Land South of Dearne Valley Parkway

Energy & Sustainability Statement

On behalf of

Project Ref: 332511259 | V2 | Date: November 2023

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Revision	Date	Description	Prepared	Reviewed	Approved
V1	04/10/2023	Draft V1	TW	ADH	KH
V2	13/11/2023	Final	TW	ADH	KH
V3	24/11/2023	Final with client comments addressed	TW	ADH	

Contents

Figures

Tables

Appendices

1 Introduction

1.1 Background

1.1.1 Stantec UK Limited (Stantec) has been appointed by Equite Newlands (Goldthorpe) Ltd (the 'Applicant') to prepare a Sustainability Statement (the 'Statement') to support a hybrid planning application at Land South of Dearne Valley Parkway, Goldthorpe (the 'Site').

1.1.2 The hybrid application element is for up to 204,000 square metres (sqm) Gross Internal Area (GIA) of Storage and Distribution (Use Class B8) and General Employment (Use Class B2) space, with ancillary offices. The full application element is for engineering infrastructure works comprising access roads, earthworks to create the Proposed Development platforms/bunding, drainage works, flood compensation area and strategic landscaping. The outline application and the full application collectively form 'the Development'.

1.1.3 Part of the Site was allocated for employment uses in the Barnsley Local Plan (January 2019) under Policy ES10 Land South of Dearne Valley Parkway. The policy states 72.9 hectares have been allocated for proposed employment in Land South of Dearne Valley Parkway. This Site equates to 85.32 ha.

1.2 Purpose of this Statement

1.2.1 The purpose of this Statement is to:

- highlight how the Proposed Development will meet the requirements of local, regional and national policies aligned with sustainability and their associated targets;
- demonstrate how the Proposed Development will seek to reduce greenhouse gas (GHG) emissions; and
- outline the Applicant's aspirations with regards to addressing and mitigating against climate change.

2 Development and Site Context

2.1 The Proposed Development

2.1.1 This Statement supports a hybrid planning application for Class B8 (and ancillary offices) floorspace on Land South of the Dearne Valley Parkway. The planning statement sets out more details.

2.1.2 The Proposed Development description is provided below:

Hybrid Planning Application:

Outline permission sought for the construction of Storage and Distribution (Use Class B8) and General Employment (Use Class B2) space with ancillary offices and gatehouses on four separate, self-contained and severable plots as shown on the submitted Parameters Plan. All matters reserved except for site access.

Full permission sought for engineering infrastructure works to support the employment development comprising: the access roads; earthworks to create the development platform zones/bunding; drainage and culvert works; a flood compensation area; and strategic landscaping areas.

2.2 The Site and Surrounding Context

2.2.1 The Site comprises 85.32 ha and currently comprises open, agricultural land. The fields are divided by hedgerow field boundaries. The central part of the site is relatively flat, however slopes upwards to the north towards the A635 and to the south towards the public footpath.

2.2.2 The Site is located within the local authority of Barnsley Metropolitan Borough Council (BMBC) and is approximately 10.4 km from Barnsley city centre.

2.2.3 The Site is directly adjacent to the A635 Dearne Valley Parkway which runs along the northern boundary of the Site, providing connections to the M1 motorway 9 miles to the west and the A1 four miles to the east.

2.2.4 Two residential properties are located to the north of the Site and are accessed from the A635. Aldi Goldthorpe Regional Office and Distribution Centre (RDC) sits adjacent to the eastern boundary of the Site, and Goldthorpe industrial estate sits adjacent to this; both are accessed via Dudley Drive. To the southeast of the Site, there is Heather Garth Primary School and a residential area, predominantly comprising two storey semi-detached properties.

2.2.5 There are two existing water courses (Carr Dike and Highgate Lane Dike) which transect the Site; Carr Dike from the west along trees and hedgerows. RSPB Dearne Valley is located to the southwest of the Site alongside a Site of Specific Scientific Interest (SSSI), Bolton Tip, Bolton Ings and Old Moor. Southeast of the Site lies Dearne Valley Wetlands SSSI. Additionally, there is greenbelt land to the north, south and west of the Site.

3 Policy Context

3.1 Introduction

3.1.1 The policies that apply to the Proposed Development in relation to sustainable development are multi-layered and complex. The following section presents a summary of the main national and local policies that are directly related to defining sustainable development and highlight the key sustainability objectives that need to be met.

3.2 National Planning Policy Framework

3.2.1 The National Planning Policy Framework (NPPF) 2023 maintains the "*presumption in favour of sustainable development*". It sets out the three mutually dependent roles that the planning system needs to consider delivering sustainable development. These are:

- An **economic** objective: to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types in available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure.
- A **social** objective: to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.
- An **environmental** objective: to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

3.2.2 The NPPF includes the following core land use planning principles, or 'principles' for delivering sustainable development – these form the framework against which the sustainability of new development or redevelopment is assessed:

- Building a strong, competitive economy;
- Promoting sustainable transport;
- Supporting high quality communications infrastructure;
- Requiring good design;
- Meeting the challenge of climate change, flooding and coastal change; and
- Conserving and enhancing the natural environment.

3.2.3 The NPPF 2023 sustainable development principles guide the preparation of local plans and policies. It is important that the local planning policies align with the NPPF 2023. In complying with local policy requirements, it is considered that the principles contained within the NPPF 2023 are also addressed.

3.3 Barnsley Local Plan

3.3.1 The local planning authority for the Proposed Development is Barnsley Metropolitan Borough Council (BMBC). The key policies within Barnsley's Local Plan (2019) relevant to this Statement are listed below.

Site ES10 Land South of Dearne Valley Parkway 72.9 ha

The development will be subject to the production of a phased Masterplan Framework and will be expected to:

- *Protect and enhance biodiversity value including possible impacts on the Golden Plover population and on the nearby Old Moor RSPB reserve and ensure that the development avoids impacts or incorporates effective mitigation measures. Any impact on the golden plover habitat will be expected to be mitigated by either;*

  a. On-site creation of optimal agricultural conditions for fields to be retained; or

  b. Creating suitable compensation habitat for the species off-site but nearby.

- *Provide a contribution towards improvements to biodiversity within the Dearne Valley Green Heart Nature Improvement Area;*

- *Include the creation of a habitat corridor (at least 8m in width) along Carr Dike and a sustainable drainage scheme to ensure that rainwater falling on the site is still able to drain into the Dike aiming to improve water quality;*

- *Improve the highway network to mitigate the impact of additional traffic generated by the development on surrounding roads and in particular effects on the A635 and other strategic road links to the A1/M and M1 motorways;*

- *Provide appropriate access to housing site reference HS51 from Billingley View through the south east corner of the site;*

- *Retain the existing woodland and hedgerows on the site periphery;*

- *Retain the section of hedgerow remaining in the north-west corner of the site;*

- *Avoid locating any built development in Flood zones 2 and 3;*

- *Safeguard the setting of the Billingley Conservation Area;*

- *Give consideration to Carr Dike and the connecting unnamed ordinary watercourse which run through the site; and*

- *Provide an air quality assessment to assess the impacts of traffic emissions within air quality management areas along the A635 and other strategic road links to the A1/M and M1. Any adverse impacts on air quality should be mitigated in accordance with policy AQ1.*

Archaeological remains are known to be present on this site. The site area has been reduced to allow flexibility in the development to ensure the remains can be preserved in situ if necessary.

Policy SD1 Presumption in favour of Sustainable Development

When considering development proposals, we will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy

Framework. We will work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.

3.3.2 This Statement demonstrates the approach to sustainable development, which includes economic, social and environmental factors.

Policy CC2 Sustainable Design and Construction

Development will be expected to minimise resource and energy consumption through the inclusion of sustainable design and construction features, where this is technically feasible and viable.

All non-residential development will be expected, to achieve a minimum standard of BREEAM 'Very Good' (or any future national equivalent). This should be supported by preliminary assessments at planning application stage.

Policy CC1 Climate Change

We will seek to reduce the causes of and adapt to the future impacts of climate change by:

- *Giving preference to development of previously developed land in sustainable locations;*
- *Promoting the reduction of greenhouse gas emissions through sustainable design and construction techniques;*
- *Locating and designing development to reduce the risk of flooding;*
- *Promoting the use of Sustainable Drainage Systems (SuDS);*
- *Promoting and supporting the delivery of renewable and low carbon energy; and*
- *Promoting investment in Green Infrastructure to promote and encourage biodiversity gain.*

Policy RE1 Low Carbon and Renewable Energy

All developments will be expected to seek to incorporate initially appropriate design measures, and thereafter decentralised, renewable or low carbon energy sources in order to reduce carbon dioxide emissions and should at least achieve the appropriate carbon compliance targets as defined in the Building Regulations.

We will allow development that produces renewable energy as long as there is no material harm upon:

- *The character of the landscape and appearance of the area;*
- *Living conditions;*
- *Biodiversity, Geodiversity and water quality;*
- *Heritage assets, their settings and cultural features and areas;*
- *Key views of, from or to scenic landmarks or landscape features;*
- *Highway safety, or*
- *Infrastructure including radar.*

In assessing effect, we will consider appropriate mitigation which could reduce harm to an acceptable level.

Proposals will be expected to include information regarding their efficiency.

Proposals must be accompanied by information that shows how the local environment will be protected, and that the site will be restored when production ends.

3.4 Validation Checklist

3.4.1 The BMBC Validation Checklist outlines the requirements for Energy/Sustainability Statements, which has informed the structure of this Statement:

An Energy/Sustainability Statement should demonstrate how the proposed development would minimise resource and energy consumption compared to the minimum required under current Building Regulations legislation and how it is located and designed to withstand the longer term impacts of climate change. It should also detail how the proposed development would incorporate decentralised, renewable or low carbon energy sources. All non-residential development will be expected, to achieve a minimum standard of BREEAM 'Very Good' (or any future national equivalent). This should be supported by preliminary assessments at the planning application stage.

3.5 Goldthorpe Framework Masterplan

3.5.1 The Masterplan Framework, adopted in September 2021, will guide the development of the Site to achieve its full potential and secure sustainable and inclusive growth by providing improved job opportunities in accordance with the Barnsley 2030 vision.

