installed as part of the Phase 1 works.

Note: An application for the above works has been made to South East Water, due to the complexity of the works, the proposals need to be hydraulically modelled to understand the impact on the network. Therefore, any proposals/quotations are anticipated to be returned by March 2024.

Should there be inadequate flow or pressure in the local network, or South East water cannot guarantee the fire hydrant flow rates required, then a 45,000l storage tank will be required to serve both the Garden Centre site and the Birdworld Entrance Building and Play Barn Building.

6.3 HEATING

Play Barn

The building will typically be heated via air source heat pumps.

An air source heat pump system is a versatile solution that provides heating capabilities using electricity as a primary energy source with the efficiency of the refrigeration cycle and heat extraction form the environment to achieve an energy efficient means of heating a building. This system is designed to serve multiple heat emitter solutions, including heating coils, overdoor heaters and underfloor heating.

The air source heat pump system operates by utilising refrigerant to transfer heat. In the heating mode, the refrigerant absorbs heat from the outdoor air and delivers it to the heating coils, overdoor heaters and underfloor heating system.

The heat pump will be connected to a distribution network that serves heating coils, overdoor heaters and underfloor heating. Heating coils within air handling units are responsible for distributing conditioned air. Overdoor heaters will be positioned at the entrance to the play barn, to ensure energy is not lost from the building when the doors are opened, but also to provide a quick heat response should some energy be lost. All areas with the exception of the kitchen and play barn itself will be provided with underfloor heating.

Underfloor heating involves a network of pipes installed beneath the floor surface. These pipes circulate warm water during the heating mode, creating a comfortable and even temperature distribution across the floor.

The kitchen and play barn will be provided with heating via their respective air handlings units.

This type of HVAC system offers flexibility and energy efficiency. By utilising an air source heat pump, it can effectively meet the heating needs of the building, while heating coils, overdoor heaters and underfloor heating provide localised temperature control for enhanced comfort.

No heating will be provided to the MEP plant areas.

The air source heat pumps will be positioned externally within a dedicated compound towards the east of the Play Barn. All associated plant and equipment will be positioned in the internal plantroom positioned towards the south east corner of the building, therefore, buried external heating flow and return pipework will need to route from the air source heat pumps to the mechanical plant room. To ensure adequate air flow to the air source heat pumps, the compound will be louvred. The exact location and technical design of the ASHPs is to be confirmed through developed design stage.

Heating controls will be via localised room temperature sensors controlled via the BMS.

Entrance Building

The building will typically be heated via air source heat pumps.

An air source heat pump system is a versatile solution that provides heating capabilities using electricity as a primary energy source with the efficiency of the refrigeration cycle and heat extraction form the environment to achieve an energy efficient means of heating a building. This system is designed to serve multiple heat emitter solutions, including heating coils, overdoor heaters and underfloor heating.

The air source heat pump system operates by utilising refrigerant to transfer heat. In the heating mode, the refrigerant absorbs heat from the outdoor air and delivers it to the heating coils, overdoor heaters and underfloor heating system.

The heat pump will be connected to a distribution network that serves heating coils, overdoor heaters and underfloor heating. Heating coils within air handling units are responsible for distributing conditioned air. Overdoor heaters will be positioned at the entrances and exits to the gift shop, to ensure energy is not lost from the building when the doors are opened, but also to provide a quick heat response should some energy be lost. All areas with the exception of the 2 person office, open plan office, meeting room, staff kitchen and IT comms rooms will be provided with underfloor heating.

Underfloor heating involves a network of pipes installed beneath the floor surface. These pipes circulate warm water during the heating mode, creating a comfortable and even temperature distribution across the floor.

This type of HVAC system offers flexibility and energy efficiency. By utilising an air source heat pump, it can effectively meet the heating needs of the building, while heating coils, overdoor heaters and underfloor heating provide localised temperature control for enhanced comfort.

No heating will be provided to the MEP plant areas.

The air source heat pumps will be positioned externally within a dedicated compound towards the east of the Entrance Building adjacent to the warehouse area. All associated plant and equipment will be positioned in the internal plantroom, therefore, buried external heating flow and return pipework will need to route from the air source heat pumps to the mechanical plant room. To ensure adequate air flow to the air source heat pumps, the compound will be louvred. The exact location and technical design of the ASHPs is to be confirmed through developed design stage.

Heating controls will be via localised room temperature sensors controlled via the BMS.

6.4 COOLING

The cooling requirements for the building have been dictated following production of BREEAM HEA 04 Thermal Comfort calculations and subsequent report.

Mechanical cooling will be provided to the following areas;

Play Barn

- 2 Person Office

Entrance Building

- 2 Person Office

- Open Plan Office
- Meeting Room
- Staff Kitchen
- IT Room

Cooling will be provided by means of localised DX 1-1 or multi split units. Direct Expansion (DX) air conditioning systems offer an efficient approach to providing mechanical cooling. DX air conditioning systems operate on the principle of direct heat exchange between the refrigerant and the air within a space.

Where DX systems are provided with duct mounted cooling coils, these will be controlled via localised room temperature sensors in conjunction with the BMS.

Individual room AC units will be controlled via a combination of localised room temperature sensors, and the BMS.

Note: within the play barn building commercial catering fridges and freezers will require external condensers (by specialist) it is anticipated these will be located adjacent to the air source heat pump within a compound towards the east of the building.

6.5 VENTILATION

Play Barn

The building will utilise mechanical ventilation means to provide a comfortable internal environment and air quality for the occupants.

The café seating area will utilise a mechanical heat recovery ventilation unit to operate when the space is occupied to provide tempered fresh air to the café seating area. The units will be capable of meeting the heating needs of the fresh air via an integral LTHW heating coil. This will be controlled via a combination of CO2 sensors and room temperature sensors in conjunction with the BMS. The air handling unit will be positioned in the roof level plant area above.

Mechanical ventilation will be provided to the kitchen areas and will include the following;

- Main canopy extract fan
- Main canopy/kitchen supply air fan (inc. heating coil) Note: 80% of total extract air volume.
- Condense canopy extract fan

Kitchen ventilation system will be manually controlled.

