REAP 3 Limited

PLOTS 4 AND 5, CENTRAL SQUARE, CITY CENTRE, CARDIFF

Energy & Sustainability Statement

AUGUST 2025

CONFIDENTIAL

REAP 3 Limited

PLOTS 4 AND 5, CENTRAL SQUARE, CITY CENTRE, CARDIFF

Energy & Sustainability Statement

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 0040270.4485

DATE: AUGUST 2025

WSP

WSP House
70 Chancery Lane
London
WC2A 1AF

Phone: +44 20 7314 5000

WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	First draft	V01	V02	
Date	21st July 2025	29th July 2025	31ST July 2025	
Prepared by	Bahareh Salehi	Bahareh Salehi	Bahareh Salehi	
Signature		Bahareh Salehi	Bahareh Salehi	
Checked by	James Paje	George Barnes	George Barnes	
Signature	James Paje	George Barnes	George Barnes	
Authorised by	George Barnes	George Barnes	George Barnes	
Signature	George Barnes	George Barnes	George Barnes	
Report number	Rev00	Rev01	Rev02	

CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

This Energy and Sustainability Statement has been prepared by WSP on behalf of REAP 3 Limited to Cardiff Council in support of a full planning application for the development of Plots 4 and 5, Central Square, City Centre, Cardiff. The proposed development features a landmark 50-storey building with a maximum height of up to 177.85m AOD comprising:

- 528 new homes (Class C3) comprising a mix of 1-bed and 2-beds
- A pavilion building within Central Square comprising up to 601sqm of flexible non-residential floorspace (flexible Class A1 and A3).
- 2,856.5sqm of high quality internal and external amenity space through provision of roof terraces, lounges, coworking, gym and other wellbeing spaces.
- A basement level providing ancillary residential floorspace.
- A car free development with 528 cycle parking spaces within proposed building, including 5% accessible spaces, and a publicly accessible bike hub and café. Additionally, 52 public cycle spaces are provided within adjacent square provided as Sheffield stands.

The project is a mixed-use development to provide residential accommodation, flexible non-residential uses, cycle parking, landscaping, and other associated works.

The site sits at the heart of the wider 'Central Square' regeneration area in Cardiff City Centre. Central Square is a strategically important area which the Council considers to be a gateway to the City, and an opportunity to showcase the best that Cardiff has to offer. Given the strategic importance of the location, the Council envisages that the regeneration of Central Square, towards which this development will contribute significantly, will play a key role in attracting investment on other strategically important development sites in the City.

The proposed development provides the opportunity to make a significant positive contribution to the ongoing regeneration of this part of Cardiff. The proposed development will build upon the success of the wider Central Square area, proposing a development of exceptional architectural and residential quality. The Applicant is fully committed to the delivery of the site, and it is their ambition to create a new iconic landmark for Cardiff and Wales.

As well as the delivery of much needed high-quality homes to address the Council's housing need, the proposed development brings with it a wide range of enhanced planning and public benefits. The benefits include the delivery of a strategically important City Centre site, new flexible non-residential floorspace that will activate Central Square, a publicly accessible bike hub and cafe, a new pavilion building that can accommodate a restaurant, extensive public realm landscaping in and around the buildings, highly sustainable and energy efficient buildings, and other significant economic and social benefits for the City.

The energy strategy has been developed in accordance with the Welsh Government's National Development Framework: Future Wales 2040 (February 2021), Cardiff Local Development Plan 2006-2026 (2016), and relevant Building Regulations, particularly Part L (2021). The Proposed Development will comply with applicable energy performance and carbon emissions standards while contributing to Future Wales: The National Development Framework: Future Wales 2040 (February 2021) and the Well-being of Future Generations (Wales) Act 2015.

ENERGY AND CARBON POLICY SUMMARY

In line with the applicable regulations and sustainability standards, the energy and carbon strategy for the Proposed Development includes the following key commitments:

- Part L Compliance: All buildings will meet or exceed the requirements of Building Regulations 2021 Part L, using Approved Document Volume 1 (residential) and Volume 2 (commercial).
- Future Homes Standard (2025 readiness): The design is being developed with anticipated compliance to the 2025 Future Homes Standard, ensuring long-term energy efficiency and resilience.
- Net Zero Targeting: In accordance with the Net Zero Strategy: Build Back Greener and Prosperity for All – A Low Carbon Wales, a reduction in regulated CO_2 emissions of at least 35% beyond Part L 2021 baseline will be targeted on-site.
- Energy Efficiency Targets:
  - 10% improvement in energy efficiency over Building Regulations for residential components.
  - 15% improvement in energy efficiency for non-domestic spaces.
- Low Carbon Heating Strategy:
  - Adoption of Air Source Heat Pumps (ASHPs) as the primary heating source to provide energy to the main ambient loop water circuit. Individual Water Source Heat Pumps (WSHPs) in each space to use ambient loop water heat as a heat source.
- Overheating Mitigation:
  - Modelling to be undertaken per CIBSE TM52, TM59, and Part O to minimise overheating risk in residential areas.
- Monitoring and Performance:
  - The project will comply with the "Be Seen" energy monitoring guidance and will report on post-construction operational energy performance.

ENERGY STRATEGY SUMMARY

The energy strategy follows the Welsh and UK energy hierarchy:

- Be Lean – Reduce energy demand through passive design and efficient fabric.
- Be Clean – Employ efficient heat network and ASHP systems.
- Be Green – Use on-site renewable energy, including rooftop PVs.
- Be Seen – Enable transparent energy performance monitoring.

Key Features of the Strategy:

- High-performance building envelope, exceeding minimum Part L U-values.
- Optimised glazing ratios, orientation, and solar control to balance daylight and overheating risk.
- Mechanical ventilation with heat recovery (MVHR) for improved internal air quality and efficiency.

- High performing ambient loop system, recovering waste heat energy from constant cooling loads to maximise efficiency of comfort heating for both residential and non-residential areas.
- Photovoltaic (PV) array on available spaces, where possible and with feasibility to be determined at detailed design stage, to generate renewable electricity for communal areas.
- A car free development with 528 cycle parking spaces within proposed building, including 5% accessible spaces, and a publicly accessible bike hub.
- Smart metering and monitoring for all residential and commercial units.

Modelling of regulated and unregulated carbon emissions will be undertaken using:

- SAP 10.2 for residential dwellings
- IES VE dynamic simulation for non-residential spaces

SAP and SBEM modelling will demonstrate:

- Full compliance with Part L 2021 TER/DER/BER requirements
- Targeted ≥35% reduction in regulated carbon emissions over baseline
- Compliance with Target Fabric Energy Efficiency (TFEE)
- Target a minimum EPC rating of B for all apartments
- TAN12: design, guidance for local planning authorities on designing a sustainable development

The Proposed Development at Central Square, Cardiff, will represent a best-practice example of sustainable high-density development in line with Welsh and UK energy policy. The energy strategy is robust, future-ready, and aligned with the carbon neutrality goals set out in local and national frameworks.

By deploying efficient passive design, low-carbon heat systems, and on-site renewables, the project achieves a significant reduction in carbon emissions and creates a resilient, low-energy urban development.

Contact name Bahareh Salehi

Contact details +442031169357 | bahareh.salehi@wsp.com

1 SITE DESCRIPTION

The site sits within the administrative area of Cardiff Council, who are the relevant Local Planning Authority when determining any planning applications on the site.

The site is 0.21ha and comprises a cleared rectangular plot of land, alongside two smaller parcels of land located to the north of Wood Street within the public realm (these smaller parcels will accommodate public cycle parking spaces). The site is bound by Wood Street to the south, Scott Road to the west, Park Street Lane to the north-west, and a public square to the east. The site was formerly occupied by St David's House, until it was demolished in late 2018.

The site benefits from full planning permission for the following development (Ref: 21/02984/MJR), which was granted by the Council on 2nd May 2024:

'Full planning application for a mixed-use building providing commercial uses at ground floor/mezzanine level (Use Classes A1/A2/A3/B1/D1/D2) and residential accommodation above (Use Class C3 and including non C3 Use Class residential), a pavilion (Use Classes A1/A2/A3), public realm, cycle parking, access, drainage and other infrastructure works required for the delivery of Central Square Plots 4 and 5.'

