Dormitory Eradication, Edward Street Hospital

Energy & Sustainability Statement

Integrated Healthcare Projects

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P01	25 January 2022	Draft Issue
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Executive Summary

The Dormitory Eradication, Edward Street Hospital development aims to be at the forefront of sustainability. Its strong carbon and sustainability goals will help to create a development which supports Black Country's ambitious climate transition.

In accordance with the Black Country Core Strategy planning requirements, the following Energy Statement has been developed for the proposed Dormitory Eradication, Edward Street Hospital development. It aims to meet the energy and climate change requirements of the Black Country Core Strategy (February 2011) and the West Bromwich Area Action Plan (adopted in 2012). The replacement policies to the Black Country Core Strategy, the joint development plan, the Black Country Plan (BCP), policies are currently in draft as the Plan is emerging. We have taken note of the direction of travel of Black Country policy to ensure the development meets the standard set out in the Black Country Core Strategy.

An energy strategy has been developed by following the energy hierarchy; Be Lean, Be Clean and Be Green. The energy assessment is based on the current SAP 2012 emission factors.

The proposed Dormitory Eradication, Edward Street Hospital, West Bromwich, West Midlands development will deliver 2359.8 m^2 (GIA) of 30 bed dementia wards which are an extension of the existing Edward Street Hospital, built on the grounds of an existing wing. f

The core strategies applied in the project are outlined below:

- The envelope of the new build will be designed to perform significantly better than the Building Regulation standards with low U-values, g-values and low air leakage rates.
- Analysis has been carried out to optimise the facades so that heat losses are minimised whilst the size and position of openings has been optimised to maximise the use of natural light within each space.
- The development will be mechanically ventilated throughout the year, making use of heat recovery to reduce the heating demands.
- Energy efficient services employed in the development include high efficiency LED lighting coupled with occupancy and daylight controls to significantly reduce the lighting energy use.
- Electrical and mechanical systems within the development will be tightly metered and controlled with a full Building Management System (BMS). This will enable energy use to be tracked and opportunities for efficiency improvements to be made.

An 3 % carbon emissions reduction is achieved through energy efficiency measures.

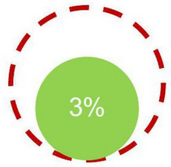
The inclusion of a Combined Heat and Power (CHP) unit to deliver a portion of the development's heat demand and electricity plant has been also assessed. The heat load of the development is insufficient to permit effective operation of an on-site combined heat and power unit. It is also widely recognised that CHP is now more CO_2 intensive than electricity because of the rapid decarbonisation of the electricity grid. Therefore, it is considered to be unviable for this scheme.

The proposed roof area is allocated as plant area and unused roof space. The proposed location of PV arrays is at roof level. A total of 210m^2 usable PV array is required over a few sections of roof, with a modular efficiency of at least 22.6%, orientated south at an inclination of 30° to the horizontal. This could enable a 47.5 kWp photovoltaic solar array to be installed.

The use of on-site renewables and low carbon technologies could reduce the site-wide CO_2 emissions of the development by 32.2% across the site.

The proposed development is achieving a 35.3% improvement over the Building Regulations Part L 2013 Target Emission Rate.

Carbon emissions reduction through energy efficiency measures:



Carbon emissions reduction through low & zero carbon technologies:

Total carbon emissions reduction over the Building Regulations Part L 2013 TER:

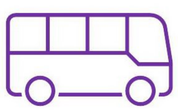
Health & Wellbeing

With people spending up to 90% of their lives indoors, the impact that buildings have on the health & wellbeing of occupants is of growing importance. The development aims to provide an environment that has a positive impact on its occupants.

- **Good daylight** will be achieved in occupied spaces through the balanced and considered use of glazing. High performance glazing will reduce energy loss and prevent excessive heat gain.
- A mixed mode ventilation system is to be provided. As part of the façade, openable sections of the glazing (top hung opening) are incorporated, that will provide free cooling during the day. The development will be mechanically cooled to maintain **thermal comfort** under normal operational hours**.**
- A central Air Handling Units (AHU) will maintain a consistent supply of filtered fresh air to the clean space changing area to maintain good **indoor air quality**.
- Low VOC materials and finishes will minimise internal sources of pollutants.

Transport

As the second largest emitter of CO_2 in the UK, the transport of people is a priority area in achieving the UK's net zero carbon ambition. Supporting alternatives to fossil fuel and private modes of transport is key.



- The promotion of **walking and cycling** with strong connection links from the site to the surrounding area. This is further supported with the provision of cycle storage facilities for occupant use.
- Good **public transport** links in the immediate vicinity with further national links in the nearby city centre.

Water

Climate change continues to place increasing pressure on the UKs water supply, with an increase in the frequency and severity of droughts. Furthermore, the energy and carbon emissions associated with the treatment of fresh water places water conservation at the forefront.

- **Water efficient** fixtures and fittings will be specified to reduce water consumption below the levels required for national building regulations.
- **Metering and sub-metering** of consumption will enable ongoing, targeted reductions in water use.
- **Leak detection and shut-off** will prevent both major and minor leaks within the buildings as well as in external areas.
- The need for **irrigation** will be minimised through appropriate landscaping which are adapted to the UK's conditions.

Materials

As well as carbon emissions, materials can have much wider social and environmental impacts which need to be considered.

- All **timber** used in the project will be from a responsible or sustainable source, using certified FSC or PEFC sources.
- To ensure **responsible and sustainable procurement**, materials will be specified in line with a documented sustainable procurement plan.
- Materials that are **durable and resilient** will be specified to maximise their lifespan and avoid the need for disposal and replacement.

Waste

Buildings and building sites produce a significant amount of waste per year.

- The use of a **Resource Management Plan** will set targets for resource efficiency and procedures for waste management.
- Appropriate and accessible **waste facilities** will be provided to encourage occupants to recycle waste effectively.

Land Use & Ecology

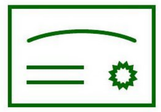
As well as a climate crisis, the UK faces a biodiversity crisis with a rapid decline in biodiversity in recent years. The built environment can respond to this through sustainable land use, habitat protection and creation as well as improvement of long-term biodiversity for the site and surrounding land.

- Using the external landscape to integrate **biodiversity** and create a microclimate for planting..
- Diversity of planting to create valuable habitat throughout the seasons.

Pollution

- The site will feature no **on-site combustion** for heating and hot water which would be detrimental to local air quality.
- **External lighting** will be designed to minimise the impact of light pollution. Light fittings will be specified with a reduced light spill and controlled using photocells and timeclocks to limit unnecessary operation.
- Limits to noise emitting plant to prevent impacts on its surroundings.
- Responsible construction practices to minimise resource use and the impact of noise, dust and pollution.

Environmental Compliance



Black Country Plan and Black Country Core Strategy – requires that new commercial developments should demonstrate best practice which will include the application of the BREEAM standards.

The preliminary BREEAM assessment indicates that the development is currently likely to achieve 'Excellent' under BREEAM New Construction 2018 scheme.

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1.0

Introduction

1.0 Introduction

1.1 Purpose of Statement

This Energy Statement has been prepared in support of the planning application for the Dormitory Eradication, Edward Street Hospital located in West Bromwich, West Midlands. It responds to the energy and climate change policy requirements of the West Midlands's Combined Authority, the Black Country Core Strategy (adopted in 2011), and the West Bromwich Area Action Plan (adopted in 2012). The Black Country Core Strategy has been considered as the Black Country Plan (newer version) is still under review and will likely be adopted in 2023.

The format of the statement is intended to reflect and respond to the issues raised in the Black Country Core Strategy (February 2011).

The principal objectives are to:

Outline the development's approach to reducing the site's contribution to the causes of climate change by minimising the site's needs for energy and the emissions of CO_2, by providing some of the requirement by renewable/sustainable means, minimising waste generation and limiting consumption of finite resources. Demonstrate that the proposed development will meet the highest standards of sustainable design and construction throughout all the stages of the project, including demolition, construction, and long-term management in line with the principles of BREEAM to achieve 'Excellent".

1.2 Methodology – The Energy Hierarchy

The design of the proposed scheme has been developed to reduce its annual energy consumption, provide energy in an environmentally friendly way, and to minimise its annual CO_2 footprint. To achieve this, the Statement follows the 'Steps to low carbon methodology' as illustrated below.

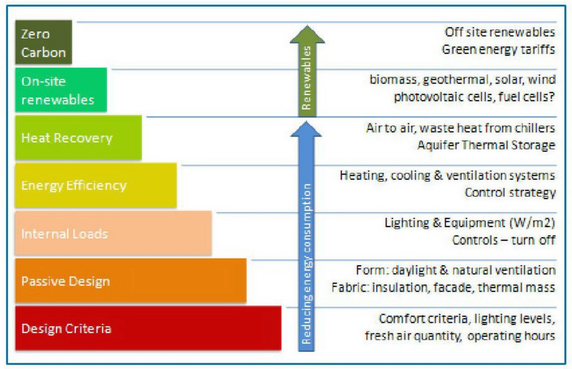


Figure 1-1. Steps to low carbon methodology

As part of the Energy Strategy an energy assessment has been carried out to benchmark the proposed energy strategy and evaluate its performance against the relevant policies. The calculations referenced within this planning statement have been based upon the National Calculation Methodology and Building Regulations Part L. An important item to note is the potential risk associated due to new 2021 versions of Part L, Part F and Part O regulations that will be adopted in June 2022. The impact these may have on the project will be reviewed once the accredited software is available. These results highlight the development's potential energy efficiency. These are not a reflection on the likely energy consumption / CO_2 emissions of the building.

1.3 The Site, Surrounding Context and Proposed Development

The site is known as Dormitory Eradication, Edward Street Hospital and is bound by Edward Street to the north, Victoria Street to the east, Lodge Road tram station to the south, and Lodge Road to the west. The scheme is for the redevelopment and remodelling of Edward Street Hospital (ESH) on its existing site in West Bromwich. There will be a partial demolition of the existing building and building a new 2-storey building.

The Proposed Development will deliver 2359.8 m^2 (GIA) of 30 bed dementia wards which are an extension of the existing Edward Street Hospital, built on the grounds of an existing wing.

There are limited trees present within the site, largely associated with the amenity grassland along Edward Street and along the southern boundary adjacent to the Metro Line.