WCs will utilise a mechanical heat recovery ventilation unit to operate when the spaces are occupied to provide tempered fresh air to each area. Where ducted ac units are installed fresh air will terminate at the back of each fan coil unit, otherwise, fresh air will be ducted directly into each space. Heat recovery units will typically be positioned within the roof void areas above. Heat recovery units will be controlled via a combination of PIR sensors, CO2 sensors and temperature sensors in conjunction with the BMS.

The small office will utilise a mechanical heat recovery ventilation unit to operate when the space is occupied to provide tempered fresh air. Where ducted ac units are installed fresh air will terminate at the back of each fan coil unit, otherwise, fresh air will be ducted directly into each space. Heat recovery units will typically be positioned within the roof void areas above. Heat recovery units will be controlled via a combination of PIR sensors, CO2 sensors and temperature sensors in conjunction with the BMS.

The COSHH will be provided with extract air ventilation via a localised inline extract fan positioned locally and will operate continuously. Make-up air will be provided by a door transfer grille.

The heat recovery ventilation units will recover in excess of 70% the heat from the extract air to pre-heat the incoming fresh air, each MVHR unit will be provided with an integral heating coil to ensure supply air conditions do not create draughts for occupants. Each MVHR unit will also be complete with a by-pass damper around the heat recovery coil to allow the units to provide cooling via ventilation and to operate out of hours to provide nighttime cooling to the building as required.

Entrance Building

The building will utilise mechanical ventilation means to provide a comfortable internal environment and air quality for the occupants.

The gift shop/tills will utilise a mechanical heat recovery ventilation unit to operate when the space is occupied to provide tempered fresh air to the gift shop/tills. The unit will be capable of meeting the heating needs of the fresh air via an integral LTHW heating coil. This will be controlled via a combination of CO2 sensors and room temperature sensors in conjunction with the BMS. The air handling unit will be positioned locally.

WC, Shower & Changing Areas will be provided with extract air ventilation via localised inline extract fans, the fans will operate via a PIR complete with overrun timer. Make-up air will be provided by a door transfer grille.

All office areas and meeting rooms will utilise a mechanical heat recovery ventilation unit to operate when the spaces are occupied to provide tempered fresh air to each area. Where ducted ac units are installed fresh air will terminate at the back of each fan coil unit, otherwise, fresh air will be ducted directly into each space. Heat recovery units will typically be positioned within the roof void areas above. Heat recovery units will be controlled via a combination of PIR sensors, CO2 sensors and temperature sensors in conjunction with the BMS.

The first aid room, utility room, copy room and IT comms room will be provided with extract air ventilation via local inline extract fans, the first aid room and copy room will operate via a PIR complete with overrun timer whilst the utility room and IT comms room will operate continuously. Make-up air will be provided by a door transfer grille.

The heat recovery ventilation units will recover in excess of 70% the heat from the extract air to pre-heat the incoming fresh air, each MVHR unit will be provided with an integral heating coil to ensure supply air conditions do not create draughts for occupants. Each MVHR unit will also be complete with a by-pass damper around the heat recovery coil to allow the units to provide cooling via ventilation and to operate out of hours to provide nighttime cooling to the building as required.

6.6 DOMESTIC COLD WATER

Play Barn & Entrance Building

A new incoming mains cold water service will be provided to serve the Play Barn presented within the mechanical plantroom towards the southeast corner of the building complete with appropriate isolation and backflow protection to meet the local utility company requirements. The incoming water supply will serve the new heating systems filling loop, and the site wide break tank and booster set.

The Birdworld site will be provided with a combined break tank and booster set to ensure adequate flow and pressure is provided to all sanitary outlets throughout the building. The break tank will be positioned externally towards the east of the building. The break tank will incorporate a split compartment to allow maintenance to occur without disruption to the site operation. The tank will serve the Play Barn, Entrance Building and be capable of serving the entire Birdworld site.

The break tank and booster set will serve all sanitaryware and appliances throughout the Play barn and Entrance building.

Separate metering will be provided to each building, with further sub-metering provided to separate areas of the building.

6.7 DOMESTIC HOT WATER

Play Barn

Domestic hot water services to the Play Barn will be provided via 2No. commercial electric boilers coupled with hot water storage cylinders. The hot water boilers will utilise energy from the roof mounted PV system to generate hot water. The system will utilise 2 separate hot water boilers and cylinders to allow maintenance of the hot water system without disruption to the building, but also provide resilience should a component fail.

Wash hand basins will be provided with a thermostatic mixing valve where it does not form an integral part of the tap specification.

No provision has been made for boiling hot water taps or similar.

Entrance Building

Domestic hot water services to the Entrance building will be provided via 2No. commercial electric boilers coupled with hot water storage cylinders. The hot water boilers will utilise energy from the roof mounted PV system to generate hot water. The system will utilise 2 separate hot water boilers and

cylinders to allow maintenance of the hot water system without disruption to the building, but also provide resilience should a component fail.

Wash hand basins will be provided with a thermostatic mixing valve where it does not form an integral part of the tap specification.

No provision has been made for boiling hot water taps or similar.

6.8 ABOVE GROUND DRAINAGE

New above ground drainage will be provided to sanitaryware throughout the buildings.

Condensate wastes will be provided to all MVHR units, and fan coil units as required.

The plant areas will be provided with a floor gully to collect water from any leaks and allow a termination position for safety valves and overflows.

- kitchen above ground drainage system (including enzyme treatment system).
- Above ground drainage will be provided to all sanitaryware throughout the building, carefully coordinated with the below ground drainage.
- Further drainage points will be necessary for AC condensate, boiler condense, plantroom safety valves etc.

6.9 SERVICE DISTRIBUTION

Mechanical services distribution is to be routed using common service route wherever possible, combined and integrated into the building structure with careful consideration given to services which are ‘on-show’.

7 ELECTRICAL SERVICES CONCEPT DESIGN

7.1 INCOMING ELECTRICAL SERVICES

The incoming electrical supply to the Birdworld site will be via a new ground mounted SSEN substation located near the entrance building. The substation will be used to supply the Birdworld site including car park, EV chargers, entrance building, play barn, external attractions, service yard and other back-of-house areas.