3.5.2 With regards to sustainability and energy:

The council has declared a climate emergency (September 2019), with a strategy for the borough achieving zero carbon by 2045 (Zero 45). As the Council strives to achieve this goal, new developments will be asked to play their part and through further work, consideration will be given to the following measures:

- *Creating energy efficient well insulated buildings in order to reduce carbon emissions;*
- *Use of renewable energy sources (e.g., solar, wind, biofuels) for all or part of their energy needs to reduce carbon emissions;*
- *Sustainability standards such as BREEAM and CEEQUAL when designing developments;*
- *Implementation of sustainable drainage systems to safely deal with surface water runoff and minimise the risk of flooding;*
- *Identifying opportunities to incorporate space within new buildings to accommodate low carbon technology in the future, to ensure that new development is durable and adaptable;*
- *Recycling facilities;*
- *Identifying opportunities for green and solar roofs;*
- *Travel plans to encourage active and sustainable travel.*

3.6 Barnsley Climate Emergency

3.6.1 BMBC declared a climate emergency in September 2019. To help Barnsley reduce its carbon emissions, BMBC has two programmes:

i. **Zero 40** which will focus on improving BMBC's performance to work towards being net zero carbon by 2040

ii. **Zero 45** where the BMBC will help the whole of Barnsley, including residents, communities, partners and businesses to become net zero carbon by 2045

3.7 Emerging Sustainable Construction and Climate Change Adaptation Supplementary Planning Document

3.7.1 BMBC adopted a new Supplementary Planning Document (SPD) in July 2023. The purpose of this SPD is to make clear what BMBC's expectations are for development with respect of sustainability in contribute towards Barnsley's zero 45 target.

3.7.2 The SPD sets out guidance with regards to whole life carbon, BREEAM, energy efficiency and adaptation, sustainable materials, modern methods of construction, renewable energies, water consumption and flood risk, recycling and waste, and EV charging.

3.8 Policy Context Summary

3.8.1 With regards to sustainability, the Proposed Development is subject to the following policies, plans, and guidance:

- National Planning Policy Framework (2023)
- Barnsley Local Plan (2019)
  - Site ES10 Land South of Dearne Valley Parkway 72.9 ha
  - Policy SD1 Presumption in favour of Sustainable Development
  - Policy CC2 Sustainable Design and Construction
  - Policy CC1 Climate Change
  - Policy RE1 Low Carbon and Renewable Energy
- Barnsley Validation Checklist (2021)
- Goldthorpe Framework Masterplan (2021)
- Barnsley's Climate Emergency declaration (2019)
- Sustainable Construction and Climate Change Adaptation SPD

3.8.2 This Statement demonstrates how the Proposed Development responds to these policy requirements, and is structured as follows:

- Section 4 – **Energy** – sets out energy efficiency measures, and renewable and low carbon energy;
- Section 5 – **Carbon Emissions** – sets out GHG reduction measures;

- Section 6 – **Land Use and Ecology** – sets out sustainable land use and biodiversity measures;
- Section 7 – **Water** – sets out flood risk and water conditions;
- Section 8 – **Health and Wellbeing** – sets out measures to promote a healthy environment;
- Section 9 – **Pollution** – sets out how pollution, including air quality, will be managed;
- Section 10 – **Transport** – sets out sustainable transport measures; and
- Section 11 – **Materials and Waste** – sets out waste management and sustainable material use.

3.8.3 The Conservation Area safeguarding, and archaeological preservation measures are outlined in Chapter 7: Cultural Heritage ES Chapter.

4 Energy

4.1 Energy Efficiency Measures

4.1.1 Indicative energy modelling and a high level review of potential heating and low and zero carbon (LZC) technologies have been carried out for this Site. The energy recommendations have been set out below, according to the Energy Hierarchy:

- **Be Lean**: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures;
- **Be Clean**: supply energy efficiently and cleanly;
- **Be Green**: take advantage of opportunities for renewable energy by producing, storing and using renewable energy on-site.

4.2 Demand Reduction (Be Lean)

4.2.1 The Proposed Development will incorporate a range of energy efficiency measures, in order to comply with the Part L2A 2021 national building specification. This includes:

- Insulated building fabric with low air permeability;
- Glazing with suitable U-value, G-value and daylight transmittance;
- Mechanical ventilation with heat recovery (MVHR) to high occupancy areas (office);
- Low energy and appropriately zoned lighting;
- Enhanced lighting control (occupancy sensors and daylight sensors); and
- Efficient electric water heaters.

4.3 Heating Infrastructure (Be Clean)

4.3.1 A summary of the feasibility process of this SIte is contained within **Table 4.1**.

Table 4.1: Heating system feasibility analysis

Heating Technology	Brief Description	Benefits	Issues / Limitations	Feasible for Site
Air Source Heat Pump (ASHP)	A heat pump located within a packaged outdoor unit. Drawing air across the heat exchanger draws energy from the ambient air to water for heating and hot water generation.	Efficient Use of Fuel Relatively low capital costs Income generated from Renewable Heat Incentive (RHI) scheme	Specialist maintenance Requires defrost cycle in extreme conditions Some additional plant space is required	Feasible. This option should be considered further.

Heating Technology	Brief Description	Benefits	Issues / Limitations	Feasible for Site
Electric Heaters	A resistive element within a protective casing that can be turned on or off as required.	These systems use standard rate electricity. Fast acting and have no losses (efficient). Zero risk of carbon monoxide. Flexible installation.	Expensive form of heating	Feasible. This option could be considered further for spaces with low/intermittent heating requirements.
District Heating (connection to an off-site network)	Connection to or extension of a local district heat network for the local generation of heating and hot water.	Improves Energy Efficiency and reduces CO_2 Reduces running costs	No local heat networks within suitable capacity have been identified within the vicinity of the Site.	Not feasible. No existing or planned networks to connect to for the proposed development.
Ground Source Heat Pump (GSHP)	An array of either horizontal pipe “loops” or vertical boreholes, through which water is circulated. Coupled to heat pump unit(s), this water can be utilised to provide heating and hot water generation within the building.	Minimal maintenance required Flexible installation options to meet available site footprint Income generated from the Renewable Heat Incentive (RHI) scheme	Large area required for horizontal pipes Full ground survey required to determine geology Integration with piled foundations must be done at an early stage	Not feasible due to high capital costs for relatively low carbon saving.
Gas Fired Combined Heat and Power (CHP)	Installation of a gas fired (electrical) generator, providing electrical output for consumption on the site, and “waste heat” (from engine coolant) to provide heating. Can be controlled to provide heating with the “waste” electricity.	Efficient Use of Fuel Excess electricity can be exported to the grid Benefits from being part of an energy centre/district heating scheme	Maintenance intensive Sufficient base thermal and electrical demand is required Some additional plant space is required	Not feasible. Gas is unlikely to meet carbon reductions of Part L2A 2021.
Biofuel Fired Combined Heat and Power (CHP)	As above – but powered with biofuels.	Efficient Use of Fuel Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme Income generated from Renewable Obligation Certificates (ROCs) and Renewable Heat Incentive (RHI) scheme	Maintenance intensive Sufficient base thermal and electrical demand required Sufficient plant space required Biomass fuelled systems are at early stages of commercialisation Large area needed for fuel delivery and storage	Not feasible. Insufficient space within the proposed development for fuel deliveries and storage.

Heating Technology	Brief Description	Benefits	Issues / Limitations	Feasible for Site
			Reliable biomass fuel supply chain required	

4.3.2 The above assessment demonstrates that ASHPs are a feasible option for the provision of heating and would provide carbon emission reductions in line with Part L 2021. This option has therefore been proposed to heat the office areas only. According to Part L *'a separately heated area should be treated as a separate building or zone and the normal procedures for demonstrating compliance should be followed*[1]*.'*

4.3.3 Indicative energy modelling for the Proposed Development has been undertaken, and is provided in **Appendix C**. This modelling compares the gas boiler with ASHP and demonstrates that gas boilers do not comply with Part L 2021. ASHP will help the building to meet the target emission and energy rates.

4.4 Renewable Energy (Be Green)

4.4.1 An assessment of the viability of various low and zero carbon technologies has been carried out for the Proposed Development. A summary of the feasibility process is contained within **Table 4.2**.

Table 4.2: Renewable energy technologies

Heating Technology	Brief Description	Benefits	Issues / Limitations	Feasible for Site
Solar Photovoltaic (PV)	An array of roof mounted solar panels, providing an electrical output for consumption on site. Any "excess" electricity generated could be exported to the grid.	Low maintenance, no moving parts Easily integrated into building design	Any overshadowing reduces panel performance Panels ideally need to be inclined at 30° to the horizontal facing at a southerly direction Limited roof space	Feasible. This option should be investigated further.
Solar Thermal	An array of roof-mounted "evacuated tubes" through which water is passed, providing a heat source for hot water generation.	Low maintenance Little/no ongoing costs Income generated from Renewable Heat Incentive (RHI) scheme	Must be sized for the building hot water requirements Panels ideally inclined at 30° to the horizontal facing at a southerly direction	Potentially a feasible solution, however the array would utilise space that could otherwise utilise photovoltaics (see above). Given PVs provide a higher output, these should be considered first. If PVs are unfeasible, consideration to solar thermal should be given.

1 Approved_Document_L__Conservation_of_fuel_and_power__Volume_2_Buildings_other_than_dwellings__2021_edition_incorporating_2023_amendments.pdf (publishing.service.gov.uk)

Heating Technology	Brief Description	Benefits	Issues / Limitations	Feasible for Site
Wind Turbine (Stand-alone, column-mounted)	Installation of a wind turbine providing electrical output for consumption on the site, and export of "excess" electricity to the grid.	Low maintenance / ongoing costs Minimum wind speed available (www.bwea.com) Excess electricity can be exported to the grid Income generated from the Feed-in Tariff (FIT)	Planning issues Space limitations on site Wind survey to be undertaken to verify 'local' viability	Not feasible due to insufficient space within the Site for wind turbines.
Wind Turbine (Roof-mounted)	As above, roof mounted.	Low maintenance / ongoing costs Minimum wind speed available (www.bwea.com) Excess electricity can be exported to the grid Income generated from the Feed-in Tariff (FIT)	Planning issues Structural/vibration impact on building to be assessed Proximity of other buildings raises issues with downstream turbulence Wind survey to be undertaken to verify 'local' viability	Not feasible due to structural/vibration impact on warehouse.