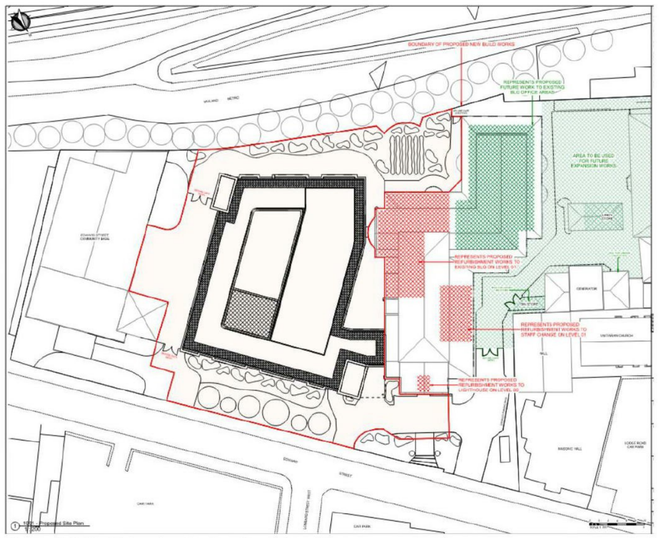
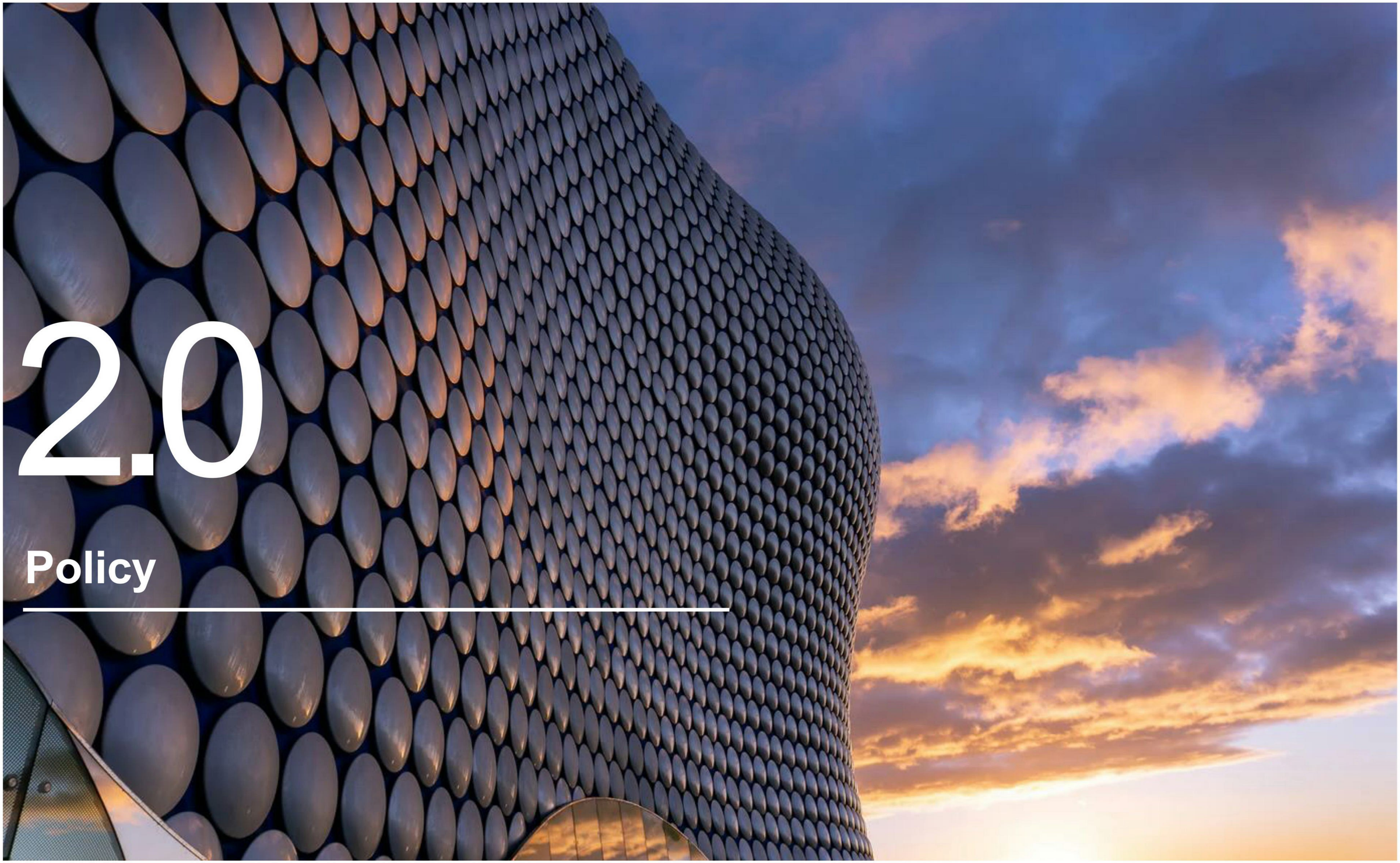


Figure 1-2. Red Line Application Boundary Plan



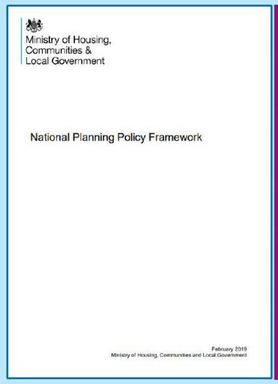
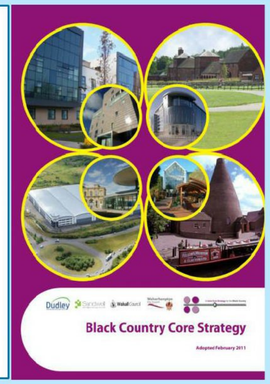
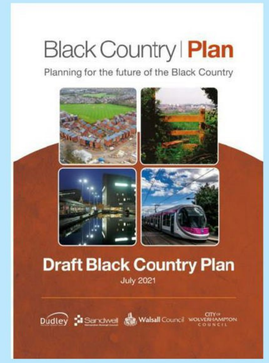
2.0

Policy

2.0 Policy

In support of the planning submission this energy and sustainability statement has been produced to demonstrate how the Dormitory Eradication, Edward Street Hospital development proposal addresses the policies and standards presented in the following table.

For more details about the planning policies see **Appendix A**.

	Guidance	Policy Reference	Minimum Requirements	
Energy Strategy	National ▪ National Planning Policy Framework – February 2019 ▪ Building Regulations Part L2A 2013 Regional West Midlands Combined Authority Local The Black Country Core Strategy (2011) Black Country Plan Review (due to be adopted in 2024)	The Black Country Core Strategy (2011) ▪ Policy ENV7: Renewable Energy Black Country Plan Review (2023) ▪ Policy CC2: Energy Infrastructure ▪ Policy CC7 Renewable and Low Carbon Energy and BREEAM Standards	Policy ENV7: ▪ To incorporate the generation of energy from renewable sources sufficient to off-set at least 10% of the estimated residual energy demand of the development on completion. ▪ To explore the use of combined heat and power facilities for larger development schemes3 ▪ To consider the use of on-site sources, off-site sources, or a combination of both. Policy CC7: ▪ To achieve 19% carbon reduction improvement upon the requirements within Building Regulations Approved Document Part L 2013. ▪ To incorporate generation of renewable energy or low carbon sources sufficient to off-set a minimum of 20% of the estimated residual energy demand of the development on completion.	   
Overheating Assessment	Black Country Plan Review (due to be adopted in 2024)	Black Country Plan Review ▪ Policy CC3: Managing Heat Risk	Policy CC3: ▪ To minimise the internal heat generation using energy-efficient design such as increasing glazing and airtightness. ▪ To provide passive and mechanical ventilation ▪ To provide active cooling systems but should be avoided where possible. ▪ To reduce the amount of heat entering the building by using shadings and green roofs	
Sustainability Strategy	▪ Black Country Core Strategy – Climate Change – Air quality – Sustainable drainage – Ecology/ landscaping (Urban Greening) – Sustainable transport Black Country Plan Review	The Black Country Core Strategy 2011 ▪ Policy ENV3: Design Quality ▪ Policy ENV4 - Trees, Woodlands, and Hedgerows, ▪ Policy ENV5: Flood Risk, Sustainable Drainage Systems and Urban Heat Island Black Country Plan Review ▪ Policy CC1: Increasing Efficiency and Resilience ▪ Policy CC4: Air Quality ▪ Policy CC5: Flood Risk ▪ Policy CC6: Sustainable drainage and surface water management	Policy ENV3: ▪ To reduce the urban heat island effect by including tree cover, green roofs, and green space in development. Policy ENV5: ▪ To create new green space, increase tree cover and/or provide green roofs ▪ To incorporate Sustainable Drainage Systems (SUDs) Policy CC5: To demonstrate flood risk assessment and surface water drainage strategy. Policy CC6: ▪ To incorporate Suds and provide details of ongoing maintenance and management of Suds.	

Compliance Tools	<u>The Black Country Core Strategy 2011</u> Black Country Plan Review	<u>The Black Country Core Strategy 2011</u> ▪ Policy ENV3: Design Quality <u>Black Country Plan Review (due to be adopted in 2024)</u> ▪ Policy CC7 Renewable and Low Carbon Energy and BREEAM Standards	<u>Policy CC7 and ENV3:</u> ▪ To meet BREEAM Very Good or above or the national requirement at the time of submitting the proposal for planning permission, to demonstrate a commitment to achieving high quality sustainable design.	

3.0

Energy Strategy

3.0 Energy Strategy

This section outlines the development's approach to achieve the Black Country Core Strategy's planning requirements.

To calculate carbon emissions and reductions, the design was assessed under 'Part L 2013: Conservation of Fuel and Power' of the UK Building Regulations, using the National Calculation Methodology (NCM). A detailed energy model was created using Government approved software Integrated Environmental Solutions: Virtual Environment (IES: VE) 2021, in line with CIBSE AM11. The model was revised for each of the steps of the Energy Hierarchy to establish expected performance and satisfaction of the policy requirements. The energy assessment is based on the current SAP 2012 emission factors.

The energy strategy has been developed by following the energy hierarchy:

- **Energy Demand Reduction – Be Lean**: The energy demand of the development is minimised through prioritisation of passive design.
- **Heat Networks/ Combined Heat Power (CHP) – Be Clean:** The use of a decentralised heating network utilising a combined heat and power to reduce emissions.
- **Low & Zero Carbon Technologies – Be Green:** On site renewable energy generation should be prioritised and where this is not possible, off-site renewable energy should be procured.

As part of the Energy Strategy an energy assessment has been carried out to benchmark the proposed energy strategy and evaluate its performance against the relevant Policies. The energy strategy will cover passive design elements, energy efficiency measures and low and zero carbon energy delivery systems and how they have been incorporated into the project.

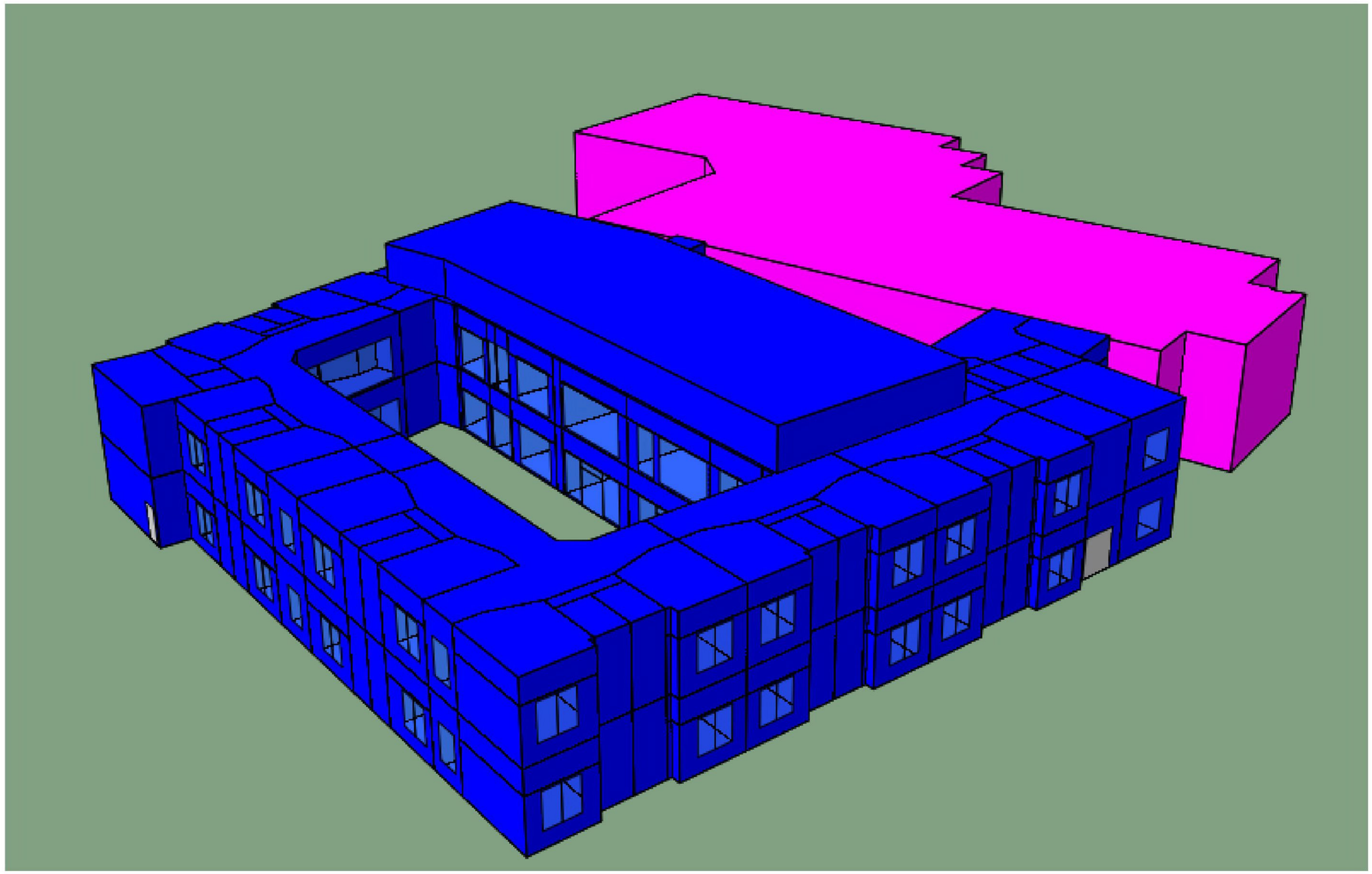
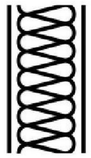


Figure 3: Proposed Edward Street Hopsital Building

3.1 Demand Reduction – Be Lean

Envelope



The development will first and foremost seek to reduce its energy demand in line with five basic principles:

1. Continuous thermal insulation
2. Airtightness
3. Thermal bridge free
4. High-performance windows
5. Mechanical ventilation with heat recovery

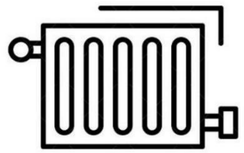
These principles focus on achieving a continuous, well insulated envelope which is both airtight and thermal-bridge free. High performance glazing provides a positive energy balance whilst improving thermal comfort. Mechanical ventilation with heat recovery ensures a continual supply of fresh air with minimal heat loss.