The substation will comprise an SSEN specification Holly Green 14C39 GRP enclosure complete with double hinged doors and ventilation louvres, mounted on a concrete base. Incoming and outgoing HV and LV cabling to the substation will be routed below ground.

A client owned main electrical feeder pillar will be installed close to the new SSEN substation.

The main electrical feeder pillar will comprise a minimum IP55 Holly Green 14C39 painted galvanised steel enclosure. The enclosure will contain the incoming electrical MPAN meter, incoming ACB, outgoing MCCB devices and other ancillary equipment. The outgoing devices will distribute the supply to a range of buildings and areas across the Birdworld site. The incoming and outgoing LV cabling to the electrical feeder pillar will be routed below ground.

The existing SSEN electrical supply serving the Birdworld site is currently derived from a pole mounted transformer located in the north-east corner of the site. The existing SSEN supply will be disconnected and removed following the establishment of the new supply.

7.2 ELECTRICAL DISTRIBUTION

MCCB panel boards will be minimum Form 3 type 2 and fitted with lockable covers. Adjacent meter enclosures will be selected as required to satisfy the sub-metering requirements.

Single and split-load MCB distribution boards will be selected as required to satisfy the sub-metering requirements. All MCB boards will be manufactured to BS EN 60439-3 and fitted with lockable doors.

All distribution equipment will be located discretely and securely in back-of-house areas and service cupboards with equipment sized to allow for 25% spare capacity.

Play Barn:

A small MCCB distribution panel will be installed within the Play Barn main M&E equipment plant room to provide safe and reliable primary electrical distribution across the building.

The MCCB distribution panel will distribute power to MCB final circuit distribution boards and other large individual loads across the building, including but not limited to PV system, front-house house, kitchen / café, mechanical services, and external lighting MCB distribution boards.

Entrance Building:

A small MCCB distribution panel will be installed within the Entrance Building main M&E equipment plant room to provide safe and reliable primary distribution across the building. The MCCB distribution panel will distribute power to MCB final circuit distribution boards and other large individual loads across the building, including but not limited to PV system, gift shop / entrance, office, mechanical services, IT, and external lighting distribution boards.

7.3 LIGHTNING PROTECTION

A lightning protection system will be provided to each building, designed to prevent damage to the building and injury to occupants as a result of a lightning strike.

The design of each system will be subject to a risk assessment carried out by a specialist in compliance with BS EN 62305 & BS 7430.

The building construction may utilize the available steel work or may necessitate the use of separate earth tapes and arrays fixed to the free surface of the building fabric. These will be concealed behind rainwater down pipes or other discrete locations in order not to compromise the aesthetics of the facades.

7.4 SURGE PROTECTION

A combined lightning and surge arrestor device will be provided either within or adjacent to each electrical distribution panel and distribution board.

The new PV inverters provided as part of the PV arrays will be provided with integral surge protection devices.

7.5 EARTHING & BONDING

Earthing and bonding systems will be provided to meet all statutory and regulatory requirements.

All extraneous metalwork will be earthed including but not limited to the following:

- Incoming Services
- Building Structure
- Lightning protection System
- Mechanical Services
- Enclosures and IT Equipment

7.6 ENERGY METERING

Comprehensive energy monitoring will be provided across the installation in compliance with BREEAM requirements.

The meters will be integrated into each buildings BMS system to provide energy monitoring and management capability for the building user.

7.7 PHOTOVOLTAIC

A photovoltaic array will be installed on the roof of the Play Barn and Entrance buildings.

The photovoltaic inverters will be located discretely within a back-of-house area in each building.

The photovoltaic installation will provide primary benefit to the building user, reducing the electrical demand of the building from the local electricity network. Any surplus energy will be exported to the local energy network.

The Photovoltaic installation will include monitoring functionality to provide the client granular import, generation and export consumption data.

7.8 CABLING

Primary Electrical Distribution will comprise multi-core armoured cables to BS 6724, with full sized neutrals.

Final circuits for small power services and lighting will generally comprise twin and earth LSZH sheathed & insulated cable 624*B or LSZH multicore flex 318*B cable.

7.9 CONTAINMENT

The cable management system within each building will comprise segregated pathway for final distribution cables, sub-mains cabling, fire alarm, ELV systems (i.e. security, BMS) and data systems. The containment systems will be sufficiently sized to account for future service alterations.

The main containment routes within building will generally be concealed above a suspended ceilings where possible. Within areas where no ceiling voids are available the containment systems, routes and finishes will be carefully considered to align with the architectural and interior design requirements of the space.

Suitable ceiling access hatches will be provided as required to ensure ongoing access to containment routes.

Where appropriate and in areas with high numbers of socket outlets (for example office areas), surface mounted multi-compartment dado trunking will be installed.

7.10 SMALL POWER SUPPLIES

Supplies to mechanical plant and PV systems will be provided via suitable isolators containing a lock off facility.

All accessories will typically be of white / coloured plastic in front of house areas with metal finish within plant room areas etc.

Within front-of-house areas decorative accessories finishes will be provided as agreed with architect and interior designer.

BS4343 (IP 65) socket outlets and isolators will be provided as required.

Supplies will include but not be limited to:

- Mechanical services equipment.
- EV Chargers.
- Kitchen and front of house catering.
- General small power outlets.
- Fire alarm system.
- Security alarm system.
- Disabled WC Alarm system.
- PA system.
- Door access controls.
- Motorised doors.
- Data racks & UPS equipment
- Hand driers / Auto flushes / Sensor Taps.
- EAS Pedestals.
- AV Equipment.
- CCTV Equipment.
- Cleaning sockets (not less than 12m intervals)

Electric hand dryers will be provided in toilets as specified in the Architects sanitaryware package. A fused connection unit supplying the hand dryers will be located at high level above each hand dryer.

7.11 MOTORISED DOORS

Play Barn:

Motorised sliding doors will be provided at the following locations:

- Public entry doors between the car park and Play Barn.

The doors will each be provided with closed, open and automatic key-switch controls. The automatic function will comprise overdoor proximity sensors.