4.4.2 The provision of photovoltaic (PV) panels would be feasible as a green energy source, given the roof area available as part of the Proposed Development.

5 Carbon Emissions

5.1 Emissions from Road Construction

5.1.1 The application is applying for full permission for the access road, and therefore there is sufficient design information to undertake a carbon assessment. This has been undertaken with due regard to the Design Manual for Roads and Bridges (DMRB) climate LA114.

5.1.2 The DMRB LA 114 standard sets out the appropriate study area, and sources and lifecycle stages for project greenhouse gas (GHG) emissions. A full methodology is provided in **Appendix B**.

Baseline

5.1.3 The Site is currently comprised of open agricultural fields. There is likely to be GHG emissions associated with farming on the Site, including emissions from tractors and other machinery, and associated with soil disturbance. There are some hedgerows and planting within the Site which may also provide some limited carbon sequestration.

Construction GHG Emissions

5.1.4 **Table 5.1** sets out the estimated GHG emissions associated with the road construction phase.

Table 5.1: Summary of Construction GHG Emissions of Road

Lifecycle stage	Construction activity	Estimated GHG emissions (tCO_2e)	% GHG emissions
A1-A3 Embodied Carbon	Permanent construction materials	3,353.46	41%
A4 Transport to Works Site	Transport materials and staff to area of works	2,080.15	25%
A5 Construction Process stage	Construction activities e.g., plant, welfare facilities etc.	2,758	11%
Total		**8,191.61**	100%

Operation GHG Emissions

5.1.5 **Table 5.2** sets out the estimated GHG emissions associated with the road operational phase on the opening year (construction is assumed to be completed in 2026) and over the 40 year design life. This assessment has been based on the assumption that the road has a design life of 40 years, as set out in **Appendix A**.

Table 5.2: Summary of Operational GHG Emissions of Road for opening year (2026) and total over assumed 40 year design life

Lifecycle stage	Construction activity	Estimated GHG emissions for opening year (tCO_2e)	Total (cumulative) over 40 year design life
B2-B5 Maintenance, repair, replacement, refurbishment	Road resurfacing	0	5,490.09
B6 Operational Energy	Lighting columns	165.43	6,617.07
B9 User Utilisation	Annual emissions from road users	11,896.51	475,860.40
Total		**12,061.94**	**487,967.56**

Comparison to UK Carbon Budget

5.1.6 DMRB LA 114 requires an assessment to compare the project GHG emissions against the UK government carbon budgets. The budgets are set out in **Table 5.3**, with the comparison set out in **Table 5.4**.

Table 5.3: 2008-2037 UK Carbon Budgets

UK Budget	Carbon Budget (tCO_{2e})	Reduction below 1990 levels	UK Emissions
1st carbon budget (2008 to 2012)	3,018,000,000 tCO2e	25% (achieved)	2,982,000,000 tCO_2e
2nd carbon budget (2013 to 2017)	2,782,000,000 tCO2e	31% (achieved)	2,398,000,000 tCO_2e
3rd carbon budget (2018- 2022)	2,544,000,000 tCO_2e	37% by 2020	N/A
4th carbon budget (2023- 2027)	1,950,000,000 tCO_2e	51% by 2025	N/A
5th carbon budget (2028- 2032)	1,725,000,000 tCO_2e	57% by 2030	N/A
6th carbon budget (2033-2037)	965,000,000 tCO_2e	78% by 2035	N/A

Table 5.4: Comparison to UK Carbon Budget

Project Stage	Estimated total (cumulative) GHG emissions over carbon budgets (tCO2e)	Net (cumulative) scheme GHG emissions per relevant carbon budget (tCO2e)		
		Fourth (2023 – 2027)	Fifth (2028 – 2032)	Sixth (2033 – 2037)
Construction (over period of 2023-2025)	8,191.61	8,191.61	N/A	N/A
Operation (from 2025 to end of 6th carbon budget 2037)	156,805.22	36,185.82	60,309.70	60,309.70
Total	164,996.83	44,377.43	60,309.70	60,309.70
% of Carbon Budget	**N/A**	**0.00228%**	**0.00349%**	**0.00625%**

Mitigation to Reduce GHG Emissions from the Road Construction

5.1.7 To reduce emissions associated with the road construction, the following measures will be implemented. These have not been factored in to the emission calculations set out in Table 5.1:

- A Construction Environmental Management Plan (CEMP) (included within **Section 6 – Land Use and Ecology**) will be in place during the construction phase, and will include mitigation measures covering transport, materials, waste and air quality during construction. Measures could include no unnecessary idling of engines, and maintenance of plant equipment to check they are operating optimally and efficient use of materials to reduce waste.

- Construction workers would be encouraged to access the Site by sustainable means of travel. Information would be provided on convenient walking and cycling routes together with the local bus and rail services to ensure workers are aware of the choices available to them. Workers who choose to drive to the Site will be encouraged to car share, where practical.

5.2 Emissions from Operational Energy Use

5.2.1 The indicative energy modelling (**Appendix C**) includes the target CO_2 emission rate (TER) and building CO_2 emission rate (BER) of the Proposed Development, comparing gas boilers / Business-As-Usual to ASHP. This is summarised in **Table 5.5**.

Table 5.5: Target and Building CO_2 Emission Rate

Heating scenario	Target CO_2 emission rate (TER)	Building CO_2 emission rate (BER)
Gas boiler / Business-As-Usual	2.48	2.47
ASHP	2.45	2.26

5.2.2 As noted in **Section 4 - Energy**, the gas boiler scenario does not comply with Building Regulations Part L 2021 and will therefore not be taken forward. It is noted that the comparison in the table above is indicative only.

5.2.3 The indicative energy modelling demonstrates the potential CO_2 saving benefits of using ASHPs, that will meet Building Regulations.

5.3 Emissions from Embodied Carbon of Buildings

5.3.1 The application is applying for the buildings in outline, and therefore there is not sufficient detail required to undertake a full Lifecycle Carbon Assessment (LCA) of the buildings.

5.3.2 It is therefore recommended that an LCA is undertaken at the detailed design, in accordance with Barnsley's Sustainable Construction and Climate Change Adaptation SPD.

6 Land Use and Ecology

6.1 Introduction

6.1.1 A desk-based study and a variety of habitat and species studies were carried out (FCPR Environment and Design LTD, 2023) to inform a Preliminary Ecological Assessment (PEA) and Biodiversity ES Chapter. The majority of the Proposed Development will likely be located on areas of arable land and species-poor grassland which is of low or negligible ecological value.

6.1.2 Avoiding or limiting as far as possible negative impacts on the ecology of the Site and its zone of influence helps to conserve local nature ecosystems and maintain environmental assets for the community.

6.1.3 A Biodiversity Net Gain report (FCPR Environment and Design Ltd, 2023) will be submitted with the application. This Biodiversity Metric 3.1 assessment demonstrates the Proposed Development will improve units in all three categories: habitat, hedgerow, and river. This is in line with Policy ES10 of the BMBC Masterplan which states that 10% BNG will be required.

6.1.4 In line with the requirements for development on Site ES10 in Barnsley's Local Plan, the Proposed Development will maintain a corridor along Carr Dike of at least 8m in width.

6.2 Construction

6.2.1 A CEMP will incorporate the methods of environmental and ecological protection to be used during construction, including:

- Designated Ecological Protection Zones (EPZs) around retained habitats;
- Consideration given to timing of construction outside of the breeding bird season where possible;
- Control of potential sources of dust during excavation work by covering stockpiles where possible;
- Implementing best practice guidance on the storage of environmentally hazardous materials; and
- Implement lighting strategy to minimise light spill from temporary lighting on to key habitats where possible.

6.2.2 There are two trees on the site with bat roost potential which may be cut down during construction. However, necessary mitigation will be in place to prevent negative impacts to the local bat population in the form of woodland habitat creation and installation of additional bat boxes.

6.2.3 Further details can be found in Chapter 9 Biodiversity of the ES.

6.3 Operation

6.3.1 A conservation-led Landscape and Ecological Management Plan (LEMP) will be produced which will detail the mechanisms for habitat creation and management and contain methods of monitoring and management throughout the operation of the Proposed Development

6.3.2 To mitigate the impact on bats, a lighting strategy will be produced based upon the Bat Conservation Trust & Institute of Lighting Engineers Guidelines. The lighting design will aim to

include strategic landscaping and planting to avoid light spill on sensitive habitats. Further details on lighting design are included in Chapter 9 Biodiversity of the ES.

6.3.3 To mitigate the impacts on birds and bats, bird and bat boxes will be implemented on retained trees and new buildings to provide nesting/roosting sites. Additionally, it is intended that deadwood features will be incorporated within the proposed wet woodland areas to allow Willow tits to nest there. Breeding bird and wintering bird surveys carried out show that Golden Plovers have not been identified as using the Site; this is included in Chapter 9 Biodiversity of the ES.

6.4 Summary and Recommendations

6.4.1 In summary, there is sufficient mitigation incorporated into the design of the Proposed Development to avoid negative impacts on the habitats and species present. There are further ecological enhancements suggested that will provide potential benefits to habitats and species present.

6.4.2 Biodiversity Net Gain requires developers to ensure habitats for wildlife are enhanced and left in a measurably better state than they were pre-development. An assessment must be undertaken, using a biodiversity metric, of the type of habitat and habitat condition within the site before any development. It must then be demonstrated how the development aims to improve biodiversity, such as through the creation of new habitats, or the enhancement of existing habitats.

7 Water

7.1 Introduction

7.1.1 The Proposed Development will comply with the relevant flood risk advice published by the Environment Agency and incorporate design features to address potential flood risk that may arise due to and from the Proposed Development. A flood risk assessment (FRA) and Water ES chapter (Hydrock, 2023) have been used to inform this section of the statement.

7.2 Flood Risk and Drainage

7.2.1 The Environmental Agency (EA) Flood Zone Maps indicate that the majority of the Site is within Flood Zone 1 (low risk) with some areas of Zone 2 (medium risk) and 3 (high risk) in the northern part of the Site. Detailed hydraulic modelling confirms that the Site is largely within Flood Zone 1 but identifies it is at risk of fluvial flooding (Flood Zone 2 and 3) originating from Carr Dike and extending out across the Site.