The thermal envelope will go significantly beyond the building regulation standards, with preliminary target values according to Part L 2A 2013 as required by the policy as shown in the table below:

Element U-Values (W/m^2K)	Part L2A Minimum	Design Values
Floor	0.25	0.10
Roof	0.25	0.12
External Wall	0.35	0.15
Windows & Glazed Doors	2.20	1.6
Doors	2.20	1.8

An improved air leakage rate of $1.0m^3/(hr.m^2)$ is being targeted for the proposed development, in comparison with the Building Regulation minimum standards of $10m^3/(hr.m^2)$ at 50Pa. Good air tightness could be achieved by prefabrication of several key building components under factory conditions, robust detailing of junctions and good building practices on site.

Systems



All equipment and plant will exceed the minimum requirements of the Building Services Compliance Guides. This document provides guidance on the means of complying with the requirements of Approved Document Part L2A of the Building Regulations for conventional space heating/ cooling systems, hot water systems and ventilation systems.

Central Air Handling Units (AHU) are to be employed to provide fresh air with a heat recovery efficiency of at least 73%.

All fans and pumps will be specified with variable-speed drives, which will reduce their energy consumption by more than two-thirds compared with equivalent constant speed alternatives, by only supplying the required flow rate to meet the demand.

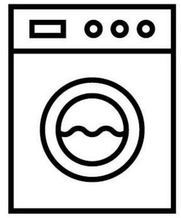
The heating and cooling systems are to be appropriately zoned, with local fast responding controls.

Natural light is maximised throughout, where practicable, with appropriate glazing design. This allows electric lighting energy consumption to be reduced during daylight hours, reducing running costs and CO_2 emissions.

Installing efficient low energy light fittings internally and externally can significantly reduce a building's overall lighting load hence lowering its annual CO_2 emissions. The development will reduce the energy consumption by the specification of low energy, high efficacy LEDs to all areas.

Appropriate lighting controls and occupancy controls will reduce the lighting energy use where appropriate.

Unregulated Energy



Unregulated energy is those uses that fall outside the typical scope of building regulations. This includes energy used through cooking, computers, external lighting and other 'plug loads' which are typically under the control of the occupant.

Addressing these loads, which often form a significant portion of a building's overall energy consumption, is key to reducing energy consumption to levels required for Net Zero Carbon.

This will be achieved through the specification of energy efficient white goods, lifts, and other appliances.

Be Lean Results

In accordance with the industry recognised Energy Hierarchy, an energy assessment has been carried out for the entire development with the aforementioned passive design and energy efficiency measures.

The table below presents the improvement over the notional building Part L2A 2013 carbon emissions after the energy demand reduction.

An 3% carbon emissions reduction is achieved through energy efficiency measures.

Part L2A 2013 End-uses Breakdown ($kgCO_2/m^2$)		
End-use	TER	BER
Heating	10.88	5.65
DHW	20.75	25.26
Cooling	0.00	0.00
Auxiliary	4.23	5.13
Lighting	12.81	11.17
Renewables	0.00	0.00
Total	48.67	47.21
Improvement over TER		**3%**
Part L Status (BER<TER)		**Pass**

The BRUKL document's front page and technical data sheet can be found in **Appendix C**.

3.2 Cooling and Overheating

The proposed development has been designed to minimise its use of energy intensive cooling systems through passive and energy efficient measures.

Minimising internal heat generation

Plug-loads and occupant densities associated with the building's activities cannot be altered beyond the client's brief. Therefore, the only area that can be targeted is the lighting. Low energy, high efficacy, LED lighting will be used through-out the development to minimize internal heat gains.

Reducing the amount of heat entering the building

The development facades have undergone design review to control the amount of solar gain entering internal spaces. The façade elements have been specified with a low solar transmission (g-value) of 50% in all facades.

Glazing Specifications (%)	Design Values
Solar transmittance typical (G-value)	0.50
Glazing visible light transmission (VLT)	0.71
Solar control blinds shading coefficient – Winter Gardens	N/A
Glazing frame factor (%) - typical value	10%

Passive ventilation

The bedrooms will utilise natural ventilation by means of an openable horizontal sliding window, which will be manually operated by the service users. It has been assumed that when the space temperature reaches 23°C, the sliding sash begins to open, provided the outside temperature is less than internal temperature, and is fully open at 25°C.

Mechanical ventilation and active cooling systems

To deliver the high-performance internal environment required by the client, a mechanical ventilation and cooling strategy has been recommended. All fresh air will be delivered by AHUs to all areas of the building. The bedrooms have mixed mode ventilation, and the ventilation profile of the mechanical ventilation is based on 3 ACH supplied into the bedroom. In summer, the thermal comfort strategy for occupied spaces is mechanical ventilation with peak lopping cooling, providing air in peak summer condition at circa 17°C. Cooling will be provided by air source heat pumps/VRF for office areas, clinical treatment, and communal areas. DX split will be provided in the ICT hub rooms and the medication rooms. Efficiency values of these systems will exceed the requirements of the 'Non-Domestic Building Services Compliance Guide'.

Active Cooling

The Part L assessment also provides a quantification of the energy demand likely to be expected of the cooling system. This is compared to the notional building benchmark demand to demonstrate compliance.

3.3 Heating Infrastructure – Be Clean

Combined Heat & Power

Combined Heat and Power (CHP), also known as cogeneration, is an energy system capable of producing both useful heat and electricity simultaneously in a single process. It allows for optimum use of the energy available from the fuel used.

In accordance with the Policy ENV7 of the Black Country Core Strategy the feasibility of a site-wide CHP network has been investigated. The efficient use of CHP typically depends on finding a use for the heat generated by the process. Issues to consider include:

- If heat is not used, then the system is effectively just an electricity generator and electricity will be greener and cheaper if sourced from the national grid.
- If excess electricity is generated on site this can be exported (sold) back to the grid whereas excess heat needs to be rejected (wasted). Exported electricity can count towards reducing the site's CO_2 emissions.
- Exported electricity will typically not be financially attractive as exports tend to coincide with low demand periods on the national grid so the cost of producing the electricity on site can be less than the prices received for the exported electricity.

The heat load of the development is insufficient to permit effective operation of an on-site combined heat and power unit. Furthermore, CHP emits local air pollution in the form of NOx and SOx. CHP is not viable without expensive catalytic converters which would not be feasible for a unit of this size.

It is also widely recognised that CHP is now more CO_2 intensive than electricity because of the rapid decarbonisation of the electricity grid.

As such it is not proposed to include CHP within the development.

District Heating

A district heating or cooling scheme comprises of a network of insulated pipes used to deliver heat or cooling, normally in the form of hot or chilled water from the point of production to an end user.

The feasibility of connecting to an existing district network has not been investigated for the site. The heating source will be provided through air source heat pumps, therefore connection to an existing network is not feasible.

3.4 Low & Zero Carbon Technologies – Be Green

Air Source Heat Pumps

Air source heat pumps (ASHP) exchange heat between the outside air and a building to provide space heating in winter and cooling in the summer months. The efficiency of these systems is inherently linked to the ambient air temperatures.

Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pump systems can supply as much as 4kW of heat output for just 1kW of electrical energy input. ASHPs are therefore being incorporated into the design proposals and will be implemented as follows:

VRF systems transfer heat from one location to another using refrigerant and are likely to be utilised for certain rooms as part of the heating and cooling strategy.

Domestic hot water will be provided to the basement showers via ASHP and will utilise high temperature refrigerant, such as CO_2, which operate efficiently at the high temperatures that DHW generation demands.

These heat pump systems will enable significant emissions savings over a conventional gas boiler heating system, particularly when factoring in the decarbonisation of the electrical grid.

A summary of the fixed building services inputs used for the 'Be Green' scenario can be found in **Appendix B**.

Photovoltaics (PV)

Photovoltaic solar cells convert solar energy directly into electricity. The advantage of photovoltaic cells is once they are installed, they require minimal maintenance over their operational life and have no primary fuel requirements.

The proposed roof area is allocated as plant area and unused roof space. The proposed location of PV arrays is at roof level. A total of 210m^2 usable PV array is required over a few sections of roof, with a modular efficiency of at least 22.6%, orientated south at an inclination of 30° to the horizontal. This could enable a 47.5 kWp photovoltaic solar array to be installed.

Other Technologies

Other technologies were considered, however are not considered appropriate for the development. These include:

- **Wind Turbines:** The output from wind turbines is highly sensitive to wind speed. Hence it is essential that turbines should be sited away from obstructions, with a clear exposure, or fetch, for the prevailing wind. The urban nature of the site means these are not considered appropriate for this development.
- **Biomass:** Biomass in the form of logs, wood chips and wood pellets are classified as a renewable source of energy since the carbon dioxide emitted when the biomass is burned has been taken out of the atmosphere by the growing plants. Even allowing for emissions of carbon dioxide in planting, harvesting, processing, and transporting the fuel they will typically reduce net CO_2 emissions by over 90%. However, biomass boilers and their associated NOx emissions would impact local air quality and therefore are not considered feasible for this development.
- **Solar Thermal:** Solar thermal collectors utilise solar radiation to heat water for use in buildings. Solar collectors are typically designed to meet a development's base heat load, associated with its domestic hot water requirements. However, the complexities involving the integration of pipework as well as the limited available roof space means that solar thermal collectors are not considered feasible for the development.

Be Green Results

The analysis indicates that the proposed development is performing significantly better than the minimum requirements of Part L of the Building Regulations and achieves an improvement of 32.3% over the Building Regulations Part L 2013 Target Emission Rate as highlighted below.

Part L2A 2013 End-uses Breakdown ($kgCO_2/m^2$)		
End-use	TER	BER
Heating	10.88	4.29
DHW	20.75	18.53
Cooling	0.00	0
Auxiliary	4.23	5.13
Lighting	12.81	11.05
Renewables	0.00	-7.49
Total	48.67	**31.51**
Improvement over TER	**32.3%**	
Part L Status (BER<TER)	**Pass**	

The BRUKL document's front page and technical data sheet can be found in **Appendix C**.

3.5 Proposed Energy Strategy

The analysis indicates that the proposed development is performing significantly better than the minimum requirements of Part L of the Building Regulations and achieves an improvement of 35.3% over the Building Regulations Part L 2013 Target Emission Rate as highlighted below.

A summary of the energy and sustainability policies and the developments performance against the targets is shown in the next page.

A summary of the fixed building services inputs used for the scenarios can be found in **Appendix B**.