Entrance Building:

Motorised sliding doors will be provided at the following locations:

- Public entry doors between the car park and Entrance Building.
- Public entry doors between the entrance building and Birdworld site.
- Public entry doors between the Birdworld site and Entrance Building Shop.
- Public exit doors between the Entrance Building Shop and car park.

The doors will each be provided with closed, open and automatic key-switch controls. The automatic function will comprise overdoor proximity sensors.

7.12 DOOR ACCESS CONTROL

Door access control will be provided in building at the demarcation between front-of-house and back-of-house areas in order to prevent unauthorised entry to private areas by the public.

Door controllers for the access-controlled doors will be located discretely typically within services cupboards and other non-customer facing areas.

All doors will be interfaced to the fire alarm system in the associated building and programmed to operate under an alarm condition in agreement with the fire consultants fire strategy report.

7.13 TELECOMMUNICATIONS

Telephony services will be provided to the buildings via a series of below ground ducts and pits. The Openreach duct infrastructure will rise within a secure area of the building.

Below ground client communication ducts will be installed across the site, complete with suitable draw pits. The client duct infrastructure will rise within a secure area of the buildings allowing connection of the clients private IT network between various buildings and areas of the site.

The provision of the incoming telephony services from external providers will be by the client.

7.14 STRUCTURED CABLING

Cross site private fibre links will be provided between buildings and areas of the site.

A structured internal cabling installation will be provided throughout each of the buildings.

The structured cabling system will comprise CAT6A cabling run in dedicated discrete data cabling containment with suitable separation from other services.

It is anticipated that IT racks or cabinets will be installed in a secure area of each building. The IT system specification including the requirements for interactive displays, displays, TV's, wireless access points and other hardware across each site will be finalised with the client.

Uninterruptable Power Supplies (UPS) will be provided as required to support the IT infrastructure, the equipment will be located within the IT equipment spaces, typically within the equipment rack or cabinet.

7.15 CCTV

A new CCTV system will be provided to the buildings, including both internal and external areas.

The CCTV system will be provided via the data network in accordance with the requirements that fully complies with BS 7958.

Cabling to camera positions will be routed discretely within common containment pathways.

Cabling to external cameras will be routed within building, connecting directly to the rear of each camera position. The requirement for additional CCTV movement sensors, audio speakers and lighting will be confirmed during the specialist CCTV design.

Digital recording equipment and any local viewing equipment will be located in compliance with GDPR regulations.

7.16 INTRUDER ALARM SYSTEM

A comprehensive intruder alarm system will be provided to each of the buildings.

New intruder detection and alarm system will be provided in accordance with the specific security grade & environmental class that satisfies the requirements of the client and building insurer.

The system will include but not be limited to window contacts, door contacts, vibration sensors, PIRs, internal and external sounders.

Panic alarms will be installed at various locations across the buildings, typically at point-of-sale positions.

Arm/disarm keypads will be provided at staff entrance lobby's.

7.17 EAS (ELECTRONIC ARTICLE SURVEILLANCE)

Entrance Building

An EAC pedestal system will be installed and entry / exit doors form he gift shop. The system is designed to detect security tags on items of high value equipment and thus to prevent the removal of unpaid items from the store.

7.18 TURNSTYLES

Entrance Building

Entrance turnstiles and accessible gates will be provided within the Main Entrance Building to manage access to the site. As necessary, suitable electrical and data supplies will be provided to the equipment pedestals via underground ducts.

7.19 WORKFORCE MANAGEMENT SYSTEM

Entrance Building

A biometric workforce management system will be installed to facilitate employee sign-in/sign-out. The system will be installed close to the side staff entrance to the building.

7.20 PUBLIC ADDRESS SYSTEM

A new public address system will be provided and installed with the building suitable for voice (tannoy) announcements and music playback, compliant with BS 6259:2015.

The system will include a central undercounter rack located at the main information / reception desk areas of the buildings. The system scope and coverage will be developed by the client.

The PA system will be interfaced to the fire alarm system to inhibit music playback upon activation of the fire alarm. The fire alarm system will not be used as a voice alarm systems.

7.21 INTERNAL LIGHTING

Internal lighting will be LED low energy type throughout, compliant with CIBSE SLL Guides.

Lighting control methodology and zoning within buildings will be compliant with BREEAM requirements.

All lighting switches / accessories will typically be white / coloured plastic, with metal finish within plant room areas etc. IP 65 rated switches will be provided in wet and hazardous areas.

The lighting within toilet and back-of-house areas will comprise automatic PIR controls.

The lighting within the front-of-house areas and M&E plant rooms will typically comprise manual controls.

The light fittings will be selected to achieve lighting to minimise contrast and achieve a good average level of illuminance. Particular attention will be paid to ensuring that walls and ceilings are illuminated to enhance the building appearance.

7.22 EMERGENCY LIGHTING

All emergency lighting will generally be LED type complete with 3-hour duration in compliance with BS 5266 and Building Regulations.

Additional safety emergency lighting will be installed in high-risk plant areas.

Exit signs will be illuminated by local emergency lighting.

A key switch testing facility will be provided that will require enhanced input from the building user in order to maintain the building emergency lighting system in compliance with BS 5266.

7.23 EXTERNAL LIGHTING

Internal lighting will be LED low energy type throughout, compliant with CIBSE SLL Guides.

Lighting control and zoning will be compliant with BREEAM requirements.

For further details refer to the separate external lighting strategy document.

7.24 FIRE ALARM AND DETECTION

A fire alarm system will be installed within each building in compliance with the BS5839-1 system category required by the fire engineer and building insurer.

The fire alarm panel will be located adjacent to the main entrance doors to each building.

Door hold open devices will be provided as required by the fire engineer to provide compartmentation as required by the fire engineer and building insurer.

Visual fire alarm warning indicators are to be provided to alert occupants with sensory disabilities of an alarm situation.

Input/output Interface modules will be provided to signal third party equipment upon alarm activation.

automatic smoke detectors, heat detectors, and manual break glass call points will be located throughout the building to detect a fire condition. Break Glass Units will be provided with plastic drop down covers.