7.2.2 The EA's Flood Risk from Surface Water Map shows that, whilst the majority of the site is at 'Very Low' risk of surface water flooding, there are areas of up to 'High' risk of potential surface water flooding around existing watercourses and extending into the site. The FRA does not identify the Site or surrounding area to be an area with persistence surface water flooding issues and as most of the potential flood risk can be attributed to fluvial flooding from existing watercourses onsite, the Site is concluded to be a 'Low' risk of surface water flooding.

7.2.3 Due to the presence of Carr Dike and Highgate Lane Dike water courses within the Site which act to draw down groundwater flows, groundwater flooding is only likely to occur when fluvial flooding is already present. Therefore, the FRA concludes the Site to be a low risk of groundwater flooding.

7.3 Mitigation Measures

7.3.1 Due to the higher flood risk in some areas of the Site and to ensure the Proposed Development would be safe from flooding both in the present day and across its design life (75 years for a non-residential development in accordance with Paragraph 006 of the Flood Risk and Coastal Change Planning Practice Guidance (NPPG)), proposed finished floor levels will be raised above the maximum flood level (>2m), in line with the proposed drainage strategy. Additionally, two flood compensation storage will be implemented, connected with a series of culverts, to provide the necessary storage, accounting for the predicted impacts of climate change over the lifetime of the Development, in accordance with Paragraph 049 of the NPPG.

7.3.2 Post-development, any rainfall and surface water flood risk within the Site will be managed through a surface water drainage strategy. The implementation of surface water drainage systems will include the use of SuDS features prior to water being discharged which will ensure contaminated flows are not discharged to the downstream catchment.

7.3.3 Once the Surface Water Strategy and the Foul Water Drainage Strategy are fully implemented, there will be permanent neutral effects to flood risk, surface water drainage, foul water drainage and surface water quality within the Application Site and surrounding area. The Surface Water Strategy and Foul Water Drainage Strategy will enable surface and foul water to be treated before being discharged through infiltration into the ground within the Application Site.

7.4 Summary and Recommendations

7.4.1 The surface water drainage strategy for the Proposed Development has been designed in accordance with local and national guidance and has incorporated SuDS measures throughout the Development. The FRA details measures that will allow proposed buildings to be prepared to withstand the impacts of climate change and potential flooding from the present day, across its design life, and able to in line with local and national planning requirements.

7.4.2 Water conservation measures should be considered. There is potential for the Proposed Development to target the higher water efficiency standard outlined in Building Regulations Part G, which is 110 litres/person/day. To achieve this, the Site could adopt water efficiency measures such as leak detection systems, flow control devices and pulsed water meters, to reduce the energy demands associated with water heating where relevant.

8 Health and Wellbeing

8.1 Introduction

8.1.1 A Socioeconomics ES chapter (Stantec, 2023) and Health Impact Assessment (Stantec, 2023) have been used to inform this section of the statement.

8.2 Job Creation

8.2.1 During construction, the Proposed Development will support the equivalent of 20% of construction employment in the BMBC, £80.6m per annum in gross value added (GVA) and increase workforce expenditure in the BMBC area by 1%.

8.2.2 During operation, the Proposed Development will generate a minimum of 2,260 FTE jobs and a net additional employment in the BMBC area of 1,677 FTE jobs. This will increase GVA by 1.8% to £70.1m and workforce expenditure by 1.7% in the BMBC area.

8.2.3 The Proposed Development will not comprise residential floorspace and the construction and operational workforce will likely be drawn from the BMBC area, resulting in no significant increase in demand on the local housing market or community infrastructure. Therefore, construction and operational phase effects on housing delivery, education, healthcare services and open space have been scoped out of the assessment.

8.3 Healthy Workspaces

8.3.1 A Health Impact Assessment (HIA) report was prepared by Stantec (2023). The Proposed Development will be formed of sustainable, well designed buildings which are good places to work. The Healthy Urban Development Unit (HUDU) Rapid Health Impact Assessment Tool provides criteria that the Proposed Development has been assessed against the impact it will have on health and wellbeing. The performance of the Proposed Development has been assessed against the following key health themes:

- Access to open space and nature;
- Air quality, noise and neighbourhood amenity;
- Accessibility and active travel;
- Crime reduction and community safety;
- Access to healthy food;
- Access to work and training;
- Minimising the use of resources; and
- Climate change.

8.3.2 Each unit will be designed so that where feasible, natural light will provide the primary source of light to promote a healthy, efficient working environment, Additionally, all units and offices will be sufficiently ventilated to enable fresh air to circulate.

8.4 Active Travel

8.4.1 To encourage walking and cycling, cycle parking will be incorporated within each unit, located as close to the main entrances as possible to ensure they are within the CCTV monitored, well

lit, and secure areas. Additionally, the relevant internal infrastructure such as showers, changing rooms and lockers will be implemented to support those who wish to run, walk or cycle a significant distance into work. The occupiers will be in charge of maintaining these facilities and ensuring they are suitable for use.

8.4.2 To encourage cycling, a new combined footway / cycleway will be developed which will run from the north of the Proposed Development to the south, connecting the Proposed Development zones.

8.4.3 In line with the Green Infrastructure Strategy for Barnsley, the Proposed Development aims to comply with Objective 3 which is to improve access, movement and connectivity with sustainable travel and secure healthy communities and well-being by providing natural open space for physical activity and leisure and increasing accessibility of natural green space. There is no provision for play areas on site due to the commercial nature of the Development and the intention for the open space to be used only by future users of the site. Trees and hedgerows will be planted along the new pedestrian routes to provide solar shading and weather protection for users.

8.5 Summary and Recommendations

8.5.1 Both construction and operation of the Proposed Development will result in the creation of jobs for residents of BMBC and increase GVA. Through incorporation of a new footway/cycleway and effective placement of cycle parking, and relevant facilities, active travel will be encouraged.

8.5.2 The current plans for the Proposed Development include retention of existing vegetation where possible, and proposed footpaths for walking routes. Additionally, there are plans to develop a healthy workspace with natural light and efficient ventilation.

9 Pollution

9.1 Introduction

9.1.1 This section outlines how the Proposed Development will minimise pollution and enhance environmental quality. Pollution is defined as per the BMBC Local Plan – Policy Poll 1: *Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.* Pollution in this chapter is covered by noise pollution from construction and operational activities, air pollutants from transport and construction, light pollution from lighting, and ground pollution on land and water courses. A report by the Centre for Low Emissions Construction shows 30% of PM10 emissions are emitted from construction[2].

9.1.2 During construction and operation, new developments should reduce their environmental impact relative to land, air, noise, light and water. From a sustainability perspective, new developments are required to mitigate the effects of climate change in their location.

9.2 Air Quality

9.2.1 An Air Quality Assessment was undertaken (Vanguardia, 2023) to determine the impacts from dust and stationary plant emissions during the construction period and the potential impact from traffic flows on the local road network on both on-site and off-site receptors, during and after construction.

Existing Conditions

9.2.2 The Site is not located within an Air Quality Management Areas (AQMA). The closest AQMA to the Site is 3.4km east in the village of Hickleton. It has been declared by Doncaster Metropolitan Borough Council (DMBC) for exceedances of the NO_2 annual mean and 1-hour mean objective.

Construction Phase

Construction dust

9.2.3 A construction dust assessment has been undertaken in line with the IAQM (2016) guidance methodology. The assessment has been used to identify the need for standard and best practice mitigation measures to be implemented during the construction phase of the Proposed Development. These measures will be controlled and implemented through a CEMP, which is anticipated to be secured via a suitably worded planning condition.

9.2.4 The impacts of dust emissions arising from activities associated with the construction phase at existing sensitive receptors in the vicinity of the Site are considered to be 'Low' with the inclusion of secondary mitigation measures related to earthworks, construction, and trackout. These include but are not limited to the following:

- Earthworks - revegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Construction - avoid scabbling if possible; and

[2] Reducing air pollution from construction sites - Impact on Urban Health

- Trackout - avoid dry sweeping of large areas.

Construction traffic

9.2.5 The air quality impacts of emissions from road traffic associated with the construction phase on NO_2, PM_{10} and $PM_{2.5}$ concentrations at modelled existing sensitive receptors within Barnsley are considered to be 'Low', without the inclusion of additional mitigation. It is, however, noted that noticeable effects are predicted at receptors within Hickleton, notably the John O Gaunts property, with the impact at this receptor, before mitigation, considered to be 'Significant'.

Operation Phase

Operational traffic

9.2.6 The impacts associated with development traffic are deemed to be low for the majority of modelled receptors.

9.2.7 However, it is noted that a temporary adverse impact is predicted at one receptor within Hickleton, with the NO_2 annual mean, 1-hour mean and PM_{10} 24-hour mean exceeded. Therefore, in order to mitigate against significant adverse impacts, the NPPF (Paragraph no.32) is clear that suitable mitigation measures should be proposed.

Mitigation

9.2.8 As mentioned above, there are significant impacts on one receptor within Hickleton from both construction and operation, that requires ventilation. This is mainly due to the proximity of this receptor to the A635. There is also a damage cost that will form part of the wider Hickleton mitigation package – further details are available in the Chapter 14 - Air Quality ES Chapter. Based on the IAQM position statement (2018), mitigation in the form of Mechanical Ventilation with Heat Recovery (MVHR) systems with filtration is recommended for these potentially impacted properties. Further details are available within **Appendix 14.14** of the ES.

9.2.9 In accordance with the Barnsley (2021) SPG, a number of mitigation measures are required as the development is classified as 'Major,' which include the requirement for Type 1, Type 2 and Type 3 mitigation, with the latter in line with a pollution damage cost, which determines the level of mitigation compensation required to offset the impact of the development.

9.2.10 Examples of mitigation measures specific to a 'Major' Development include, but are not limited to:

9.2.11 *Type 1 mitigation:*

- Electric Vehicle Charging Points:
  - 10% of parking spaces

9.2.12 *Type 2 mitigation:*

- Travel Plan - discouraging high emission vehicle use and encouraging modal shift.
- Commercial vehicles comply with most recent European Emission Standards from scheme opening;

9.2.13 *Type 3 mitigation:*

- Support measures to reduce the need to travel:

- Local sourcing of staff, products and raw materials

- Support measures to reduce private car use:
  - Development of car clubs and car sharing with financial incentives and promotion.