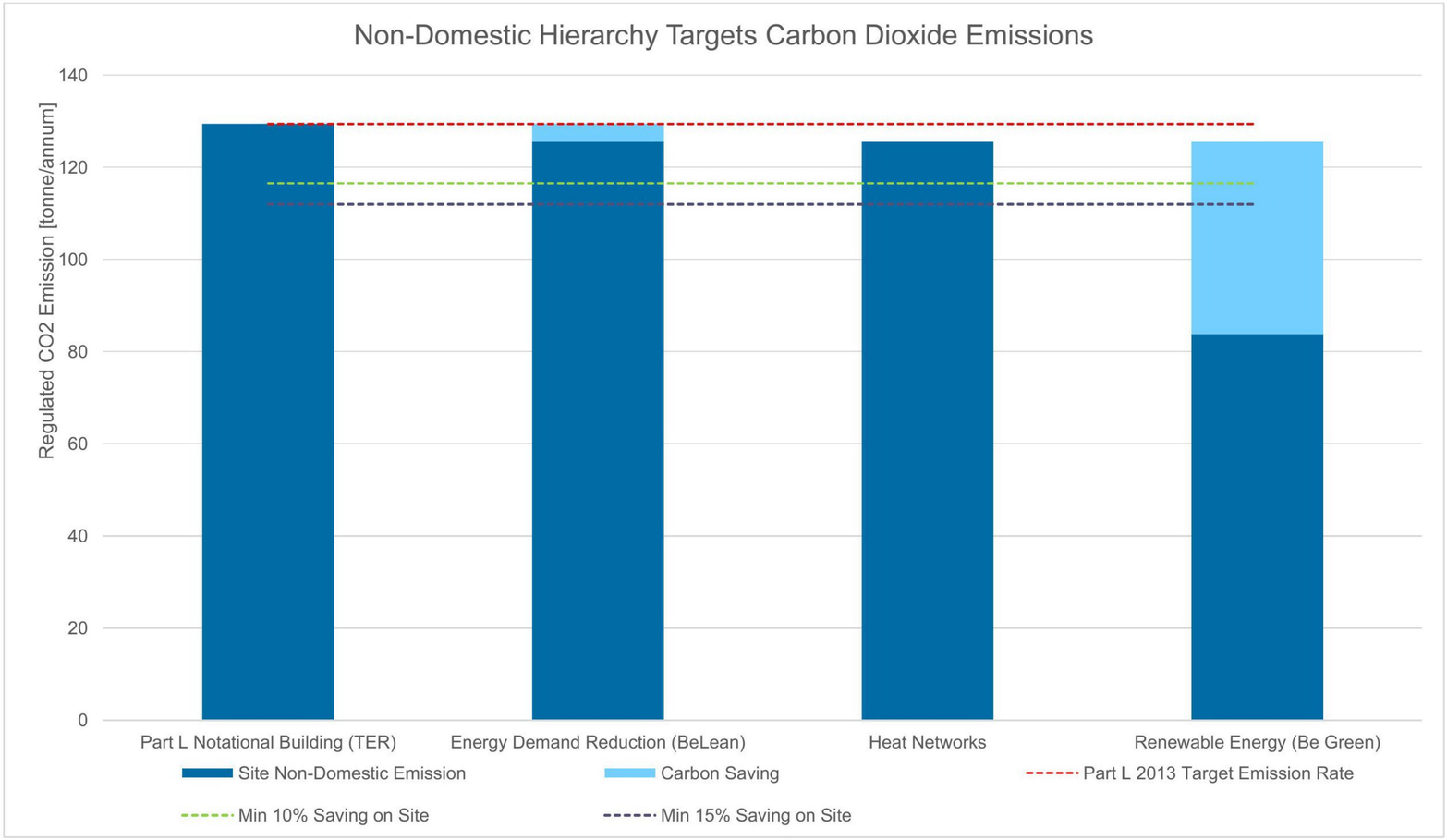


Figure 3.5: Non-Domestic Hierarchy Targets Carbon Dioxide Emissions

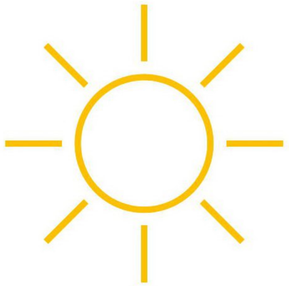
	Guidance	Minimum Requirements	Summary of Performance
Energy Strategy	The Black Country Core Strategy (2011) ▪ Policy ENV3: Design Quality ▪ Policy ENV7: Renewable Energy Black Country Plan Review ▪ Policy CC2: Energy Infrastructure ▪ Policy CC7 Renewable and Low Carbon Energy and BREEAM Standards Birmingham Development Plan (BDP) ▪ Policy TP3: Sustainable Construction ▪ Policy TP4: Low and zero carbon energy generation	Policy ENV3: Design Quality ▪ To meet BREEAM very good standard or above. ▪ To reduce the urban heat island effect by including tree cover, green roofs, and green space in development. Policy ENV7: ▪ To incorporate the generation of energy from renewable sources sufficient to off-set at least 10% of the estimated residual energy demand of the development on completion. ▪ To explore the use of combined heat and power facilities for larger development schemes ▪ To consider the use of on-site sources, off-site sources, or a combination of both. Policy CC7: ▪ To achieve 19% carbon reduction improvement upon the requirements within Building Regulations Approved Document Part L 2013. ▪ To incorporate generation of renewable energy or low carbon sources sufficient to off-set a minimum of 20% of the estimated residual energy demand of the development on completion. Policy TP4: Commercial developments connected to CHP or other forms of low or zero-carbon energy generation.	The results indicate that the proposed development is achieving a 35.3% improvement over the Building Regulations Part L 2010 Target Emission Rate, using the SAP 2012 emissions factors. This exceeds the Black Country Plan target. A 3% carbon emissions reduction is achieved through energy efficiency measures ('Be Lean'), using the SAP 2012 emissions factors. The 'Be Lean' scenario utilises a centralised gas-fired boiler system to deliver the space heating and domestic hot water requirements. Based on NMC modelling guide, the notional building uses the same system type and fuel for hot water generation as the actual building. The analysis found that the use of renewables (air source heat pumps for heating and cooling and photovoltaic panels) could reduce CO_2 emissions by 32.3% for the development over a conventional HVAC configuration, using the SAP 2012 emissions factors.
Overheating Assessment	Black Country Plan Review ▪ Policy CC3 – Managing Heat Risk	▪ To minimise the internal heat generation using energy-efficient design such as increasing glazing and airtightness. ▪ To provide passive and mechanical ventilation ▪ To provide active cooling systems but should be avoided where possible. ▪ To reduce the amount of heat entering the building by using shadings and green roofs	The development will use a mixed mode strategy, using natural ventilation where possible, and switching to mechanical during periods of higher demand. There is a reduction in load due to lower energy lighting, solar control, and improved fabric performance. An overheating assessment has been carried out, refer to document RB0002-CDLL-XX-XX-RP-X-9025
Sustainability Strategy	Black Country Plan Review ▪ Policy CC1: Increasing Efficiency and Resilience ▪ Policy CC4: Air Quality ▪ Policy CC5: Flood Risk ▪ Policy CC6: Sustainable drainage and surface water management The Black Country Core Strategy 2011 ▪ Policy ENV4 - Trees, Woodlands, and Hedgerows, ▪ Policy ENV5: Flood Risk, Sustainable Drainage Systems and Urban Heat Island	Policy ENV5: ▪ To create new green space, increase tree cover and/or provide green roofs ▪ To incorporate Sustainable Drainage Systems (SUDs) Policy CC5: To demonstrate flood risk assessment and surface water drainage strategy. Policy CC6: To incorporate Suds and provide details of ongoing maintenance and management of Suds.	
Compliance Tools	Black Country Plan Review (due to be adopted in 2024) ▪ Policy CC7 Renewable and Low Carbon Energy and BREEAM Standards The Black Country Core Strategy 2011 ▪ Policy ENV3: Design Quality	Policy CC7 and ENV3: ▪ To meet BREEAM Very Good or above or the national requirement at the time of submitting the proposal for planning permission, to demonstrate a commitment to achieving high quality sustainable design. Policy T3: Commercial developments meeting BREEAM standard excellent.	BREEAM 'Excellent' rating is being targeted. The preliminary BREEAM assessment indicates that the development is currently likely to achieve 'Excellent'.

4.0

Health & Wellbeing

4.0 Health & Wellbeing

4.1 Daylight



Good daylight is an important factor in moderating people's circadian rhythm, which enhances productivity and regulates the sleep cycle. It is also a key factor in reducing energy consumption from artificial lighting.

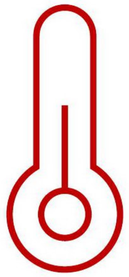
Achieving a perfect balance between thermal comfort, internal daylight and energy consumption is a main driver when establishing the location and size of windows and the glazing properties.

The elevations have been established using a balanced approach to glazing to ensure that all windows within elevations are providing maximum daylighting resulting in bright and airy space, but at the same time, no excessive heat enters the building during hot summer days.

Room depths enable occupants to have access to a view out, which is important in allowing the eyes to refocus after periods of deep focus.

Glare control measures such as blinds will allow occupants to regulate their own internal daylight conditions in line with their preferences.

4.2 Thermal Comfort



As climate change leads to rising summer temperatures, maintaining acceptable temperatures in occupied spaces is fundamental to creating productive, healthy & safe places for people to live and work. Maintaining good thermal comfort has been central to the project's shading, ventilation & cooling strategy.

Heat has been limited from entering the building through careful consideration of glazing. This must be balanced with a need for good daylight and solar heat in winter, so the use of shading and solar control glass has been considered.

The specification of LED lighting and energy efficient equipment has been considered for reducing the internal heat generation.

The development will be mechanically cooled and ventilated throughout, with manually openable sections behind perforated panels on the façade adjacent to glazed areas that will enable free cooling during the day.

4.3 Air Quality

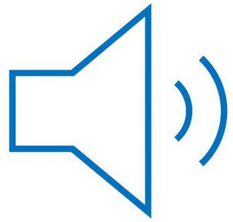
Poor external air quality originates from the high number of vehicles, as well as plant and machinery such as boilers used to heat buildings, and the density of roads and building, which prevents effective dispersal of pollutants.

To protect occupants from the high levels of air pollution experienced at certain areas of the site, a background ventilation strategy that does not rely on openable windows will be adopted. Centralised Air Handling Units (AHU) with heat recovery will maintain a reliable and consistent supply of fresh air to occupants whilst avoiding excessive heat loss in winter. Where necessary, appropriate filtration will be installed to clean the incoming air into the building and ensure good standards of air quality.

The development proposal will not include the installation of any combustion plant for the purposes of generating heat or hot water. This will be entirely electric, therefore will not create any adverse effect on the local air quality for residents and neighbouring properties.

To maintain good internal air quality, internal finishes will be specified which have low or no emissions of VOCs and other harmful pollutants complying with European best practice levels as a minimum.

4.4 Acoustics



Acoustic comfort is important for occupant productivity, relaxation and rest. High noise levels which hinder this can have a range of adverse effects on people's mental and physical health.

For more details refer to the Noise Impact Assessment report issued by Cundall.

5.0

Transport

5.0 Transport

5.1 Walking & Cycling

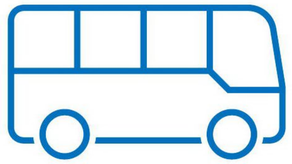
The transport of people between buildings is the second largest source of CO_2 emissions in the UK after energy use in buildings and remains the main source of many local pollutants. Energy use and emissions from transport are growing at 4% per year, while the effects of climate change are becoming more severe.

As part of the development, secure cycle spaces will be provided for occupants use to reduce reliance on car-based travel.

The site benefits from good walking and cycling links from the site to the surrounding areas, including:

- The area provides multiple options for safe cycling such as trails, dedicated lanes and bicycle-friendly roads.

5.2 Public Transport



The proposed development on Edward Street, West Bromwich, benefits from access to a comprehensive range of public transport services.

The West Midlands Metro Lodge Road is located within four-minute walk of the site (260m away), as shown in the next figure.

Also, there are few bus stops that are close to Dormitory Eradication, Edward Street Hospital Edward Street Hospital including West Bromwich Town Hall stop which is within a four-minute walk from the site (260m away) and Victoria St stop which is within three-minute walk from the site (250m away).

Further details on the development's approach to sustainable transport can be found in the Transport Statement and Framework Travel Plan, which have been prepared by Hydrock.