7.25 ACCESSIBLE WASHROOM ALARMS

A new localised disabled WC alarm will be provided to a public and staff accessible washrooms.

The overdoor buzzer and warning lamp will be provided above each washroom door.

All alarms will be relayed to a central annunciation panel located at the public information desk.

7.26 ELECTRIC CAR CHARGING

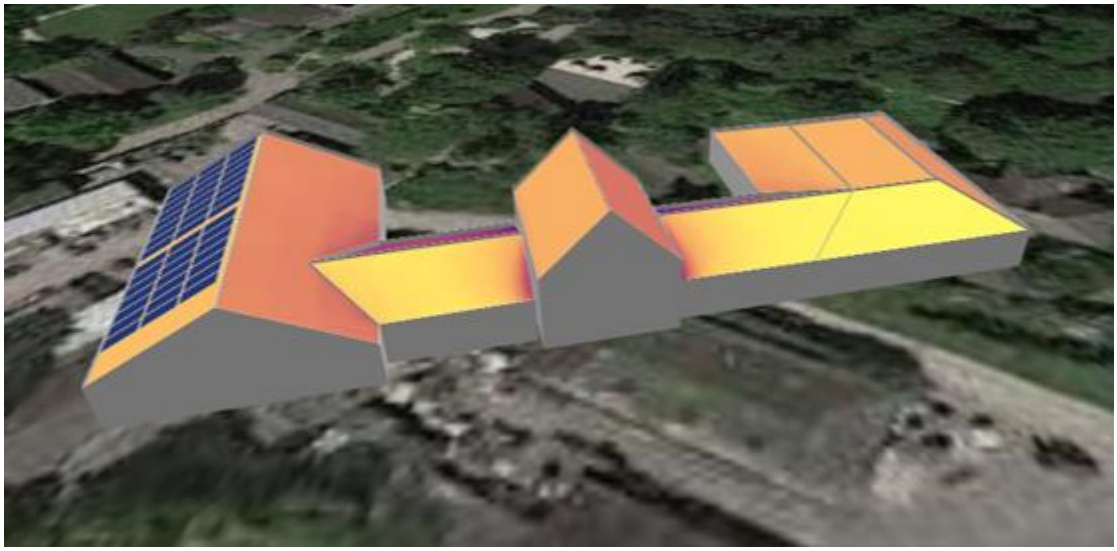
EV chargers will be installed within the Birdworld public car park in compliance with Building Regulations Part S, local planning and client requirements.

EV chargers will be supplied from a nearby electrical feeder pillar.

The Ev charging system will be cloud connected to allow management of the use chargers and to facilitate load management of the installation.