9.3 Noise

9.3.1 A Noise Impact Assessment was undertaken (Vanguardia, 2023) to support the planning application.

9.3.2 Environmental noise surveys have been completed to quantify the prevailing soundscape at the Site. To characterise and quantify the existing noise environment around the Site, a baseline noise survey was undertaken at locations selected to be representative of the identified noise sensitive receptors.

9.3.3 The baseline noise environment as observed during the noise survey was dominated by road traffic noise from nearby roads, particularly the A635.

Construction Phase

9.3.4 No important effects have been identified from either construction activity or construction traffic noise; therefore, no additional mitigation measures are required. The CEMP will provide mitigation measures to manage any potential negative noise impacts that may arise.

Operation Phase

Road Traffic Noise

9.3.5 No receptors are expected to experience negative noise impacts as a result of the change in road traffic noise during the day. However, two receptors (R02 Rose Valley and R03 Woodbine) are expected to experience negative impacts during the night time period.

Onsite HGV Activity Noise

9.3.6 There have been effects identified on two receptors, Rose Valley and Woodbine, from on-site HGV Activity Noise. The Applicant has proposed a 5m high barrier along the northern part of Plot 1 to reduce the potential operation noise levels at these two receptors during the night. Other noise mitigation measures may also be agreed at the reserved matters stage.

Offsite HGV Activity Noise

9.3.7 There is a significant impact in Hickleton from HGV Activity Noise. A fund is being proposed to allow for noise mitigation to be implemented.

Mitigation

9.3.8 The Proposed Development may incorporate noise insulation, including enhanced glazing and alternate methods of providing ventilation The applicant may provide and install noise insulation, such as enhanced glazing and ventilation methods to the affect noise sensitive receptors. Noise insulation measures will also aid the reduction of internal noise levels within bedrooms.

9.4 Ground Conditions

9.4.1 Part of the sustainable drainage (SuDS) system will be constructed during the infrastructure works when installing the temporary surface water management measures. All temporary

drainage of the construction works will be designed and managed to comply with BS 6031:2009 'The British Standard Code of Practice for Earthworks', which details methods that should be considered for the general control of drainage on construction sites. The residual permanent sustainable drainage system will be implemented in accordance with the Site-wide drainage strategies and the principles established in CIRIA C753 'The SuDS Manual'.

9.4.2 All Site works will be undertaken in accordance with CIRIA document 'Control of Water Pollution from Construction Sites' which promotes environmental good practice for control of water pollution arising from construction activities. The construction drainage system will be designed and managed to comply with BS6031 'The British Standard Code of Practice for Earthworks', which details methods that should be considered for the general control of drainage on construction sites. Further advice is contained within the Geotechnical Design, General Rules (BS EN 1997) which should be read in conjunction with Basis of Structural Design (BE EN 1990).

9.4.3 Construction vehicles will be properly maintained to reduce the risk of hydrocarbon contamination and will only be active when required. Construction materials will be stored, handled and managed with due regard to the sensitivity of the local water environment and thus reduce the risk of accidental spillage or release will be minimised.

9.4.4 In accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001, any tanks storing more than 200 litres of oil will have secondary bunding in accordance with Section 3(2)(a). Bunding will be specified having a minimum capacity of "not less than 110% of the container's storage capacity or, if there is more than one container within the system, of not less than 110% of the largest container's storage capacity or 25% of their aggregate storage capacity, whichever is the greater." Any above ground storage tanks will be located on a designated area of hardstanding. No underground storage tanks will be used during the construction period. Storage of liquids such as degreasers, solvents, lubricants and paints will be in segregated, bunded enclosures.

9.4.5 Regarding ground condition measures, the following will be incorporated into the CEMP:

- Temporary surface water management system, for example oil interceptors, holding tanks to remove suspended sediment before discharge etc;
- Equipment maintenance;
- Wheel washing;
- Covering stockpiles;
- Storage of substances in accordance with applicable legislation;
- Controls on noise, vibration, light and pollution;
- Best practice ecology mitigation; and
- Construction Traffic Management Plan (CTMP).

9.5 Lighting

9.5.1 The Proposed Development should be designed to reduce light pollution which may result from construction and operational activities. As covered in Section 6 – Land Use & Ecology, the impact on bats is only likely to be minor.

Mitigation

Construction

9.5.2 The requirement for temporary lighting will be minimised where possible to minimise light spill onto retained and key habitats.

9.5.3 During the construction period, the principal contractor will implement the CEMP procedures to reduce the impact of light pollution. The following measures should be implemented in order to mitigate any adverse impacts from lighting during construction:

- Construction lighting should be directed so it does not intrude (or cause light intrusion) outside of the immediate working area;
- Sufficient lighting units used to avoid the need for tall, wide beam lighting units to illuminate large areas;
- Vehicle lights should be properly directed, and lenses must be intact to prevent unnecessary glare and breakout of obtrusive lights;
- Lighting should be reduced when not required for safety purposes. Security lighting should be kept at the minimum level needed for visual and security protection;
- If appropriate, to reduce the need for fixed visible lighting outside working hours, the use of infrared floodlighting and CCTV systems should be considered for security;
- Locating and angling construction Site lighting with consideration to any nearby light sensitive receptors;
- Where possible, arranging construction Site deliveries during daylight hours to reduce light pollution generated from vehicle headlights; and
- All lighting related to the works will be designed and fitted to reduce light intrusion onto any sensitive habitat such as hedgerows, mature trees and woodland;
- The use of visual screening, such as hoardings between more sensitive visual receptors and construction light sources in proximity to the Site; and
- Dark corridors should be maintained during the evening, overnight or early morning (i.e., outside approximately one hour before dusk and one hour before dawn) along hedgerows, watercourses and any other linear features by avoiding light trespass on these areas. This will avoid fragmentation of habitat used by species such as bats.

Operation

9.5.4 A lighting strategy will be implemented for the Proposed Development to reduce impacts to bats. Where practicable this will include, but is not limited to, the following measures:

- Strategic planting to avoid light spill onto sensitive habitats;
- Location of lighting will be designed to avoid the direct lighting of proposed and existing trees, scrub and woodland; and
- New column mounted luminaires to be fitted with flat glass to aid 0% upward light discharge and reduce light pollution.

9.5.5 During operation of the Site, the minimum standards and requirements for artificial lighting will be used to determine a suitable lighting design. The following measures should be implemented during the operation of the Proposed Development in order to mitigate long term adverse impacts from lighting:

- Lighting should be located away from sensitive receptors including existing local residents, road users and heritage features wherever possible;
- To further reduce the light spillage from the development during its operation, any new lighting installed on the buildings as part of the development could be designed with daylight and passive infrared (PIR) sensors to limit unwanted usage;
- Lighting should be designed to avoid reflectance from buildings. High intensity lights, if installed, should be mounted onto buildings or on lighting stands and directed to the area where they are needed rather than facing building facades;
- Green infrastructure could be used to mitigate light pollution by providing natural buffer zones where necessary on site. Lighting to service yards will be designed to minimise light spill beyond plot boundaries;
- Light units should be focused so that no light is released above the horizontal. Ideally, light spread should be kept to 90 degrees or below. This is achieved by ensuring that the lighting units are correctly placed and also by placing them at a height that they can be directed downward rather than horizontally; and
- For security lighting, the use of infrared lighting and cameras should be considered where possible to reduce the need for visible lighting outside working hours.

9.6 Summary

9.6.1 An initial review of the current baseline situation of the Site in regard to pollution has been undertaken. The noise and air quality assessments detail the necessary mitigation measures to reduce impacts during construction and operation. The Proposed Development is not anticipated to have any significant impacts on local air quality and is considered to be compliant with the National Planning Policy Framework and the Barnsley Local Plan.

9.6.2 The Proposed Development encourages active travel for occupants. Elements such as reduced car parking and the promotion of cycling through the provision of cycle spaces will improve the health and wellbeing of occupants. Elements such as green infrastructure aid surface water drainage and water penetration.

9.6.3 Lighting will be designed to minimise impacts on surrounding habitats and species, as well as to provide security to those using the site both during construction and operation.

10 Transport

10.1 Introduction

10.1.1 A Transport and Access ES Chapter has been prepared (Fore Consulting Limited, 2023) to assess the likely significant effects of the Development on the environment in respect of transport and access.

10.1.2 The A635 runs east-west along the northern boundary of the Site. A new three-arm roundabout will be developed here to provide access to the Proposed Development from the A635. This roundabout has been brought forward via a separate planning permission, submitted and granted by BMBC and due for completion in December 2023.

10.2 Construction Phase

10.2.1 Vehicle movements generated during construction will be from the delivery of plant and construction materials, and staff travelling to and from the Site.

10.2.2 Vehicle arrivals / departures will be programmed and staggered to reduce the potential for unnecessary delay and congestion at the site. The scheduling of materials, deliveries and waste collection will be managed in order to avoid congestion at the site. Vehicles will be scheduled to peak periods on the local road network, with deliveries co-ordinated with other construction on any neighbouring sites.

10.2.3 Site operatives and visitors will be encouraged to travel to and from the site by active travel modes (walking or cycling) or public transport.

10.2.4 A Construction Traffic Management Plan (CTMP) will be submitted to BMBC prior to the start of works.

10.3 Operation Phase

10.3.1 The main access to the site will be via the proposed three-arm roundabout from the A635 to the north of the site and will run southward through the site connecting the Proposed Development zones.

10.3.2 There will be an increase in HGV traffic during the operational phase. However, the roads to be used include the A636, A6195 and A1(M) Junction 27, all of which are of low sensitivity to severance due to the absence of built-up areas along the roads. This means pedestrian flows are likely to be low.

10.4 Sustainability Measures and Active Travel

10.4.1 On the new roundabout (via the separate planning permission), as part of this hybrid application, a toucan crossing is proposed to improve cycling and walking connectivity of the site by providing safe access from Billingley Green Lane Bus Stop.

10.4.2 To encourage walking and cycling, cycle parking will be incorporated within each unit, located as close to the main entrances as possible to ensure they are within the CCTV monitored, well lit, secure areas. Additionally, the relevant internal infrastructure such as showers, changing rooms and lockers will be implemented to support those who wish to run, walk or cycle a significant distance into work. The occupiers will be in charge of maintaining these facilities and ensuring they are suitable for use.