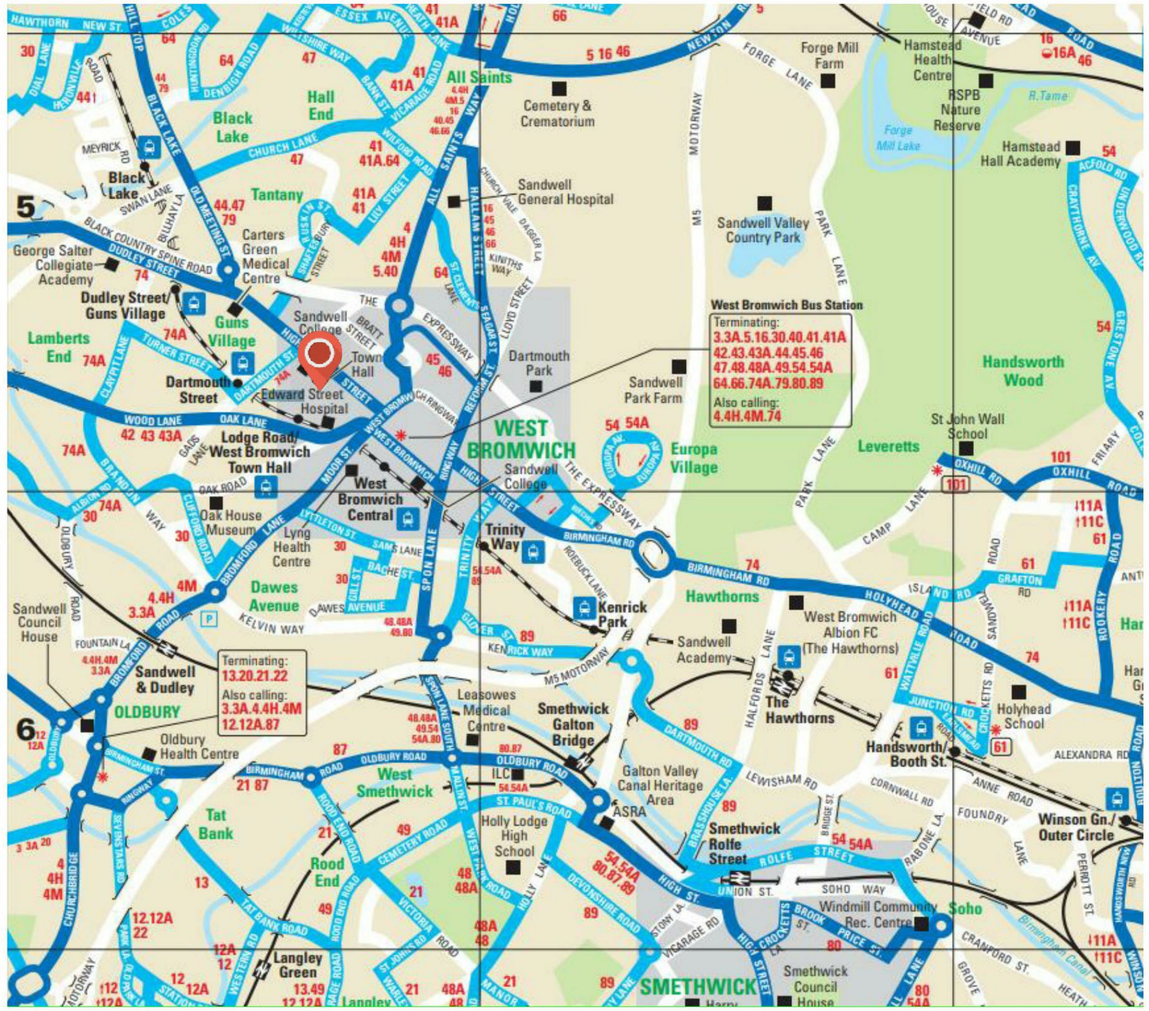


Figure 5-1. Birmingham Transport Area Map

6.0

Water

6.0 Water

6.1 Water Efficiency

Water consumption in the UK has risen by 70% over the last 30 years. Trying to meet the increasing demand by locating new sources of water supply is both expensive and damaging to the environment. Therefore, the design team have focused on reducing the demand for water and managing the existing resources.

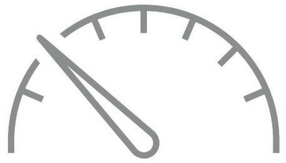
The aim is to minimise internal and external potable water use within the development. Good water management can contribute to reducing the overall level of water consumption maintaining a vital resource and having environmental as well as cost benefits in the lifecycle of the building.

Water consumption in the development will be limited to no more than 45 litres per person per day.

The following water saving measures are being considered throughout:

- ***Dual Flush Cisterns on WC's*** - It is proposed that these are used throughout the development in order to minimise water consumption.
- ***Flow Restrictors to Taps*** - Flow restrictors reduce the volume of water discharging from the tap. Spray taps have a similar effect and are recommended to reduce both hot and cold-water consumption.
- ***Low Flow Showers -*** The average shower uses 15 litres of water a minute, however by restricting the output of any showers in the development to lower rate, a significant water saving can be achieved. Flow rates can be reduced to 6 litres/ minute without compromising on water pressure and hence will be considered as the design develops.

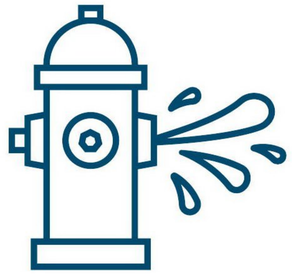
6.2 Water Monitoring



In 2017, approximately 5.3 billion cubic meters of water were abstracted for public water supply, making up over half of all water abstracted in the UK. To reduce this figure, accurate information on usage is required for management of a building's consumption.

Water meters will be specified on the main supply and sub-metering in line with the BREEAM requirements.

6.3 Leak Prevention and Detection



To minimise the risks of major water leaks occurring, a water leak detection will be installed. The flowrate of the incoming water meter will be monitored by a leak detection system, which will highlight when there is a significant rise in water consumption, indicating a major leak within the building.

The leak detection system can be standalone or can be integrated within the Building Management System (BMS). It will feature programmable thresholds to suit the specific consumption of the building and an audible alarm if those thresholds are exceeded. It will also be designed to avoid false alarms by normal operation of large water consuming plant.

As well as a major leak detection system, minor leaks will be prevented through automatic flow control devices within each WV/facility. These will feature solenoid valves within the cold-water supply to each area, linked to the occupancy sensors within the space. This will minimise water leaks and wastage from sanitary fittings.

6.4 Irrigation

External irrigation can also contribute towards significant water consumption if not appropriately managed. External planting will utilise plants which are adapted to the local climate and can rely on precipitation alone for the majority of the year.

6.5 Sustainable Urban Drainage

A surface water drainage assessment has been carried out for the development to examine opportunities to reduce the overall level of flood risk through the appropriate application of sustainable drainage systems. The assessment demonstrates that there is scope for various SuDS features that can restrain run-off to mitigate the risk of future surface water flooding, taking into account potential climate changes.

Further details on the development's approach can be found in the Proposed Drainage Strategy and Flood Risk Assessment issued by Couch Consulting Engineers February 2022.

7.0

Materials

7.0 Materials

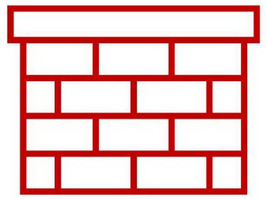
7.1 Responsible Sourcing & Procurement

All timber used for basic or finishing building elements in the scheme will be sourced from responsibly managed and sustainable forests or plantations. Such timber products are the only truly renewable construction material in common use and the responsible management of forests for timber helps to lock in CO_2. By maximising the use of timber for structural or finishing purposes the embodied carbon impact of the development can be reduced.

The development recognises the importance of using locally sourced materials, which it will aim to consider throughout the design. Preference will be given to locally sourced materials wherever practical. Materials will be sourced from reasonable sources where possible, including ISO 14001 and BES 6001.

Much of the responsibility for materials procurement falls to the contractor, therefore they will aim to procure all materials in accordance with a documented sustainable procurement plan. This sets out a clear framework for the responsible sourcing of materials to guide those involved in the specification and procurement of materials throughout a project. It is intended to identify risks & opportunities against a broad range of social, economic & environmental issues, and provide a strategic assessment of sustainably sourced materials available locally or nationally. This will also contain a policy to procure materials locally where possible. This is to reduce the environment impacts and CO_2 emissions associated with transportation to the site.

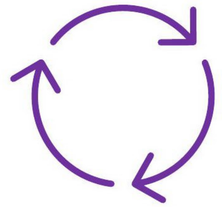
7.2 Durability and Resilience



In order to ensure the longevity of the materials used in the building construction and avoid the need for replacement, durability & protection measures will be specified where appropriate. This will prevent damage to vulnerable parts of the building, such as high pedestrian traffic areas, external vehicular collision and areas with internal vehicle/storey movement.

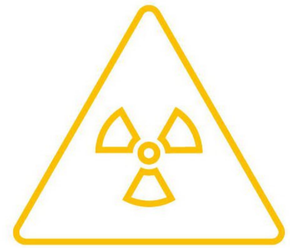
The building elements will also be designed to incorporate appropriate measures to limit material degradation due to environmental factors. This includes degradation due to factors such as temperature variation, water/moisture damage, pollutants etc.

7.3 Material Efficiency



Material use will be reduced or optimised through design, specification and construction techniques. Targets will be set and monitored throughout the construction process to achieve the objective. This is to reduce the environmental impact through optimising the use of materials during all stages of the project.

7.4 Healthy Materials



Volatile organic compounds (VOCs) are emitted as gases (commonly referred to as off-gassing) from certain solids or liquids. VOCs include a variety of chemicals, some of which are known to have short-term and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.

VOCs are emitted by a wide array of products numbering in the thousands. Examples include paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials, furnishings, adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling, particleboard, fibreboard) and furniture made with these pressed wood products.

'No' or 'low' VOC paints are available from most standard mainstream paint manufacturers. The 'eco-friendly' paints are made from organic plant sources and powdered milk-based products.

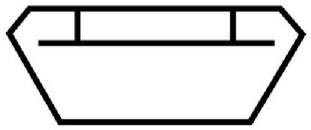
The design team will select internal finishes and fittings with low or no emissions of VOCs and comply with European best practice levels as a minimum.

8.0

Waste

8.0 Waste

8.1 Construction Waste Management



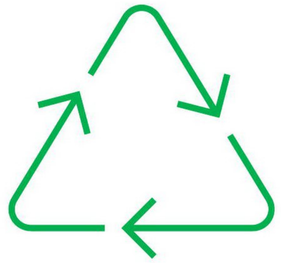
During the construction phase, a large amount of waste material will be generated through construction, demolition, and land clearing procedures. In building construction, the primary waste products in descending percentages are wood, asphalt/concrete/masonry, drywall, roofing, metals, and paper products.

Prior to commencement on site a Resource Management Plan (RMP) that complies with the requirements of current legislation and BREEAM will be prepared. This plan will identify the local waste haulers and recyclers, determine the local salvage material market, identify and clearly label site spaces for various waste material storage and require a reporting system that will quantify the results and set targets. As a minimum, the RMP will contain:

1. The target benchmark for resource efficiency i.e. m^3 of waste per $100m^2$ or tonnes of waste per $100m^2$.
2. Procedures and commitments to minimise non-hazardous waste in line with the target benchmark.
3. Procedures to minimise hazardous waste.
4. A waste-minimisation target and details of waste minimisation actions to be undertaken.
5. Procedures to estimate, monitor, measures and report on hazardous and non-hazardous site waste and demolition waste, where relevant, arising from work carried out by the principal contractor and all subcontractors. Waste data obtained from licensed external waste contractors needs to be reliable and verifiable, i.e. using data from EA/SEPA/EA Wales/NIEA waste return forms or from a PAS402 compliant company.
6. Monthly reporting of all construction waste data throughout the project checked against what would be expected based on the stage of the project, invoices, etc., to validate completeness of waste reporting data.
7. Procedures to sort, reuse and recycle construction waste into defined waste groups, either on site or through a licensed external contractor.
8. Procedures to review and update the plan.
9. The name or job title of the individual responsible for implementing the above.

The development's target is to achieve more than 90 % of construction waste be diverted away from landfill.

8.2 Operational Waste



The detailed design phases will identify the potential waste streams that the development will produce. As a minimum, plans will be formulated to handle the separation, collection, and storage of common recyclable materials such as paper, glass, plastics, and metal. The collection points will be easily accessible to all users.

The main aim will be to recycle as much waste as possible, this will be achieved by making sure that waste recycling facilities are strategically placed in convenient locations.

Dedicated storage space for recyclable materials generated by the site during occupation, will include the following:

- Be clearly labelled to assist with segregation, storage and collection of the recyclable waste streams.
- Be placed within accessible reach to building occupants or facilities operators for the deposit of materials and collections by waste management contractors
- Of a capacity appropriate to the building type, size, number of units (if relevant) and predicted volumes of waste that will arise from daily or weekly operational activities and occupancy rates.

9.0

Land Use & Ecology

9.0 Land Use & Ecology

Biodiversity of wildlife, plants and their habitats is a vital component of healthy, well-functioning ecosystems, which in turn sustain all life on the planet.

In response to the ecological emergency developments should aim to increase local ecology and diversity.

The development's roof terrace area will be used as amenity area offering the occupants vital outdoor space. The development will provide a high-quality public realm treatment including proposed tree planting along the highway edge that will create a microclimate and enhance biodiversity of the site.

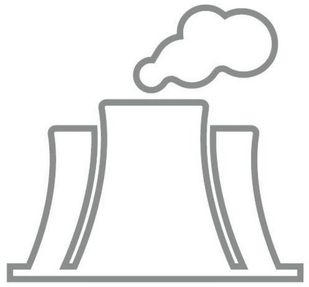
For more details refer to the Design & Access Statement issued by Gilling Dod Architects by 14/02/2022.