8 APPENDIX A: PHOTOVOLTAIC ASSESSMENT MODEL

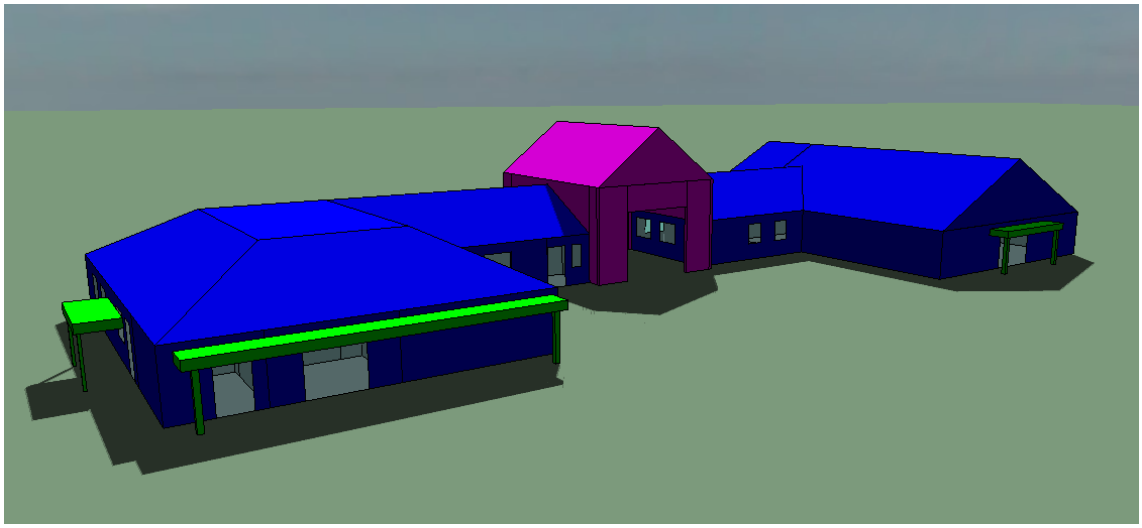
8.1 ENTRANCE BUILDING IMAGES



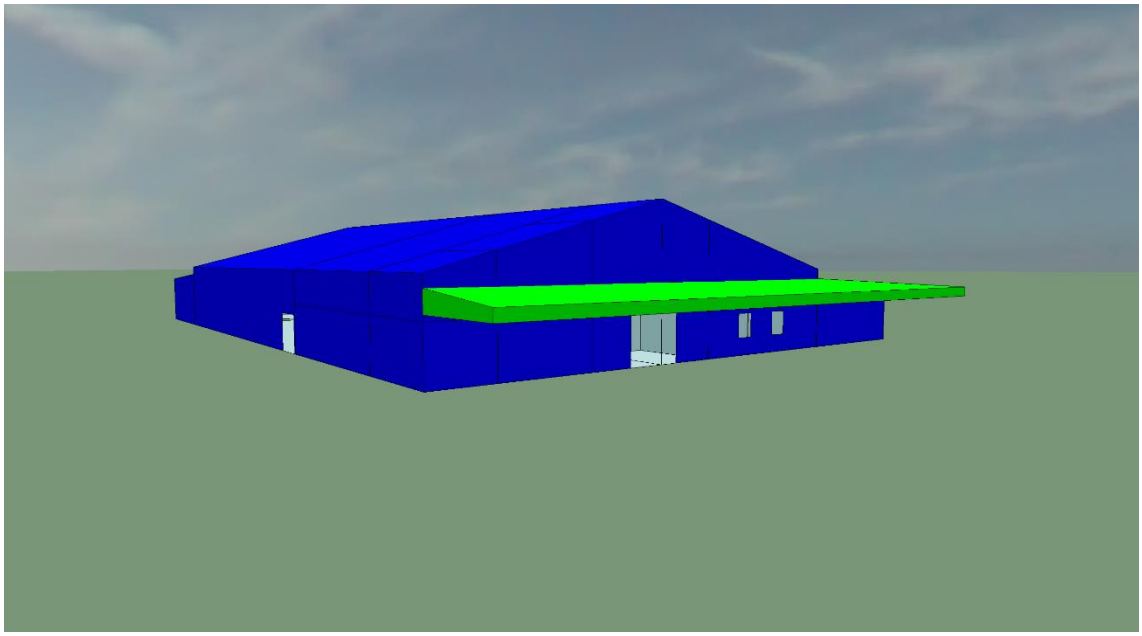
8.2 PLAY BARN IMAGES

9 APPENDIX B: RIBA STAGE 2 SBEM MODEL

9.1 ENTRANCE BUILDING IMAGE



9.2 PLAY BARN IMAGE



10 APPENDIX C: RIBA STAGE 2 BRUKL REPORT

10.1 ENTRANCE BUILDING BRUKL REPORT

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Birdworld Entrance Building — As designed

Date: Fri Dec 15 11:38:23 2023

Administrative information

Building Details

Address: Birdworld Entrance Building, Farnham, GU10 4LD

Certifier details

Name: Neil Bajaj

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.23

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.23

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

Foundation area [m²]: 907.27

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	4.36	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	2.21	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	46.11	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	20.56	
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.26	GF000002:Surf[5]
Floors	0.18	0.12	0.12	1_000004:Surf[0]
Pitched roofs	0.16	0.13	0.15	GF000002:Surf[0]
Flat roofs	0.18	0.12	0.15	GF000002:Surf[18]
Windows** and roof windows	1.6	1.2	1.2	1_000004:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)] — $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

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

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

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

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

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	5

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Building services

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

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

1- UFH + NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- DX System + HR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	-	0.7
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

3- UFH + Ext

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- UFH + HR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	0.7
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
MEETING ROOM	-	-	-	1.5	-	-	-	-	-	-	N/A
FIRST AID	-	-	0.5	-	-	-	-	-	-	-	N/A
ACC WC 1	-	-	0.5	-	-	-	-	-	-	-	N/A
SHOWER	-	-	0.5	-	-	-	-	-	-	-	N/A
WC 2	-	-	0.5	-	-	-	-	-	-	-	N/A
WC 1	-	-	0.5	-	-	-	-	-	-	-	N/A
STAFF/KITCHEN AREA	-	-	-	1.5	-	-	-	-	-	-	N/A
COPY ROOM	-	-	0.5	-	-	-	-	-	-	-	N/A
UTILITY	-	-	0.5	-	-	-	-	-	-	-	N/A
OPEN PLAN OFFICE	-	-	-	1.5	-	-	-	-	-	-	N/A
ACC WC 2	-	-	0.5	-	-	-	-	-	-	-	N/A
ACC WC 3	-	-	0.5	-	-	-	-	-	-	-	N/A
IT	-	-	0.5	-	-	-	-	-	-	-	N/A
OFFICE 2 PERSON	-	-	-	1.5	-	-	-	-	-	-	N/A
WC'S	-	-	0.5	-	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
STORAGE	120	-	-
MEETING ROOM	120	-	-
CLNR	120	-	-
FIRST AID	120	-	-
CIRCULATION	120	-	-
ACC WC 1	120	-	-
SHOWER	120	-	-
WC LOBBY	120	-	-
WC 2	120	-	-
WC 1	120	-	-
CHANGING PLACE	120	-	-
STAFF/KITCHEN AREA	120	-	-
COPY ROOM	120	-	-
UTILITY	120	-	-
OPEN PLAN OFFICE	120	-	-
ACC WC 2	120	-	-
ACC WC 3	120	-	-
IT	120	-	-
OFFICE 2 PERSON	120	-	-
WC'S	120	-	-
GIFT SHOP	120	120	1.25

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
MEETING ROOM	NO (-71.5%)	NO
STAFF/KITCHEN AREA	NO (-59.4%)	NO
OPEN PLAN OFFICE	YES (+33.3%)	NO
IT	N/A	N/A
OFFICE 2 PERSON	NO (-73.9%)	NO
GIFT SHOP	NO (-34.9%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	644.3	644.3
External area [m²]	1845.4	1845.4
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	304.18	406.57
Average U-value [W/m²K]	0.16	0.22
Alpha value* [%]	27.1	10

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

Building Use

% Area	Building Type
100	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	8.69	11.99
Cooling	2.13	0.94
Auxiliary	7.31	3.14
Lighting	17.39	12.51
Hot water	8.92	2.17
Equipment*	26.56	26.56
TOTAL**	**44.44**	**30.75**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	32.16	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*32.16*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	118.69	135.5
Primary energy [kWh_{PE}/m²]	20.56	46.11
Total emissions [kg/m²]	2.21	4.36

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	103.2	0	10	0	3.4	2.86	0	3.2	0
	Notional	119.6	0	12	0	1.9	2.78	0	---	---
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	90.6	0	8.8	0	8.5	2.86	0	3.2	0
	Notional	161	0	16.1	0	8.5	2.78	0	---	---
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	45.3	131.7	3.4	10.3	6.3	3.73	3.55	4	5
	Notional	69.8	75.5	7	4.5	3.6	2.78	4.63	---	---
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	119.9	0	11.7	0	2.2	2.86	0	3.2	0
	Notional	156.2	0	15.6	0	1.2	2.78	0	---	---
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	---	---