10.4.3 There will be car parks for each unit/building which will incorporate 5% Active and 20% passive electric charging points for employees. The use of car Electric Vehicles (EVs) will also

be encouraged via the sustainable travel plan which will form part of future reserved matters applications.

10.4.4 The Proposed Development will also upgrade the PRoW which is currently in poor condition, by widening it to 2m to enable a safer pedestrian route and encourage sustainable transport. The PRoW follows the boundary of the Goldthorpe ALDI RDC[3].

10.5 Summary

10.5.1 To summarise, there will be an increase in HGV traffic on the roads during operation of the Proposed Development but the impact on severance is likely to be low. The Proposed Development will provide active and passive electric charging points, as well as the relevant external and internal infrastructure in place to encourage active travel.

[3] Public footpaths and rights of way (barnsley.gov.uk)

11 Materials and Waste

11.1 Introduction

11.1.1 Overall, the hierarchy of waste management should be adopted, in accordance with national and local policy requirements. The waste management methods in order of preference are as follows:

- **Waste Prevention:** Through good design and procurement mechanisms.
- **Preparation for Reuse:** To provide design features to the Proposed Development to use materials in their current state and form, this can occur either on or off site.
- **Material Recovery:** By using waste materials found on site and recycling / recovering them into an alternative form that can be used for construction purposes.
- **Other Recovery:** Energy recovery from biodegradable or combustible materials.
- **Disposal:** The least preferred option where the waste stream would be subject to a final disposal route, such as landfill.

11.2 Materials

11.2.1 Material use will be determined at detailed design. However, construction will incorporate recycled materials to be used where possible and consider using materials that go through less energy-intensive processes and can be sourced locally. There are a number of UK organisations promoting the review and reduction of embodied carbon and supply chain emissions associated with construction as part of their sustainability initiatives, including WRAP, UK Green Building Council and the Green Construction Board. Material use and incorporation of recycled materials where possible should be secured as a planning condition for the Proposed Development.

11.2.2 The primary construction materials to be used will include internal and external concrete, steel frame and cladding, timber and tarmac. Where possible, materials and resources will be sourced from the local area. All timber and wood-based products would be sustainably sourced and procured from known and legal sources. A proportion of timber will be purchased from responsible forest sources.

11.3 Construction Waste

11.3.1 Excavated material and soil will be reused on Site as fill or will be sent off-site to be reused or managed appropriately. Excavated material generated by the enabling works will be subject to waste regulatory controls and permits. If the soil is reused on site, the appropriate and relevant environmental permit considerations will need to be explored.

11.3.2 Waste arisings from construction should be monitored and reviewed by the Developer through the mechanisms of the Site Waste Management Plan (SWMP). The volume/tonnage of waste generated as well as the percentage or volume/tonnage reused, recycled or disposed will be recorded throughout the construction phase.

11.3.3 The off-Site re-use, recycling or recovery of construction waste would be maximised where possible. Waste would only be sent to landfill as a last resort if there is no alternative disposal route. Opportunities to reduce waste through careful management and procurement will be set out in the CEMP and secured through planning conditions.

11.4 Operational Waste

11.4.1 The Proposed Development will have embedded within it the principles of the Waste Hierarchy – 'eliminate, reduce, reuse, recycle, other recovery and disposal'. This will allow the environmental, social and economic risks from waste to be reduced, with the aspiration to meet both local and national waste minimisation and management targets.

11.4.2 During the operational phase, all waste producers, through Duty of Care regulations be expected to adhere to the principles of the Waste Hierarchy, ensuring waste minimisation prior to reuse, recycling and recovery.

11.4.3 Consultation and correspondence will be undertaken with the Waste Strategy team BMBC, to confirm waste management storage and collection requirements in line with local planning policy.

11.4.4 The Proposed Development must provide space for recyclables. The waste storage spaces will be developed at detailed design stage.

12 Summary

12.1.1 This Sustainability Statement demonstrates that the Proposed Development meets a range of local sustainability objectives, as defined by Barnsley's Local Plan (BLP).

12.1.2 The Sustainability Statement also demonstrates that the Proposed Development delivers benefits across different strands of sustainability as per the National Planning Policy Framework 2023 (NPPF). These aforementioned objectives and benefits have been met via the measures below.

12.1.3 The Proposed Development aims to demonstrate economic sustainability measures. **Section 8 – Health and Wellbeing** outlines how both construction and operation of the Proposed Development will result in the creation of jobs for residents of BMBC and increase GVA. **Section 6 – Land Use and Ecology** details that strategic landscaping and planting will be used increase biodiversity and a LEMP will be implemented to ensure habitat creation is monitored and managed throughout the operation phase, ensuring it is environmentally sustainable. As set out **in Section 10 – Transport**, to encourage sustainable transport, cycle parking will be incorporated throughout the Proposed Development alongside the relevant internal infrastructure. Each unit will be designed so that where feasible, natural light will provide the primary source of light to promote a healthy, efficient working environment to support social behaviour and wellbeing.

- This will address **Policy SD1 Presumption in favour of Sustainable Development**

12.1.4 **Section 5 – Carbon Emissions** details how the Proposed Development will adhere to the Energy Hierarchy. The Proposed Development will be lean by incorporating a range of energy efficiency measures, in order to comply with the Part L2A 2021 notional building specification. It will be clean by using Air Source Heat Pumps (ASHPs) to help the building to meet the target emission and energy rates. **Section 4 – Energy** shows photovoltaic (PV) is an option and should be investigated further. The Proposed Development also includes the provision of 5% active and 20% passive electric charging points for employees to encourage cleaner modes of transport and reduce carbon emissions.

- This will address **Policy CC2 Sustainable Design and Construction and Policy RE1 Low Carbon and Renewable Energy**

12.1.5 As outlined in **Section 7 - Water**, through the use of raised floor levels, flood compensation storage and implementation of Sustainable Drainage Systems (SuDs) features, as well as elements such as green infrastructure which will aid in the absorption of emissions, the Proposed Development aims to adapt the future impacts of climate change.

- This will address **Policy CC1 Climate Change.**

12.1.6 As set out in **Section 11 – Materials and Waste**, a SWMP will be used during construction to monitor and review waste arisings. The Waste Hierarchy principles will be used to reduce waste during operation in line the local and national waste minimisation and management targets.

Appendix A Parameter Plan

Appendix B DMRB LA 114 Carbon Calculations Methodology

A.1.1 The study area shall comprise GHG emissions associated with project construction related activities/materials and their associated transport for construction and operational maintenance. For operational road user GHG emissions, the study area shall be consistent with the affected road network defined in a project's traffic model.

A.1.2 The scope of the GHG assessment aligns with the Design Manual for Roads and Bridges (DMRB) LA 114 Climate methodology (Highways England, 2021). This document sets out the stages of a project lifecycle, potential sources of GHG emissions, and examples of activity data from road schemes, as shown in Table B.1 below.

Main Lifecycle Stage	Sub Lifecycle Stage	Potential sources	Activity Data
Construction	A1-A3 Product stages – raw material supply, transport, and manufacture	Indirect Scope 3 emissions from primary raw material extractions, manufacturing, and transportation within the supply chain (i.e., to the suppliers) of all materials required for the permanent assets	Data on A1-A3 stages based on estimated material quantities from the design model. This includes concrete, steelwork, topsoil, and asphalt for the bridges and civils elements.
	A4 Construction process stage – transport to works site	Direct Scope 1 emissions from vehicles transporting materials to site. Indirect Scope 3 emissions from employees commuting to site.	Transportation of materials and staff to site, mode/distance (based on assumptions and typical location of materials)
	A5 Construction process stage – construction	Direct Scope 1 emissions from plant equipment, temporary welfare facilities, soil disturbance, ground works and landscaping. Indirect Scope 3 emissions from construction waste	Qualitative description of emissions arising from fuel/electricity consumption. Construction waste estimates from the Proposed Development's bill of quantities.
Operation	B2-B5 Maintenance, repair, replacement, and refurbishment	Direct and indirect Scope 1, 2 and 3 emissions from new materials and activities of organisations conducting routine maintenance, repair, replacement, and refurbishment of infrastructure.	Qualitative assessment of likely sources of GHG emissions.
	Stage B6 Operational energy use	Indirect Scope 2 emissions from energy consumption from lighting, CCTV, and traffic signalling infrastructure within the Proposed Development	Qualitative assessment of likely emissions.
	B9 User utilisation of infrastructure	Direct Scope 1 exhaust emissions and indirect Scope 2 electric vehicle (EV) charging emissions from end-user vehicles movements.	Traffic modelling outputs including numbers of vehicles, vehicle type, speed, and distance travelled (link lengths) across the road network.

Main Lifecycle Stage	Sub Lifecycle Stage	Potential sources	Activity Data
Opportunities for reduction	Applicable to all the above	Mitigation such as designing the Proposed Development using PAS 2080 (BSI, 2016).	Avoided GHG emissions through value engineering and substitution of virgin raw materials with those from recovered sources.

A.1.3 LA 114 states that "*A proportionate approach shall be applied to calculating and reporting GHG emissions from changes in land use and forestry (i.e., reporting only where there is likely to be a substantial change)*". The Proposed Development will be removing agricultural land from operation. This has therefore been provided qualitatively.

Stages A1, A2, A3 and A5

12.1.7 The National Highways Carbon Tool V2.4 (the 'Carbon Tool') has been used to assess the GHG emissions associated with the extraction, manufacturing, and transportation within the supply chain of permanent construction materials, plant equipment, temporary welfare facilities and construction waste (Stages A1, A2, A3 and A5). Due to the current design stage of the Proposed Development, the following categories have been assessed quantitively, based on an estimated Bill of Quantities received from the project team:

- Bulk materials
- Earthworks
- Road pavements
- Civil structures and retaining walls
- Business and employee transport
- Fencing, barriers and road restraint systems
- Drainage
- Street furniture and electrical equipment
- Waste

12.1.8 Each of the above categories are further split into items, material and products for which there are GHG emission factors. Where exact material type is not known (e.g., blend of concrete to be used), a reasonable, worst case assumption has been made based on discussions with the project team. Emissions from an activity or material are calculated using the below equation:

Activity data x GHG emissions factor = GHG emissions value

12.1.9 It is assumed that all cut/ fill and topsoil will be reused on site, and therefore no emissions are anticipated to arise associated with waste.