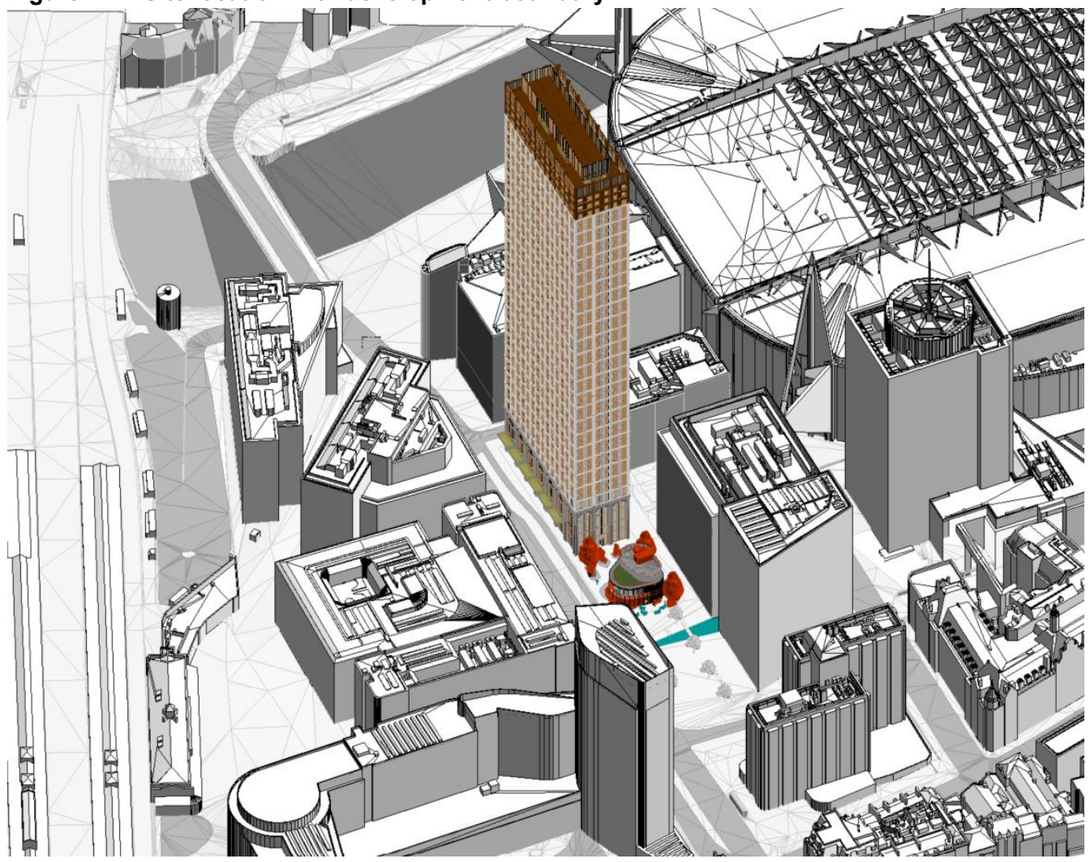
The site sits within the Cardiff Central Square Masterplan area. Whilst this masterplan was never formally adopted, it has catalysed significant development and has led to the transformation of the area in and around Cardiff Central Station. The prevailing building heights ranges between 7 to 25 storeys, which includes buildings of a variety of land uses and architectural styles.

The Media Wales office building is located at 6 Park Street, immediately adjacent to the northwest of the site. The HMRC building is located immediately adjacent to the northeast of the site. The Millennium Plaza leisure complex is located immediately to the west. To the south, across Wood Street lies the Cardiff University School of Journalism, Media and Culture, and the BBC Cymru building. The Principality Stadium is located further to the north and can be accessed via Central Square.

The Site is not within a Conservation Area and does not include any Listed Buildings. The Natural Resources Wales ('NRW') Flood Map for Planning ('FMfP') identifies the site to be at risk of flooding and falls into Flood Zone 3 (Rivers and Sea) (albeit located in a 'TAN15 defended zone')

The site is very well connected by public transport. Cardiff Central Station is within a short walking distance (0.1 miles / 2-minutes' walk). Cardiff Central provides connections to a wide range of locations, including Newport in 13 minutes and Cheltenham Spa in approximately an hour. Adjacent to the site is Wood Street bus stop, with further bus stops along St Mary Street, approximately 2-minutes' walk from the site.

Figure 1-1 - Site location with development boundary



1.1 THE PROPOSED DEVELOPMENT

The proposed development features a landmark 50-storey building with a maximum height of up to 177.85m AOD comprising:

- 528 new homes (Class C3) comprising a mix of 1-bed and 2-beds
- A pavilion building within Central Square comprising up to 601sqm of flexible non-residential floorspace (flexible Class A1 and A3).
- 2,856.5 sqm of high quality internal and external amenity space through provision of roof terraces, lounges, coworking, gym and other wellbeing spaces.
- A basement level providing ancillary residential floorspace.
- A car free development with 528 cycle parking spaces within proposed building, including 5% accessible spaces, and a publicly accessible bike hub and café. Additionally, 52 public cycle spaces are provided within adjacent square provided as Sheffield stands.