10.0

Pollution

10.0 Pollution

10.1 Local Air Pollution



Global concern for environmental pollution has risen in recent years, as concentrations of harmful pollutants in the atmosphere are increasing. Buildings have the potential to create major pollution both from their construction and operation, largely through pollution to the air (dust emissions, NOx emissions, ozone depletion and global warming) but also through pollution to watercourses and ground water. The proposed development will aim to minimise the above impacts, both at the design state and onsite.

The development will feature no on-site combustion for the provision of heating and hot water. All services will be electrically driven. As well as supporting the development's low emission aspirations, this has the added benefit of negating its impact on local air quality.

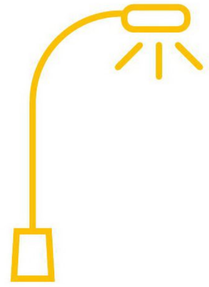
There will be an emergency backup diesel generator located in an adjacent generator room to serve the development with a flue discharging at high level to atmosphere. Anticipated use is expected to be 26hours a year for the unit, associated with 30-minute weekly testing.

10.2 Sustainable Urban Drainage

A flood risk assessment (FRA) and Drainage Strategy has been prepared for this development in support of the planning application. The FRA is used to establish the risk of flooding to the development and from the proposed development to the vicinity.

Further details on the site's flood risk and sustainable drainage strategy can be found in the Proposed Drainage Assessment Strategy issued by Couch Consulting Engineers February 2022.

10.3 Light Pollution

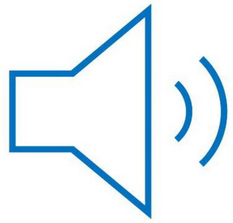


External lighting encompasses vehicle and pedestrian access lighting, security lighting, facility illumination and general feature lighting. The lighting will be designed on a site wide basis to meet the mandatory requirements and aesthetic considerations. The strategy is to provide a balance between adequate external lighting for safe and secure operation of the site without unnecessary illumination or power consumption.

The intention is to be a good neighbour and not to introduce nuisance glare or light pollution of the night sky from misdirected or unnecessary lighting. Feature lighting, where required, will be focussed to the task/subject. Where necessary, luminaires will be further screened in cases where there may be an issue of proximity and light spill to adjacent neighbouring residential areas, although the intention is to avoid this situation wherever possible from the outset. The external lighting design will take into consideration the relevant guidance from the British Standards and other recommended documents including the following Standards and Design Guides:

- CIBSE Lighting Design Guides
- BS5489 Code of Practice for the Design of Road Lighting
- BS EN 13201-1&2 Road Lighting
- Institute of Lighting Engineers Guidance for Reduction of Obtrusive Light

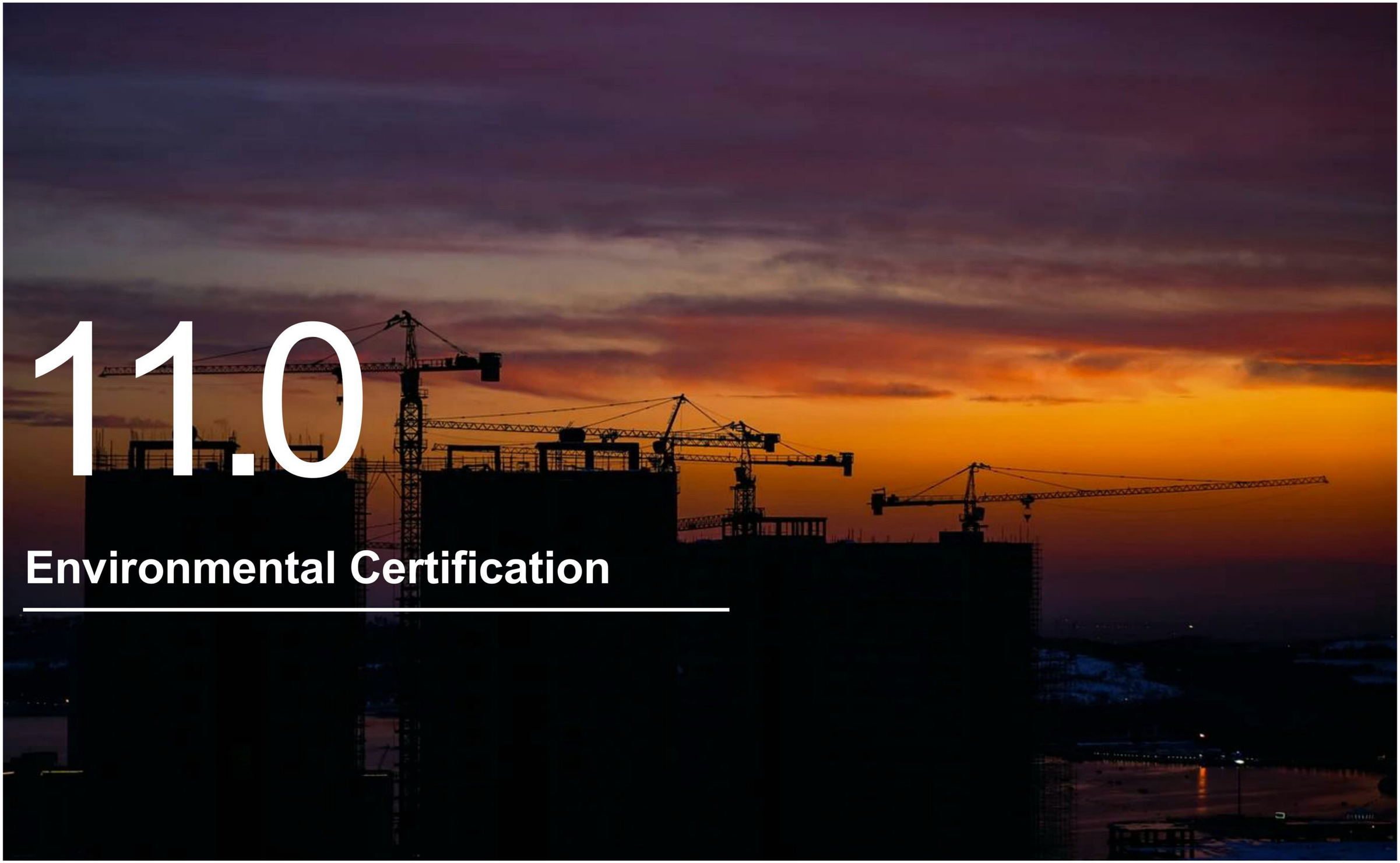
10.4 Noise Pollution



New developments can have an adverse impact on their local surroundings by creating nuisance noise that did not exist before. It is therefore important to understand and limit this noise to avoid disturbances.

Any new items of building services plant will need to be selected, installed, and attenuated such that the local authority noise criteria are achieved. It is proposed that noise from any new items of building services plant associated with the development be designed to meet the BS4142:2014 requirements.

For more details refer to the Noise Impact Assessment report issued by Cundall.



11.0

Environmental Certification

11.0 Environmental Certification

A pre-assessment has been carried out using the BREEAM 2018 New Construction methodology, fully fitted building.

The results of the assessment indicate that the current design is likely to achieve a BREEAM 'Excellent' rating, with a score or 76.55%

The threshold for an 'Excellent' rating is 70%, Cundall recommends a 4-5% additional buffer to mitigate against any unforeseen credit loss throughout the design stages.

BREEAM groups its sustainability rating under the following nine headings:

- Management - Commissioning and construction site management
- Health & Wellbeing - Indoor and external issues
- Energy Use - Operational energy and CO2 issues
- Transport - Transport related CO2 and location related factors
- Water - Consumption and water efficiency
- Materials - Environmental implication of building materials
- Waste – Operational and construction waste resource efficiency
- Land Use & Ecology - Ecological value of the site
- Pollution - Air & Water pollution

The overall rating of the building is constructed by achieving 'credits', which represent particular management, design or performance aspects of the building, as stipulated by BREEAM. The building must achieve the relevant mandatory credits, as well as other credits which contribute towards an overall target score. This score is used to determine what BREEAM rating the building achieves.

The following table summarise the initial strategy to achieve BREEAM 'Excellent' rating.

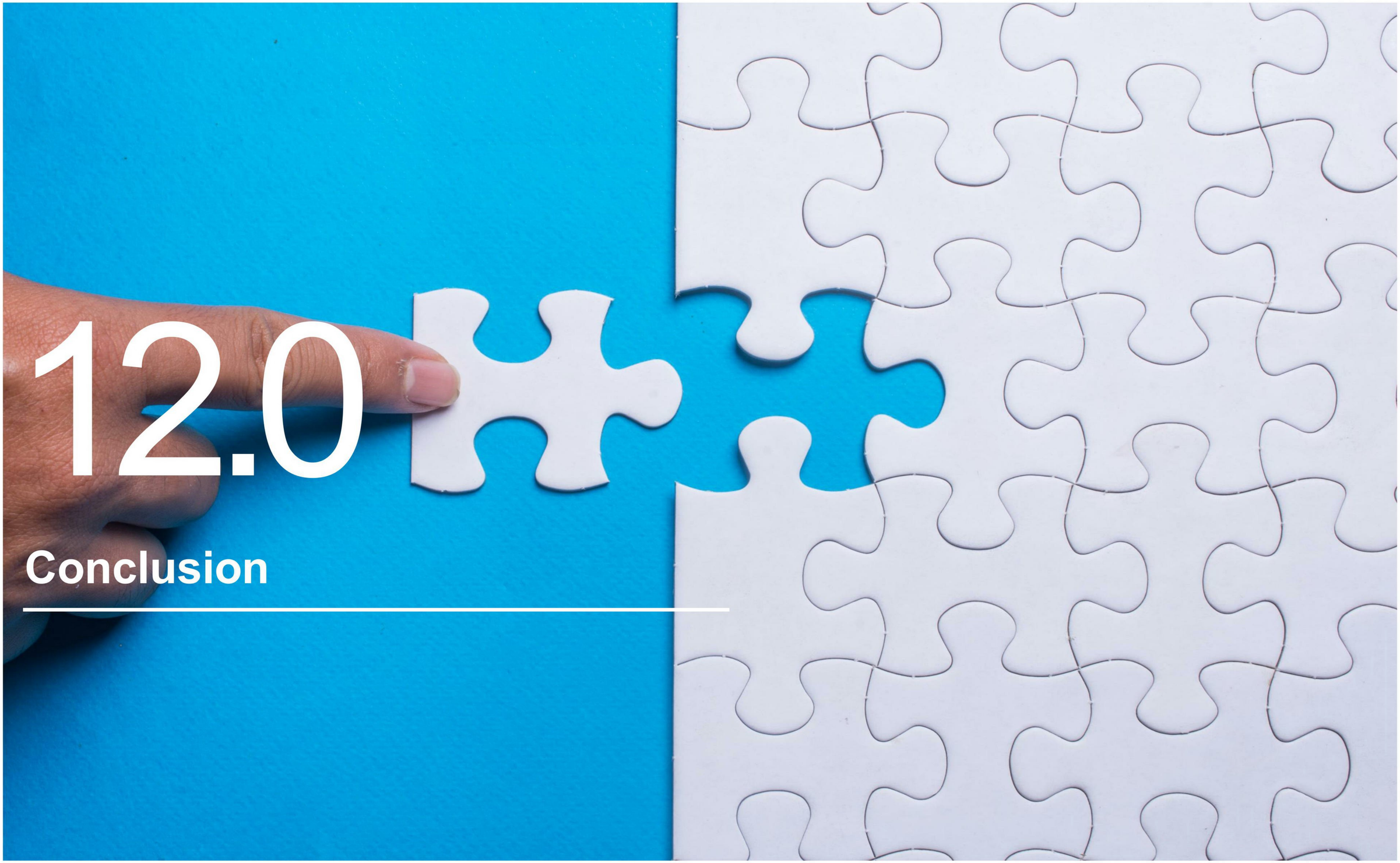
Environmental Section	Available	Weighting	Section score
Management	21	11%	21
Health & Wellbeing	19	14%	16
Energy	23	16%	17
Transport	12	10%	8
Water	8	7%	4
Materials	14	15%	9
Waste	10	6%	8
Land Use & Ecology	13	13%	10
Pollution	12	8%	8
Exemplary/Innovation	10	10%	3
Total	142	1	76.55%
Excellent			

The minimum standards for 'Excellent' rating for BREEAM UK 2018 New Construction, non-domestic buildings are shown below:

	Minimum standards by BREEAM rating level				
BREEAM issue	**Pass**	**Good**	**Very Good**	**Excellent**	**Outstanding**
Man 03 Responsible construction practices	None	None	None	One credit (responsible construction management)	Two credits (responsible construction management)
Man 04 Commissioning and handover	None	None	One credit (commissioning-test schedule and responsibilities)	One credit (commissioning-test schedule and responsibilities)	One credit (commissioning-test schedule and responsibilities)
Man 04 Commissioning and handover	None	None	Criterion 11 (Building User Guide)	Criterion 11 (Building User Guide)	Criterion 11 (Building User Guide)
Man 05 Aftercare	None	None	None	One credit (commissioning-implementation)	One credit (commissioning-implementation)
Hea 01: Visual comfort	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Ene 01 Reduction of energy use and carbon emissions	None	None	None	Four credits (Energy performance or Prediction of operational energy consumption*)	Six credits (Energy performance) and Four credits (Prediction of operational energy consumption*)
Ene 02 Energy monitoring	None	None	One credit (First sub-metering credit)	One credit (First sub-metering credit)	One credit (First sub-metering credit)
Wat 01 Water consumption	None	One credit	One credit	One credit	Two credits
Wat 02 Water monitoring	None	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Mat 03 Responsible sourcing of construction products	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Wst 01 Construction waste management	None	None	None	None	One credit
Wst 03 Operational waste	None	None	None	One credit	One credit

**For the 'Prediction of operational energy consumption', it must be demonstrated that the operational energy performance has been substantially improved.*

Please refer to BREEAM planning pre-assessment document RB0002-CDLL-XX-XX-RP-X-9028 issued by Cundall for further details regarding the credit requirements and evidence needed to complete the Design Stage Assessment.