12.1.10 As a Principal Contractor has not yet been appointed, emissions arising from plant/ equipment use, for example equipment used to move soil, welfare facilitates, and water use, cannot be

quantified at this stage. An estimate has been taken using RICS guidance based on the value of the project[4].

Stages A4

12.1.11 GHG emissions from the movement of materials and of construction workers to site (Stage A4) has been calculated using the Department for Environment, Food and Rural Affairs (Defra) Emissions Factors Toolkit (EFT) Version 11.01 (Defra, 2021).

12.1.12 The EFT requires various input data, including traffic flows (in Annual Average Daily Traffic (AADT) format), vehicle composition (i.e., the proportion of Heavy Duty Vehicles (HDVs), length of the road link, road type and average vehicle speed). Assumptions have been provided by the Proposed Development's transport consultant.

Stages B2-B5

12.1.13 The emissions associated repair, maintenance and replacement have been assessed based on the assumption that the road has a design life of 40 years and will be resurfaced approximately every 20 years.

Stage B6

12.1.14 The emissions of operational energy usage from lighting necessary for the safe operation of the road. The exact type of luminaire is currently unknown and therefore a likely type has been used to calculate emissions.

Stage B9

12.1.15 The assessment of operational end-user GHG emissions (Stage B9) uses the EFT as detailed above in Stage A4.

12.1.16 The GHG emissions assessment calculates the difference between a 'do minimum (DM) scenario (traffic flows on the road network without the Proposed Development) and 'do something' (DS) scenario (traffic flows with the Proposed Development) to determine the impact of the Proposed Development, as shown below:

Do Something – Do Minimum = Proposed Development Emissions

A.1.4 The road network on which the operational end-users utilise, is defined by the Proposed Development's transport model, provided for these scenarios by the project's transport consultants.

Limitations

A.1.5 The following assumptions and limitations should be noted:

- The Defra EFT uses data from the National Atmospheric Emissions Inventory (NAEI) to account for likely changes to national vehicle fleet composition such as increasing uptake of electric vehicles (EVs). The Defra EFT provides a projection of fleet composition up to the year 2050. The EFT notes however, that the emission outputs for 2031-2050 may not fully align with those applied for the purpose of NAEI projections. It should also be noted that the CO_2 output of the EFT includes both direct emissions from vehicle tailpipes and indirect emissions associated with the charging of electric/plug-in-hybrid vehicles. This assumption relates to the calculation of lifecycle stage B9.

[4] Whole Life Carbon Assessment for the Built Environment (rics.org)

- The projections in the Defra EFT Toolkit are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these tools do not reflect short- or longer-term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns. This assumption relates to the calculation of lifecycle stage B9.

- The trajectory of emissions factors into the future is dependent on influences outside of the Applicant's control, for example Government policy and global technology and economic shifts. Furthermore, the National Grid is anticipated to continue to decarbonise over the next decade, which would further reduce emissions from elements dependant on grid energy, including the lighting and traffic signalling systems. Therefore, there are inherent uncertainties that overestimate GHG emissions in the assessment made of future GHG emissions, which is a conservative approach. This assumption relates to lifecycle stage B6.

- The GHG assessment is based on preliminary design information that was available at the time of assessment and provided by the project's design team. Where appropriate, the selection of reasonable worst-case assumptions have been made to provide sufficient flexibility for design decisions to change at detailed design without altering the findings of this assessment, for example by assessing a material mix that does not contain recycled materials. It is acknowledged that there are some elements of the design which cannot be quantified until the detailed design stage, such as the exact material quantities required to construct the Proposed Development.

Appendix B Indicative Part L2A 2021 Compliance Model

B.1.1 The purpose of these calculations is to inform the baseline Part L2A 2021 kgCO2/m², and to summarise the proposed non-domestic performance targets required to achieve compliance with the updated Part L2A 2021 (Conservation of fuel and power).

B.1.2 Due to the limited information available on the building's layout, an indicative model was built on IESVE to undertake a DSM assessment and issue a BRUKL document. This should inform the building performance parameters and fixed building services efficiencies required to achieve compliance with Part L2 2021.

B.1 Indicative Model Geometry Assumptions

B.1.1 The following assumptions should be noted.

- Warehouses areas are similar to the areas in the illustrative masterplan.
- All warehouses were covered by a flat roof with a height of 18 m.
- Two story office with areas similar to the areas on the illustrative masterplan, and a 3.7 m story height.
- Rooflights (skylight) proportion of 6% of each warehouse roof area.
- Warehouse occupied area is 3.7 m of the overall building height, the rest of the building height is assumed to be an internal void.
- Buildings orientation is similar to the orientation provide within the illustrative masterplan.
- Glazing is provided for offices area only, with a 30% glazing area on each external wall.
- Two High usage doors for the offices area with a measurements of a 1.5 m * 2.5 m.
- Vehicle access doors distributed on all warehouse's facades.
- Figure 1 below shows an image the IES model geometry.
- Weather file used for these calculations is London TRY.

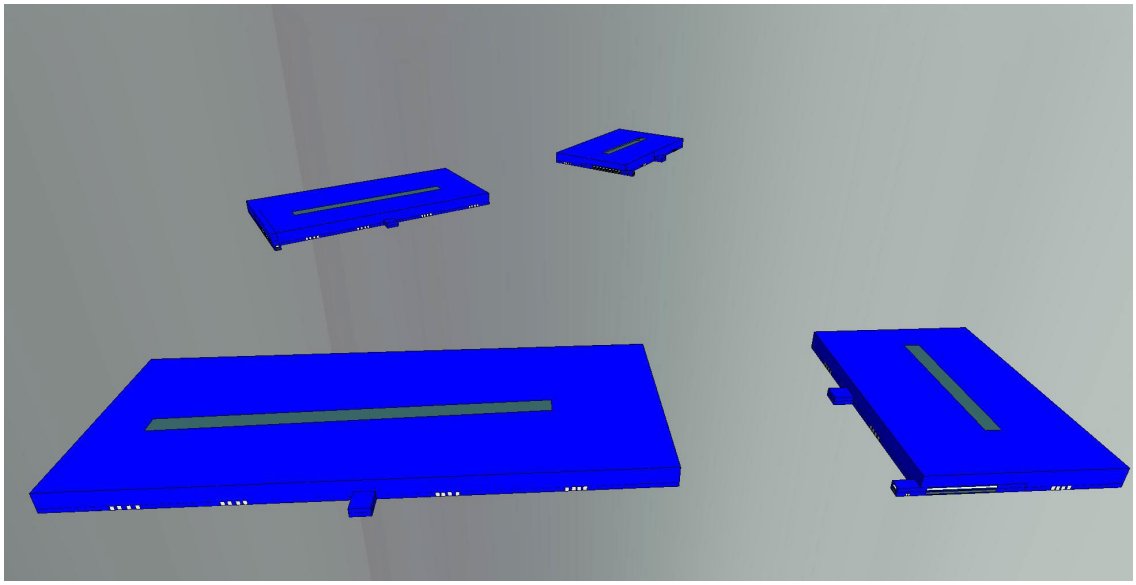

Figure C.1: Goldthorpe Warehouses and Offices Indicative model

B.2 Proposed Energy Performance Parameters

B.2.1 Table C.1 summarises the proposed building fabric parameters and fixed building services of the development. The limiting values of Part L2A 2021 are also presented at Table C.1 for reference.

Table C.1: Energy efficiency measures for non-domestic

Energy efficiency requirements minimum	**ADL2 (2021) Limiting values**	**Proposed values**
Building Fabric Parameters		
Flat Roof U-value (W/m²K)	0.18	0.11 W/m².K
Pitched Roof U-value (W/m²K)	0.16	N/A
Exposed Wall U-value (W/m²K)	0.26	0.18 W/m².K
Semi Exposed walls (Between Conditioned & Unconditioned Areas)	-	0.18 W/m².K
Exposed Ground Floor U-value (W/m²K)	0.18	0.15 W/m².K
Semi Exposed Floor (Between Heated & Unheated Areas)	0.18	0.15 W/m².K
Window U-value (W/m²K)	1.6	1.2 W/m².K- G value 0.4
Window frame factor (%)	-	15%
Window g-value (%)	-	Glazing g-value 0.32 Roof lights g-value 0.4

Energy efficiency requirements minimum	**ADL2 (2021) Limiting values**	**Proposed values**
Window light transmittance (%)	-	71%
Roof lights U-value (W/m²K)	2.2	1.6 W/m². K G value 0.4
Roof Lights Frame factor	-	20%
Pedestrian Doors (Including Glazed Doors)	1.6	N/A
Vehicle Access Doors & Similar Large Doors	1.3	1.3 W/m².K
High Usage Entrance Doors	3.0	1.6 W/m².K
Air permeability (m³/hr/m² @ 50 Pa)	8.0 m³/hr/m² @ 50 Pa)	3.0 m³/hr/m² @ 50 Pa)
Fixed Building Services		
Lighting luminaire (lm/circuit-Watt)	95 lm/W	• Offices: - - 95 lm/W - Illuminance 500 lux - Lamp efficacy (offices)= 190 - Light output ratio = 0.5 • Warehouse: - - Lamp efficacy 105 lm/W - Illuminance 150 lux - Lamp efficacy 150 - Light output ratio = 0.7
Occupancy control	-	YES. (For Offices area) [Man on/ Auto off] None - for the Warehouse Storage area
Daylight control	-	YES. (For Offices) Type - Dimming
Photoelectric parasitic power	-	0.1
Photoelectric options	-	YES, For Offices & None for Warehouse)
Photoelectric time switch control	-	YES, For Offices & None for Warehouse)
Power factor > 0.95	-	YES > 0.95