Key to terms

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

10.2 PLAY BARN BRUKL REPORT

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Birdworld Play Barn

As designed

Date: Fri Dec 15 12:09:50 2023

Administrative information

Building Details

Address: Birdworld Play Barn, Farnham, GU10 4LD

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.23

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.23

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

Certifier details

Name: Neil Bajaj

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 1782.12

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	7.02	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	5.1	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	75.42	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	51.73	
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	2_000019:Surf[0]
Floors	0.18	0.12	0.12	2_000017:Surf[0]
Pitched roofs	0.16	0.12	0.12	2_000017:Surf[6]
Flat roofs	0.18	0.12	0.12	2_000019:Surf[2]
Windows** and roof windows	1.6	1.2	1.2	2_000017:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
* 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.
^ For fire doors, limiting U-value is 1.8 W/m^2K
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	5

Building services

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

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

1- UFH + HR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	0.7
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- UFH + NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

3- UFH + Mech Vent (Kitchen)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- UFH + Ext

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	-	0.2	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

5- DX + HR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	-	0.7
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

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

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
PLAY	-	-	-	1.9	-	-	-	-	-	-	N/A
WC	-	-	-	1.9	-	-	-	-	-	-	N/A
CAFE SEATING	-	-	-	1.9	-	-	-	-	-	-	N/A
KITCHEN	-	-	-	1.1	-	-	-	-	1	-	N/A
PARTY ALCOVE 3	-	-	-	1.9	-	-	-	-	-	-	N/A
PARTY ALCOVE 2	-	-	-	1.9	-	-	-	-	-	-	N/A
PARTY ALCOVE 1	-	-	-	1.9	-	-	-	-	-	-	N/A
COSHH	-	-	0.5	-	-	-	-	-	-	-	N/A
PARTY ALCOVE 4	-	-	-	1.9	-	-	-	-	-	-	N/A
OFFICE	-	-	-	1.5	-	-	-	-	-	-	N/A
STAFF CHANGE	-	-	-	1.9	-	-	-	-	-	-	N/A
STAFF WC 2	-	-	-	1.9	-	-	-	-	-	-	N/A
STAFF WC 1	-	-	-	1.9	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
PLAY	120	-	-
CHANGING PLACE	120	-	-
WC	120	-	-
ENTRANCE LOBBY	120	-	-
SERVICE AREA	120	-	-
CAFE SEATING	120	-	-
KITCHEN	120	-	-
CORRIDOR ADJACENT TO KITCHEN	120	-	-
WALK IN FREEZER	120	-	-
STORAGE	120	-	-
WALK IN FRIDGE	120	-	-
CORRIDOR ADJACENT TO PLAY	120	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
CORRIDOR ADJACENT TO OFFICE	120	-	-
PARTY ALCOVE 3	120	-	-
PARTY ALCOVE 2	120	-	-
PARTY ALCOVE 1	120	-	-
COSHH	120	-	-
CLEANERS	120	-	-
PARTY ALCOVE 4	120	-	-
PLANT	120	-	-
OFFICE	120	-	-
STAFF CHANGE	120	-	-
STAFF WC 2	120	-	-
STAFF WC 1	120	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
PLAY	NO (-90.8%)	NO
CAFE SEATING	NO (-94.9%)	NO
PARTY ALCOVE 3	NO (-98%)	NO
PARTY ALCOVE 2	NO (-98%)	NO
PARTY ALCOVE 1	NO (-98%)	NO
PARTY ALCOVE 4	NO (-97.9%)	NO
OFFICE	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	1540.6	1540.6
External area [m²]	3874.3	3874.3
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	4
Average conductance [W/K]	513.25	1044.11
Average U-value [W/m²K]	0.13	0.27
Alpha value* [%]	25.14	10

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
100	**General Assembly and Leisure, Night Clubs, and Theatres**
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.23	7.52
Cooling	0.18	0.12
Auxiliary	13.98	6.64
Lighting	18.1	6.31
Hot water	39.08	30.14
Equipment*	30.28	30.28
TOTAL**	75.57	50.73

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	42.84	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*42.84*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	45.91	77.28
Primary energy [kWh_{PE}/m²]	51.73	75.42
Total emissions [kg/m²]	5.1	7.02

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	38.5	0	3.7	0	6.6	2.86	0	3.2	0
	Notional	72.2	0	7.2	0	3.1	2.78	0	---	---
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	5.7	0	0.6	0	124.6	2.86	0	3.2	0
	Notional	0.8	0	0.1	0	68.4	2.78	0	---	---
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	121.9	0	11.9	0	15.1	2.86	0	3.2	0
	Notional	165.5	0	16.5	0	15.6	2.78	0	---	---
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	68.9	250.1	5.1	19.6	3.2	3.73	3.55	4	5
	Notional	73.5	223.4	7.4	13.4	1.8	2.78	4.63	---	---
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	155	0	15.1	0	2.8	2.86	0	3.2	0
	Notional	198.6	0	19.8	0	1.6	2.78	0	---	---
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	---	---