12.0

Conclusion

12.0 Conclusions

The Dormitory Eradication, Edward Street Hospital, Edward Street, West Bromwich development's energy and sustainability approach is aligned with the Black Country Council planning requirements.

The energy strategy has been developed in accordance with the industry recognised Energy Hierarchy, Be Lean, Be Clean and Be Green, utilising the SAP 2012 emission factors to present the results.

- Be Lean' - **Energy demand** will be reduced by achieving a well-insulated envelope that is an improvement on Building Regulation values, which is both airtight and thermal bridge free. High performance glazing provides a positive energy balance whilst mechanical ventilation with heat recovery maintain good air quality with minimal heat loss. **Energy efficient** building systems such as LED lighting and low-power fans and pumps will further drive down regulated energy use. Robust quality control, commissioning and handover procedures on site will further drive down energy use.
- 'Be Clean' - Combined heat & power was considered however this has been discounted due to poor base load and desire to avoid on-site combustion of fossil fuels. Connection to the district heating scheme was also considered however the distance from the existing network means connection would be infeasible.
- 'Be Green' - The remaining energy demand will be met through l**ow and zero carbon** energy sources. The development's heating, cooling and part of the hot water needs will be provided through efficient air-source heat pumps.

Through the above measures, the proposed development is performing significantly better than the minimum requirements of Part L of the Building Regulations and achieves an improvement of 35.3% over the Building Regulations Part L 2013 Target Emission Rate, which surpasses those outlined in the Black Country Core Strategy.

In line with Black Country Council policies and aspirations, other sustainability measures include:

Good daylight will be achieved in occupied spaces through the balanced and considered use of glazing. High performance glazing will reduce energy loss.
As part of the façade adjacent to glazed areas, there are to be automatically openable vents, that will provide free cooling during periods of lower demand.
If demand exceeds the natural ventilations capabilities, the development will be mechanically cooled. This strategy ensures **thermal comfort** under normal operational hours**.**
Mechanical ventilation with heat recovery will be used to maintain a consistent supply of filtered fresh air to maintain good **indoor air quality**. Low VOC materials and finishes will minimise internal sources of pollutants.
The promotion of **walking and cycling** with strong connection links from the site to the surrounding area. This is further supported with the provision of cycle storage facilities for occupant use.
Good **public transport** links in the immediate vicinity with further national links in the nearby city centre.
Water efficient fixtures and fittings will be specified to reduce water consumption below the levels required for national building regulations.
Metering and sub-metering of consumption will enable ongoing, targeted reductions in water use.
Leak detection and shut-off will prevent both major and minor leaks within the buildings as well as in external areas.
The need for **irrigation** will be minimised through appropriate landscaping which are adapted to the UK's conditions.
All **timber** used in the project will be from a responsible or sustainable source, using certified FSC or PEFC sources.
To ensure **responsible and sustainable procurement**, materials will be specified in line with a documented sustainable procurement plan. This will include the use of certification schemes such as ISO14001 and BES 6001.
Materials that are **durable and resilient** will be specified to maximise their lifespan and avoid the need for disposal and replacement.
The use of a **Resource Management Plan** will set targets for resource efficiency and procedures for waste management.
Appropriate and accessible **waste facilities** will be provided to encourage occupants to recycle waste effectively.
Using the roof area to integrate biodiversity and create a microclimate for planting, green walls and rainwater gardens.
Diversity of planting to create valuable habitat throughout the seasons.
The incorporation of a **blue roof** can offer temporary storage of rainfall to mitigate runoff impacts and storage for reuse such as irrigation.
The site will feature no **on-site combustion** for heating and hot water which would be detrimental to local air quality.
External lighting will be designed to minimise the impact of light pollution.
Light fittings will be specified with a reduced light spill and controlled using photocells and timeclocks to limit unnecessary operation.
Limits to noise emitting plant to prevent impacts on its surroundings.
Responsible construction practices to minimise resource use and the impact of noise, dust, and pollution.

13.0

Appendices

Appendix A – Policy

A review into the anticipated statutory compliance requirements in relation to sustainability has been undertaken. A summary of the finds, applicable policies and likely necessary actions has been provided below. Full planning guidance and validation requirements should be sought from the project's planning consultant.

National Planning Policy Framework

The revised National Planning Policy Framework (NPPF) was published in February 2019 and sets out the government's planning policies for England and states a clear presumption in favour of sustainable development. The revised Framework replaces the previous NPPF published in July 2018.

The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourages the reuse of existing resources, including conversion of existing buildings, and encourages the use of renewable resources.

The NPPF, Section 14 outlines its energy and climate change policies. New developments should be planned for in ways that:

- avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and
- can help to reduce greenhouse gas emissions, such as through its location, orientation, and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

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

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

In determining planning applications, local planning authorities should expect new development to:

- comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

The key focus of the NPPF is to support local and regional planning authorities.

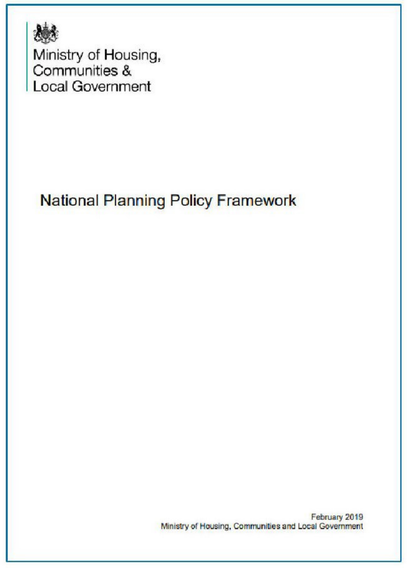


Figure A-1. Relevant planning documentation

Regional Policy

12.1 Regional Policy - West Midlands Combined Authority (WMCA)

In 2019 the West Midlands Combined Authority (WMCA) set the region a target to be net zero by 2041 and meet the ambitions set out by the Paris Agreement. In June 2020, the WMCA and stakeholders committed to producing five-year delivery plans in support of delivering the net zero carbon target for the West Midlands by 2041. The aim of this first Five-Year Plan (FYP) is to provide clear guidance on the types of measures that will need to be implemented in the 2021-2026 timeframe to reach net zero by 2041.

Carbon reduction

Under a highly ambitious 'Accelerated' scenario, goals in domestic, commercial, industrial, transport and land use sectors could deliver a 33% reduction by 2026 (against 2016 baseline) and net zero by 2041. The "Accelerated" scenario is recommended to be used as the standard to set the delivery goal ambitions.

By 2041, 100% of the buildings should be energy efficient and low-carbon heating system retrofit.

The Natural Environment Plan

Trees and hedgerows play an important part in the natural environment, as long as the 'right tree, right place' principle is followed. They offer a range of benefits for climate change mitigation and adaptation as well as biodiversity net gain. The commitment made, through the Five-Year Plan, is for 5.7 million additional trees by 2026 and 19 million by 2041 to support the regional net zero goals.

12.2 Local Policy – Black Country Core Strategy (2011 - 2026)

Black Country Core Strategy was adopted in February 2011 and it provides the framework for various Site Allocation Documents and Area Action Plans, which set out local policies and site allocations for individual authority areas. The Government requires the document to be reviewed every five years.

Policy ENV 3 outlines the response to climate change by improving the design quality in developments. While Policy ENV5 focuses on reducing and mitigating the flooding risk and Policy ENV 7 promotes the use of renewable and low carbon energy techniques to provide a sustainable development.

ENV 3: Design Quality

The Council aims to ensure that all new developments have high quality design to transform the Black Country environmentally and economically through the following actions:

- Meeting Building Research Establishment Environmental Assessment Method (BREEAM) Very Good or above for other development, or the

national requirement at the time of submitting the proposal for planning permission, to demonstrate a commitment to achieving high quality sustainable design.
- Including design features to reduce the urban heat island effect such as tree cover, green roofs, and the inclusion of green space in development.

ENV 5: Flood Risk, Sustainable Drainage Systems and Urban Heat Island

The Black Country Authorities will seek to minimise the probability and consequences of flood risk by adopting the following actions:

- Incorporate Sustainable Drainage Systems (SUDs), unless it would be impractical to do so, in order to significantly reduce surface water run-off and improve water quality. The type of SUDs used will be dependent on ground conditions.
- Open culverted watercourses where feasible and ensure development does not occur over existing culverts where there are deliverable strategies in place to implement this.
- Take every opportunity, where appropriate development lies adjacent to the river corridors, or their tributaries or the functional floodplain, to benefit the river by reinstating a natural, sinuous river channel and restoring the functional floodplain within the valley where it has been lost previously.
- On sites requiring a Flood Risk Assessment, reduce surface water flows back to equivalent greenfield rates.
- Create new green space, increase tree cover and/or provide green roofs.

ENV 7: Renewable Energy

As the vision aims to face climate change and promote sustainable development, the use of renewable and low carbon energy has an increasingly important role to meet these principles.

- All non-residential developments of more than 1,000 square metres floor space must incorporate generation of energy from renewable sources sufficient to off-set at least 10% of the estimated residual energy demand of the development on completion.
- The use of on-site sources, off-site sources, or a combination of both should be considered.
- The use of combined heat and power facilities should be explored for larger development schemes. An energy assessment must be submitted with the planning application to demonstrate that these requirements have been met.

Black Country Plan Draft (2023)

The Black Country Plan is the new version of the Black Country Core Strategy which is still under reviewing and might be adopted in 2023. The Black Country Plan is a joint Local Plan prepared by the four Black Country Authorities (Dudley, Sandwell, Walsall, and Wolverhampton). It contains planning policies and land allocations to support the growth and regeneration of the Black Country over the years to 2039.

Policy CC1: Increasing Efficiency and Resilience

The policy sets out how new development proposals will be required to demonstrate they are designed to maximise resistance and resilience to climate change through a range of design requirements:

- Wherever feasible, new buildings will be orientated to maximise opportunities for both natural heating and ventilation and to reduce exposure to wind and other elements.
- Use of trees and other planting in landscaping schemes will be required throughout the Black Country, to provide for the shading of amenity areas, buildings, and streets, mitigate against poor air quality and help connect fragmented habitats and protect and support biodiversity networks.
- Landscaping schemes should be designed using a mix of native tree species and plants where appropriate and should also use species that are able to adapt to changing climate conditions
- All development will need to minimise the impact of surface water runoff through the design of proposed drainage systems, including where possible grey water recycling and rainwater collection, and the use of permeable surfaces.

Policy CC2: Energy Infrastructure

To mitigate and adapt to climate change, policy CC2 sets out how energy infrastructure will be considered including how opportunities for decentralised energy and communal heating will be identified.

- Any development including ten homes or more, or non-residential floorspace of 1,000 sqm or more must include opportunities for decentralised energy72 provision within the site, unless it can be demonstrated that the development is not suitable, feasible or viable for district heat73 or decentralised power networks.
- The BCAs' local plans will, where applicable:
  - a) identify any necessary energy infrastructure requirements, including upgrades to existing infrastructure.
  - b) identify existing heating and cooling networks and opportunities for expanding existing networks and establishing new ones. Heating / hot water systems
- Heat sources for a communal heating system should be chosen to minimise likely emissions and to make best use of any local decentralised networks, in preference to other solutions.
- Where a communal heating system is provided, development proposals must provide evidence to show that NOx emissions related to energy generation will be equivalent to or lower than those of an ultra-low NOx75 gas boiler.