Energy efficiency requirements minimum	**ADL2 (2021) Limiting values**	**Proposed values**
Lighting systems have provision for metering	N/A	YES
Lighting systems metering warns of out-of-range values	N/A	YES
Standard value for Heating efficiency for office	2.5	- Offices area ASHP /VRF heating Seasonal efficiency 4.3, SCOP = 4.2 - No heating provided to Warehouse storage area
System controls	N/A	For offices VRF system: -Local Time control (room by room). -Local Temperature control (room by room).
SFP (W/(l/s)	-	1.8 for offices MVHR
Cooling (air-conditioned) (SEER/SSEER)	Cooling efficiency = 5	Offices area cooling SSEER 5, Seasonal EER= 6.7, No Cooling provided to Warehouse storage area
Cooling (mixed mode) (SEER/SSEER)	-	Offices area cooling EER= 2.6
Heat recovery efficiency (%)	-	70% Offices area HR efficiency
Electric water heater efficiency (%)	-	Electric 100%
Roof mounted PV	-	None

C.3 Goldthorpe All Warehouses with Gas Boiler

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Goldthorpe All warehouses with Gas Boiler

As designed

Date: Tue Mar 21 11:20:42 2023

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.19

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.19

BRUKL compliance module version: v6.1.e.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 5217.88

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

The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.48	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.47	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	24.87	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	26.08	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER > TPER

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

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.18	0.18	PL000004:Surf[2]
Floors	0.18	0.15	0.15	PL000004:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	PL000003:Surf[0]
Windows** and roof windows	1.6	1.2	1.2	PL000004:Surf[1]
Rooflights***	2.2	1.61	1.61	PL00001B:Surf[4]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	PL00000B:Surf[0]
High usage entrance doors	3	1.61	1.61	PL000004:Surf[6]

$U_{a\text{-}Limit}$ = 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
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Office system Gas

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.86	2	0	-	0.65
Standard value	0.93*	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 gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

1- Hot water

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

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

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
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Plo1 Warehouse Occupied area	105	-	-
Offices	95	-	-
Plo3 Warehouse Occupied area	105	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Plo4 Warehouse Occupied area	105	-	-
Offices	95	-	-
Offices	95	-	-
Plo3 Warehouse Occupied area	105	-	-

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?
Offices	NO (-16.8%)	NO
Offices	N/A	N/A
Offices	NO (-100%)	NO
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	NO (-10%)	NO
Plo1 Warehouse Occupied area	NO (-85.3%)	NO
Offices	N/A	N/A
Plo3 Warehouse Occupied area	NO (-86.4%)	NO
Offices	NO (-10.5%)	NO
Offices	NO (-14.9%)	NO
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	NO (-9.9%)	NO
Offices	N/A	N/A
Offices	NO (-10.4%)	NO
Plo4 Warehouse Occupied area	NO (-88.2%)	NO
Offices	NO (-20.7%)	NO
Offices	NO (-20.9%)	NO
Plo3 Warehouse Occupied area	NO (-87.1%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	206801	206801
External area [m^2]	474842	474842
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	4
Average conductance [W/K]	86852.3	92680.1
Average U-value [W/m^2K]	0.18	0.2
Alpha value* [%]	22.65	10

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

Building Use

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

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	0.86	1.75
Cooling	1.14	0.28
Auxiliary	0	0
Lighting	11.68	12.83
Hot water	4.26	4.05
Equipment*	30.74	30.74
TOTAL**	**17.94**	**18.91**

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

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	1.62
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*1.62*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	8.3	10.44
Primary energy [kWh_{PE}/m^2]	26.08	24.87
Total emissions [kg/m^2]	2.47	2.48

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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	49.1	115.2	17	22.5	0	0.8	1.42	0.86	2
	Notional	113	93.8	34.7	5.6	0	0.91	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

C.4 Goldthorpe Plot 3 with Gas Boiler in offices

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Goldthorpe Plot 3 with Gas Boiler in offices

As designed

Date: Tue Mar 21 11:12:38 2023

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.19

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.19

BRUKL compliance module version: v6.1.e.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 1120

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.46	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.36	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	25.34	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	25.26	
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	0.18	0.18	PL000004:Surf[2]
Floors	0.18	0.15	0.15	PL000004:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	PL000003:Surf[0]
Windows** and roof windows	1.6	1.2	1.2	PL000004:Surf[1]
Rooflights***	2.2	1.61	1.61	PL00001B:Surf[4]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	PL000005:Surf[1]
High usage entrance doors	3	1.61	1.61	PL000004:Surf[6]

$U_{a\text{-}Limit}$ = 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
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Office system Gas

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.86	2	0	-	0.65
Standard value	0.93*	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 gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

1- Hot water

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

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

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
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Plo3 Warehouse Occupied area	105	-	-

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?
Offices	NO (-16.8%)	NO
Offices	N/A	N/A
Offices	NO (-100%)	NO
Offices	NO (-14.9%)	NO
Offices	N/A	N/A
Offices	N/A	N/A
Plo3 Warehouse Occupied area	NO (-87.1%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	82574.5	82574.5
External area [m^2]	185364	185364
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	4
Average conductance [W/K]	33223.4	35683.9
Average U-value [W/m^2K]	0.18	0.19
Alpha value* [%]	22.45	10

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

Building Use

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

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	0.53	1.28
Cooling	0.85	0.22
Auxiliary	0	0
Lighting	11.66	12.81
Hot water	4.26	4.04
Equipment*	30.55	30.55
TOTAL**	**17.29**	**18.36**

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

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0.87
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0.87*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	5.85	7.91
Primary energy [kWh_{PE}/m^2]	25.26	25.34
Total emissions [kg/m^2]	2.36	2.46

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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	38.5	109.6	13.4	21.4	0	0.8	1.42	0.86	2
	Notional	105.8	94.4	32.5	5.7	0	0.91	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

C.5 Goldthorpe Plot 3 with ASHP in offices

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Goldthorpe Plot 3 with ASHP in offices

As designed

Date: Tue Mar 21 11:15:23 2023

Administrative information

Building Details

Address: Address 1, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.19

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.19

BRUKL compliance module version: v6.1.e.0

Foundation area [m²]: 1120

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.41	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.23	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	26.26	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	24.36	
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	0.18	0.18	PL000004:Surf[2]
Floors	0.18	0.15	0.15	PL000004:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	PL000003:Surf[0]
Windows** and roof windows	1.6	1.2	1.2	PL000004:Surf[1]
Rooflights***	2.2	1.61	1.61	PL00001B:Surf[4]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	PL000005:Surf[1]
High usage entrance doors	3	1.61	1.61	PL000004:Surf[6]

$U_{a\text{-}Limit}$ = 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
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Offices system ASHP VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.3	6.7	0	1.8	0.7
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

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

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

1- Hot water

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

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

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
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Plo3 Warehouse Occupied area	105	-	-

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?
Offices	NO (-16.8%)	NO
Offices	N/A	N/A
Offices	NO (-100%)	NO
Offices	NO (-14.9%)	NO
Offices	N/A	N/A
Offices	N/A	N/A
Plo3 Warehouse Occupied area	NO (-87.1%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	82574.5	82574.5
External area [m^2]	185364	185364
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	4
Average conductance [W/K]	33223.4	35683.9
Average U-value [W/m^2K]	0.18	0.19
Alpha value* [%]	22.45	10

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

Building Use

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

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	0.06	0.19
Cooling	0.27	0.22
Auxiliary	0.28	0.54
Lighting	11.66	12.81
Hot water	4.26	4.04
Equipment*	30.55	30.55
TOTAL**	**16.52**	**17.8**

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

Energy Production by Technology [kWh/m^2]

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

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	5.18	5.59
Primary energy [kWh_{PE}/m^2]	24.36	26.26
Total emissions [kg/m^2]	2.23	2.41

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	21.5	109.5	1.4	6.9	7.1	4.25	4.44	4.3	6.7
	Notional	47	94.4	4.7	5.7	13.6	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

C.6 Goldthorpe All warehouses with ASHP

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Goldthorpe All warehouses with ASHP

As designed

Date: Tue Mar 21 11:22:31 2023

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.19

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.19

BRUKL compliance module version: v6.1.e.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 5217.88

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.45	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.26	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	26.73	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	24.7	
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	0.18	0.18	PL000004:Surf[2]
Floors	0.18	0.15	0.15	PL000004:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	PL000003:Surf[0]
Windows** and roof windows	1.6	1.2	1.2	PL000004:Surf[1]
Rooflights***	2.2	1.61	1.61	PL00001B:Surf[4]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	1.3	1.3	PL00000B:Surf[0]
High usage entrance doors	3	1.61	1.61	PL000004:Surf[6]

$U_{a\text{-}Limit}$ = 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
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Offices system ASHP VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.3	6.7	0	1.8	0.7
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

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

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

1- Hot water

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

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

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
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Plo1 Warehouse Occupied area	105	-	-
Offices	95	-	-
Plo3 Warehouse Occupied area	105	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Offices	95	-	-
Plo4 Warehouse Occupied area	105	-	-
Offices	95	-	-
Offices	95	-	-

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
Plo3 Warehouse Occupied area	105	-	-

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?
Offices	NO (-16.8%)	NO
Offices	N/A	N/A
Offices	NO (-100%)	NO
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	NO (-10%)	NO
Plo1 Warehouse Occupied area	NO (-85.3%)	NO
Offices	N/A	N/A
Plo3 Warehouse Occupied area	NO (-86.4%)	NO
Offices	NO (-10.5%)	NO
Offices	NO (-14.9%)	NO
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	N/A	N/A
Offices	NO (-9.9%)	NO
Offices	N/A	N/A
Offices	NO (-10.4%)	NO
Plo4 Warehouse Occupied area	NO (-88.2%)	NO
Offices	NO (-20.7%)	NO
Offices	NO (-20.9%)	NO
Plo3 Warehouse Occupied area	NO (-87.1%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	206801	206801
External area [m^2]	474842	474842
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	4
Average conductance [W/K]	86852.3	92680.1
Average U-value [W/m^2K]	0.18	0.2
Alpha value* [%]	22.65	10

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

Building Use

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

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	0.09	0.27
Cooling	0.36	0.28
Auxiliary	0.36	0.7
Lighting	11.68	12.83
Hot water	4.26	4.05
Equipment*	30.74	30.74
TOTAL**	**16.75**	**18.12**

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

Energy Production by Technology [kWh/m^2]

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

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	7.19	7.39
Primary energy [kWh_{PE}/m^2]	24.7	26.73
Total emissions [kg/m^2]	2.26	2.45

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	27.3	115.2	1.8	7.2	7.1	4.25	4.44	4.3	6.7
	Notional	52.7	93.8	5.3	5.6	13.8	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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