Key to terms

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

11 APPENDIX E: RIBA STAGE 2 EPC

11.1 ENTRANCE BUILDING EPC

Energy Performance Certificate
Non-Domestic Building

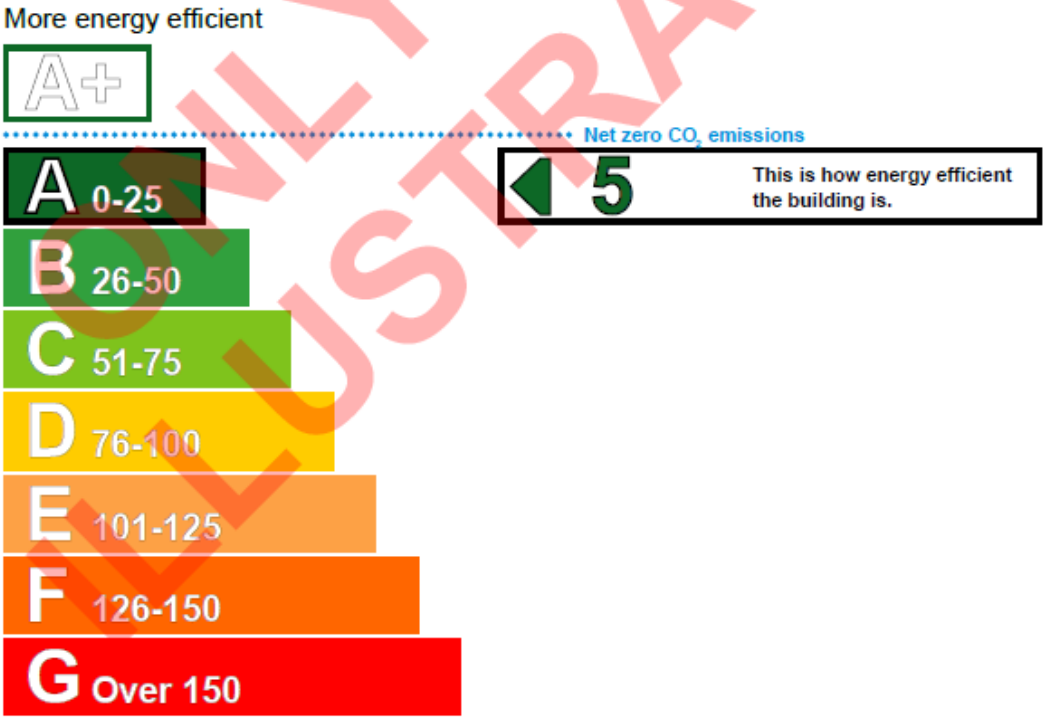
HM Government

Birdworld Entrance Building
Holt Pound Ln
Farnham
GU10 4LD

Certificate Reference Number:
2768-7513-7549-1826-4315

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

Energy Performance Asset Rating



Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Heating and Mechanical Ventilation
Total useful floor area (m^2):	644.264
Building complexity:	Level 5
Building emission rate ($kgCO_2/m^2$ per year):	2.21
Primary energy use (kWh_{pe}/m^2 per year):	20.56

Benchmarks

Buildings similar to this one could have ratings as follows:

10 If newly built

41 If typical of the existing stock

Administrative information

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

Assessment Software:	Virtual Environment v7.0.23 using calculation engine ApacheSim v7.0.23
Property Reference:	UPRN-000000000000
Assessor Name:	Neil Bajaj
Assessor Number:	EES/027663
Accreditation Scheme:	Elmhurst Energy Systems
Assessor Qualifications:	NOS5
Employer/Trading Name:	Trading Name
Employer/Trading Address:	Trading Address
Issue Date:	15 Dec 2023
Valid Until:	14 Dec 2033 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 9167-2155-7761-7963-8888

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Elmhurst Energy Systems. You can obtain contact details of the Accreditation Scheme at www.elmhurstenergy.co.uk.

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

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

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

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

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

11.2 PLAY BARN EPC

Energy Performance Certificate

HM Government

Non-Domestic Building

Birdworld Play Barn
Holt Pound Ln
Farnham
GU10 4LD

Certificate Reference Number:
8468-5843-1088-8251-5524

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

Energy Performance Asset Rating

More energy efficient

A+

Net zero CO_2 emissions

A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

9 This is how energy efficient the building is.

Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Heating and Mechanical Ventilation
Total useful floor area (m^2):	1540.640
Building complexity:	Level 5
Building emission rate ($kgCO_2/m^2$ per year):	5.1
Primary energy use (kWh_{pe}/m^2 per year):	51.73

Benchmarks

Buildings similar to this one could have ratings as follows:

13 If newly built

51 If typical of the existing stock

Administrative information

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

Assessment Software:	Virtual Environment v7.0.23 using calculation engine ApacheSim v7.0.23
Property Reference:	UPRN-000000000000
Assessor Name:	Neil Bajaj
Assessor Number:	EES/027663
Accreditation Scheme:	Elmhurst Energy Systems
Assessor Qualifications:	NOS5
Employer/Trading Name:	Trading Name
Employer/Trading Address:	Trading Address
Issue Date:	15 Dec 2023
Valid Until:	14 Dec 2033 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 5890-2058-0959-8832-6296

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Elmhurst Energy Systems. You can obtain contact details of the Accreditation Scheme at www.elmhurstenergy.co.uk.

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

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

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Opportunity to benefit from a Green Deal on this property

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

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

12 APPENDIX H: RIBA PROJECT RESPONSIBILITY MATRIX

RIBA stage and title	Summary of main deliverables for the Building Services Designer	Responsibility
Project Initiation		
1 Preparation & Brief	▪ Appraisal of physical site data, assess any key planning and environmental issues for the site. ▪ Gather key Client data and any special requirements	Consulting Engineer
2 Concept Design	▪ Draw up strategic proposals for M&E services ▪ Consider site services infrastructure ▪ Undertake essential M&E spatial planning ▪ Agree project procurement strategy ▪ Confirm project design brief / M&E budget cost	Consulting Engineer
3 Developed Design	▪ Develop concept design proposals ▪ Arrange / liaise with Statutory Service suppliers ▪ High level co-ordination of services with building & structure ▪ Prepare Employers Requirements documents / sketch drawings for tender ▪ Assist QS with pre-tender estimate	Consulting Engineer
Tender		
4 Technical Design	▪ Confirm spatial requirements for all services. ▪ Confirm sizes of ducts, pipework, flues, cables and electrical containment etc. ▪ Prepare schematics and technical design drawings. ▪ Carry out all necessary design calculations ▪ Select plant and equipment ▪ Freeze technical design and issue fixed general arrangement drawings.	Contractor
5 Construction	▪ Prepare builders' work information and co-ordinated working drawings. ▪ Review, collate and integrate information from sub-contractors and specialists ▪ Allow for liaison with specialist contactors and supplies and co-ordinate their services with M&E systems	Contractor
6	▪ Record any changes to design information ▪ Prepare building manuals including drawings, test results, certificates, health and safety file.	Contractor

Handover and Close Out	▪ Contribute to energy log book and end user guide etc. ▪ Prepare pre-handover defects schedule. ▪ Prepare As Built BRUKL / SBEM documents & submit to Building Control ▪ Prepare & Issue EPC	
	▪ Demonstrate services installations to Consulting Engineer, allow for Engineer to witness testing & commissioning	Consulting Engineer Contractor
7 In Use	▪ Review and clear list of defects from post-completion audit. ▪ Train facility management team and building users on the installed systems. ▪ Undertake seasonal commissioning	Contractor
Project Completion		