The project is a mixed-use development to provide residential accommodation, flexible non-residential uses, cycle parking, landscaping, and other associated works.

The site sits at the heart of the wider ‘Central Square’ regeneration area in Cardiff City Centre. Central Square is a strategically important area which the Council considers to be a gateway to the City, and an opportunity to showcase the best that Cardiff has to offer. Given the strategic importance of the location, the Council envisages that the regeneration of Central Square, towards which this development will contribute significantly, will play a key role in attracting investment on other strategically important development sites in the City.

The proposed development provides the opportunity to make a significant positive contribution to the ongoing regeneration of this part of Cardiff. The proposed development will build upon the success of the wider Central Square area, proposing a development of exceptional architectural and residential quality. The Applicant is fully committed to the delivery of the site, and it is their ambition to create a new iconic landmark for Cardiff and Wales.

As well as the delivery of much needed high-quality homes to address the Council’s housing need, the proposed development brings with it a wide range of enhanced planning and public benefits. The benefits include the delivery of a strategically important City Centre site, new flexible non-residential floorspace that will activate Central Square, a publicly accessible bike hub and cafe, a new pavilion building that can accommodate a restaurant, extensive public realm landscaping in and around the buildings, highly sustainable and energy efficient buildings, and other significant economic and social benefits for the City.

2 NATIONAL PLANNING POLICY

2.1 PLANNING POLICY WALES (PPW EDITION 12)

Planning Policy Wales (PPW) Edition 12, published in February 2024, serves as the principal land-use planning policy document for Wales, guiding sustainable development across the nation. It emphasises the creation of sustainable places through placemaking, integrating environmental, social, economic, and cultural considerations into planning decisions.

Table 2-1 - Key Components of The Planning Policy Wales (PPW Edition 12).

Key Components of PPW Edition 12	
Sustainable Placemaking	• Promotes vibrant, inclusive, and well-designed communities. • Ensures developments contribute positively to residents' well-being and the environment.
Green Infrastructure	• Requires a Green Infrastructure Statement in planning applications. • Encourages incorporation of parks, green roofs, and sustainable drainage systems to enhance biodiversity and ecosystem resilience.
Biodiversity Enhancement	• Mandates developments to deliver net biodiversity benefits. • Introduces a "stepwise approach" for avoidance, mitigation, and compensation to actively enhance ecological networks.
Climate Change Mitigation and Adaptation	• Promotes energy efficiency, renewable energy, and climate-resilient designs to address climate challenges.
Community Engagement	• Encourages involving local communities in planning processes. • Aims to align developments with local needs and aspirations, fostering a sense of ownership.
Sustainable Transport	• Prioritises active travel and public transport. • Expects developments to support walking, cycling, and connectivity to public transit to reduce car dependency.

2.2 NET ZERO STRATEGY: BUILD BACK GREENER

The Net Zero Strategy: Build Back Greener, published by the UK government, outlines the path to achieving net zero greenhouse gas emissions by 2050. For the Plots 4 & 5, this strategy can provide a framework to enhance sustainability efforts. Here is a summary of how the Net Zero Strategy can be applied to the proposed development:

Table 2-2 - Key Components of the Net Zero Strategy.

Decarbonising Power	
Objective	• Transition to clean electricity.
Application to Plots 4 & 5	• Incorporation of photovoltaic panels to harness renewable solar energy, if possible. • Potential integration with local grid systems or district heating initiatives for increased efficiency.
Fuel Switching	
Objective	• Replace fossil fuels with low-carbon alternatives.
Application to Plots 4 & 5	• All electric development with electricity forecast in line with future energy scenarios.
Energy Efficiency	
Objective	• Reduce energy consumption.
Application to Plots 4 & 5	• Implement measures to improve the energy efficiency of homes, businesses, and public buildings.
Green Buildings	
Objective	• Enhance energy efficiency and environmental performance in buildings.
Application to Plots 4 & 5	• Achieve Building Regulation Part L compliance for energy performance and carbon emissions. • Design to EPC B rating and aim for BREEAM targets.
Sustainable Transportation	
Objective	• Promote the use of sustainable transport options
Application to Plots 4 & 5	• Car-free development strategy, leveraging proximity to Cardiff Central Station. • Ample provision of bicycle storage and active travel pathways to encourage cycling and walking.