Policy CC3: Managing Heat Risk

As a part of mitigating and adapting to climate change, Policy CC3 sets out the requirements for managing heat risk within new development proposals:

- Development proposals will be expected to demonstrate how their potential for overheating and reliance on artificial cooling systems will be reduced, in accordance with the following cooling hierarchy:
  - a) minimise internal heat generation through energy-efficient design.
  - b) reduce the amount of heat entering a building through orientation, shading, albedo, fenestration, insulation, and the provision of green roofs and
  - c) manage heat within a building through exposed internal thermal mass79 and high ceilings.
  - d) provide passive ventilation.
  - e) provide mechanical ventilation.
  - f) provide active cooling systems

Policy CC4: Air Quality

Promoting healthy living is a key element of the Black Country Plan. The need to address climate change and its associated impacts will include the need to tackle pollution and poor air quality, especially where it has impacts on both human and environmental health. This is achieved by the following:

- Developments should not include materials or be positioned or ventilated in a way that would result in poor indoor air quality.
- requiring development and other land use proposals to promote the integration of cycling, walking, and electric charging points as part of their transport provision.
- requiring development and other land use proposals to promote the integration of cycling, walking, and electric charging points as part of their transport provision.
- Residential or other sensitive development such as schools, hospitals / health care and care facilities should be sited in areas where air quality already meets national objectives, or where compliance with those objectives can be achieved with suitable mitigation proposed as part of the development proposal and verified as being achieved before occupation of the development.

Policy CC5: Flood Risk

Climate change also means that extreme weather events will become more frequent and have the potential to cause damage to affected communities, the Policy CC5 minimises the probability and consequences of flooding by:

- The sequential test will be applied to all developments to ensure that development takes place in areas with the lowest flood risk.
- To pass the Exception Test, developments will need to:
  - a. provides a demonstrable benefit to the wider sustainability of the area. Matters such as biodiversity, green infrastructure, historic environment, climate change adaptation, flood risk, green energy, pollution, health, and transport should be considered.
  - b. detail the sustainability issues the development will address and how doing so will outweigh the flood risk concerns for the site.
  - c. prove that the development will be safe from flooding for its lifetime, taking account of the vulnerability of its users.

- d. prove that the development can be achieved without increasing flood risk elsewhere, and, where possible, will result in a reduced flood risk overall

Policy CC6: Sustainable drainage and surface water management (SuDS)

The incorporation of Sustainable Drainage Systems (SuDS) into new developments helps to manage and minimise surface water by following:

- All new developments should incorporate SuDS and all development proposals should provide details of adoption, ongoing maintenance, and management of SuDS.
- SuDS shall be designed in line with the Black Country Local Standards for SUDS.
- For all major developments, surface water flows must be reduced back to equivalent greenfield rates.
- Surface water drainage strategies are required for all major developments, regardless of their size and the flood zone and catchment they are in to meet the requirements of the Lead Local Flood Authority(s).

Policy CC7: Renewable and Low Carbon Energy and BREEAM Standards

It is essential for the successful delivery of the Black Country Plan that a high standard of sustainable design is secured on all new developments over the Plan period.

- Major developments creating ten or more homes or non-residential floorspace of 1,000 sqm gross or more (whether new build or conversion) must:
  - Achieve a 19% carbon reduction improvement upon the requirements within Building Regulations Approved Document, Part L 2013, or achieve any higher standard than this that is required under new national planning policy or building regulations.
  - b) incorporate generation of energy from renewable or low carbon sources sufficient to off-set at least 20% of the estimated residual energy demand of the development on completion.
- A variety of renewable and low-carbon energy sources and generation methods should be assessed and costed, including on-site and off-site sources where appropriate, and the use of district heat and / or decentralised energy networks. An energy assessment must be submitted with the planning application to demonstrate that these requirements have been met.
- All new build non-residential developments, student housing and care homes of 1,000 sqm gross or more should achieve the following standards of BREEAM New Construction certification, including full credits for category Wat 01 (water efficiency) in line with Policy ENV9:

Size	Standard	Year
1,000 – 5.000 sqm gross:	BREEAM very Good	Up to 2029
	BREEAM Excellent	2029-2039
More than 5,000 sqm gross:	BREEAM Excellent	

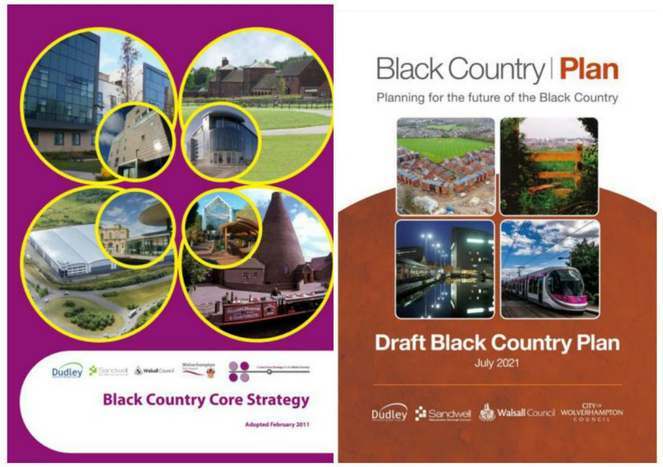


Figure A-3. Relevant planning documentation

Appendix B – Services Input

The tables below provide a summary of the fixed building services inputs used for the 'Be Lean' and 'Be Green' scenarios of the development.

Space Heating & Cooling:	
IES System	System 1 - Underfloor Heating - Heat pump with AHU – Supply Only
NCM Type	Central Heating using water: floor heating
Space heating emitters type 1	Underfloor Heating
Space heating fuel type 1	Electricity
Space heating seasonal efficiency type 1 (SCOP)	2.8
Space cooling emitters	-
Space cooling fuel	-
Space cooling seasonal efficiency (SEER)	-
Space cooling nominal efficiency (EER)	-
Ventilation type	AHU c/w Heat recovery
Demand Control Ventilation based on occupancy density	Damper Control
AHU SFP central (W/l/s) - Supply	1.1
Heat recovery type 1	-
Heat recovery efficiency type 1	-
IES System	System 2 -Underfloor Heating- Heat pump with AHU c/w Heat Recovery: Peak Lopping Cooling (not included)
NCM Type	Central Heating using water: floor heating
Space heating emitters type 2	Underfloor Heating
Space heating fuel type2	Electricity
Space heating seasonal efficiency type 2 (SCOP)	2.8
Cooling Type	Split or multi-split system
Space cooling emitters	Heat pump (electric): air source
Space cooling fuel	Electricity
Space cooling seasonal efficiency (SEER)	4
Space cooling nominal efficiency (EER)	3.5
Ventilation type	AHU c/w Heat recovery
Demand Control Ventilation based on occupancy density	Damper Control
AHU SFP central (W/l/s)	1.6
Heat recovery type 1	Plate Heat Exchanger
Heat recovery efficiency type 1	73%
NCM Type	Central Heating using water: floor heating
Space heating emitters type 1	Underfloor Heating
Space heating fuel type 1	Electricity
Space heating seasonal efficiency type 1 (SCOP)	2.8
Space cooling emitters	-
Space cooling fuel	-
Space cooling seasonal efficiency (SEER)	-
Space cooling nominal efficiency (EER)	-
Ventilation type	AHU c/w Heat recovery
Demand Control Ventilation based on occupancy density	Damper Control
AHU SFP central (W/l/s)	1.6
Heat recovery type 1	Plate Heat Exchanger
Heat recovery efficiency type 1	73%
IES System	System 4 - Underfloor Heating - Heat pump with AHU - Supply Only; Peak Lopping Cooling (not included)
NCM Type	Split or multi-split system
Space heating emitters type 1	Underfloor Heating
Space heating fuel type 1	Electricity
Space heating seasonal efficiency type 1 (SCOP)	2.8
Cooling Type	Split or multi-split system
Space cooling emitters	Heat pump (electric): air source
Space cooling fuel	Electricity
Space cooling seasonal efficiency (SEER)	4
Space cooling nominal efficiency (EER)	3.5
Ventilation type	AHU c/w Heat recovery
Demand Control Ventilation based on occupancy density	Damper Control
AHU SFP central (W/l/s) - Supply	1.1
Heat recovery type 1	-
Heat recovery efficiency type 1	-

Domestic Hot Water (DHW):	
NCM Type	Split or multi split system
DHW heating type	Storage/Breeze and Buffer Vessel
DHW heating fuel	Electricity
DHW heating seasonal efficiency (%)	3
DHW heating delivery efficiency (%)	95%
DHW heating storage volume (L)	2000
DHW heating storage losses (kWh/(lday))	0.0026
DHW secondary circulation	Yes

Lighting:	
Luminaire efficacies (Llm/cW) - Wards	120
Luminaire display efficacies (Llm/cW) -	22
Luminaire efficacies (Llm/cW) - other	60

Lighting controls - circ, toilets, dirty utilities	Auto on / Auto off
Daylight dimming (applied to perimeter zones 6.0m deep)	Yes
Time Switch (photoelectric / occupancy)	No / No
Parasitic power (photoelectric / occupancy) - Offices only	0.10

Other:	
Pump speed	Variable Speed - Multiple pressure sensors
HVAC systems metering	Yes
HVAC systems out of range warning	Yes
Lighting systems metering	Yes
Lighting systems out of range warning	Yes
Power factor correction	>0.95

Community Heating	Base Case
None	-

PV Min Performance	Value
Module nominal efficiency	0.226
Module array type	Monocrystalline
Array size (m2)	210
Azimuth (°)	137
Inclination (°)	30
Shading factor	0.9

DHW circulation losses calculations	Value
Loop length (m)	250
Circulation losses (W/m)	10.0
Pump power (kW)	0.200
Time Switch	No

Appendix C – Be Lean and Be Green BRUKL Document

Be Lean BRUKL output document

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Dormitory Eradication Edward Street Hospital Be Lean — As designed

Date: Fri Feb 04 10:39:42 2022

Administrative information

Building Details

Address: Edward St, West Bromwich, B70 8NL

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Cundall

Telephone number:

Address: , Manchester,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	48.7
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	48.7
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	47.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.26	L0000048:Surf[8]
Floor	0.25	0.1	0.22	L0000071:Surf[0]
Roof	0.25	0.12	0.12	L0000011:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	L0000069:Surf[2]
Personnel doors	2.2	1.85	2.2	L0000048:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	1

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	2564.6	2564.6
External area [m²]	4632.3	4632.3
Weather	BIR	BIR
Infiltration [m³/hm²@ 50Pa]	1	3
Average conductance [W/K]	1289.34	2107.25
Average U-value [W/m²K]	0.28	0.45
Alpha value* [%]	10.13	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
100	**C2 Residential Institutions: Hospitals and Care Homes**
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	26.17	50.36
Cooling	0	0
Auxiliary	10.14	8.36
Lighting	22.07	25.32
Hot water	116.92	96.06
Equipment*	101.83	101.83
TOTAL**	**175.31**	**180.1**

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	80.53	156.29
Primary energy* [kWh/m²]	270.99	279.45
Total emissions [kg/m²]	47.2	48.7

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

Be Green BRUKL output document

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Dormitory Eradication Edward Street Hospital Be Green

As designed

Date: Fri Feb 04 15:40:53 2022

Administrative information

Building Details

Address: Edward St, West Bromwich, B70 8NL

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Cundall

Telephone number:

Address: , Manchester,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	42
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	42
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	31.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	L0000069:Surf[0]
Floor	0.25	0.1	0.1	L0000069:Surf[5]
Roof	0.25	0.12	0.12	L0000011:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	L0000069:Surf[2]
Personnel doors	2.2	1.85	2.2	L0000048:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	1

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	2564.6	2564.6
External area [m^2]	4632.3	4632.3
Weather	BIR	BIR
Infiltration [m^3/hm^2@ 50Pa]	1	3
Average conductance [W/K]	1284.81	2107.25
Average U-value [W/m^2K]	0.28	0.45
Alpha value* [%]	10.14	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
100	**C2 Residential Institutions: Hospitals and Care Homes**
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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	8.49	16.97
Cooling	0	0
Auxiliary	10.14	8.36
Lighting	21.83	25.32
Hot water	36.61	32.38
Equipment*	101.83	101.83
TOTAL**	**77.07**	**83.03**

* 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	14.43	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	80.35	156.29
Primary energy* [kWh/m^2]	230.67	248.53
Total emissions [kg/m^2]	31.5	42

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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