Waste Reduction and Recycling	
Objective	• Minimise waste and enhance recycling efforts
Application to Plots 4 & 5	• Use of recycled and low-carbon materials in construction. • Adoption of greywater recycling systems where feasible.
Biodiversity and Natural Environment	
Objective	• Enhance and protect natural habitats and biodiversity.
Application to Plots 4 & 5	• Consideration of green roofs and landscaping to support biodiversity net gain. • Adherence to Cardiff's Green Infrastructure SPG.
Education and Engagement	
Objective	• Raise awareness and educate about sustainability.
Application to Plots 4 & 5	• Integrating public spaces and retail to foster community interaction. • Promoting sustainability awareness in local neighbourhoods.

2.3 BUILDING REGULATION PART L1 FOR DOMESTIC BUILDINGS

Building Regulations Part L1 for residential units focuses on ensuring the energy efficiency of dwellings to reduce carbon emissions and promote sustainable living. It sets requirements for new-build homes, including standards for insulation, heating, lighting, and ventilation.

For the development of Plots 4 and 5, Central Square, City Centre, Cardiff, to comply with Part L1 ensures the residential units achieve high levels of energy performance, aligning with national and regional sustainability goals.

ENERGY PERFORMANCE STANDARDS

- Target Emission Rate (TER): The calculated CO_2 emissions from the building must not exceed the TER, based on a standard dwelling of the same size and shape.
- Building Emission Rate (BER): The actual emission rate of the dwelling must meet or fall below the TER.
- Primary Energy Rate: Measures the energy demand of the dwelling, factoring in the energy source and distribution.
- Dwelling Emission Rate (DER): The actual CO_2 emissions of the building, which must not exceed the TER.2. Fabric Energy Efficiency

Part L1 sets minimum energy efficiency requirements for the building envelope, including:

Table 2-3 - Minimum requirement, Part L1 Wales (2022)

Building Element	Maximum U-value (W/m²K)	Requirement/Description
Walls	0.18	Insulated to reduce heat transfer, using materials like cavity walls with external insulation.
Roofs	0.13	High-performance insulation to minimise heat loss.
Floors	0.15	Insulated flooring to prevent thermal losses from ground contact.
Windows and Glazed Doors	1.4	Double or triple glazing with low-E coatings and insulated frames.
Opaque Doors	1.4	Heavily insulated doors to reduce heat transfer.
Air Permeability	≤8 m³/h.m² @ 50 Pa	Ensures airtightness to minimise heat loss through air leakage.
Thermal Bridging	Minimised (Accredited Details)	Design to avoid thermal bridges at junctions and around openings.

HEATING, COOLING, AND VENTILATION

- Heating Systems: High-efficiency boilers or low-carbon alternatives, such as air-source heat pumps (ASHPs), are encouraged.
- Ventilation: Mechanical ventilation with heat recovery (MVHR) systems are recommended to reduce energy loss.
- Cooling Systems: Efficient cooling systems should prevent overheating while minimising energy demand.

RENEWABLE ENERGY INTEGRATION

- Encourage the use of on-site renewable energy sources, such as Photovoltaic (PV) panels for electricity generation, where suitable.

LIGHTING AND APPLIANCES

- Use energy-efficient lighting (minimum 75% of fixed lighting outlets must be energy-saving).
- Provide provisions for energy-efficient appliances, promoting further reduction in electricity use.

2.4 2025 FUTURE HOMES STANDARD

The 2025 Future Homes Standard (FHS) is part of the UK Government's roadmap to achieving net-zero carbon emissions by 2050. It represents a significant update to building regulations, focusing on energy efficiency, low-carbon heating, and sustainable design for new residential developments.

This standard should be considered for the Site to align with proposed future requirements.

Table 2-4 - Key Components of the 2025 Future Homes Standard.

Category	2025 Future Homes Standard Requirements	Application to Plots 4 & 5 Cardiff
Carbon Emissions	• 75%-80% reduction compared to Part L 2013 standards.	• Use high-performance building fabric, renewable energy sources, and low-carbon heating systems like ASHPs.
Fabric Energy Efficiency	**U-values:** • Walls ≤ 0.15 W/m²K, • Roofs ≤ 0.11 W/m²K, • Floors ≤ 0.13 W/m²K, • Windows ≤ 0.8 W/m²K	• Advanced insulation and triple-glazed windows for enhanced thermal performance.
Heating Systems	• No connection to gas grid; low-carbon systems (e.g., ASHPs, heat networks).	• Integration of ASHPs already in design. • Explore heat network connections for further decarbonisation.
Renewable Energy Integration	• On-site renewables like PV panels; battery storage systems.	• Rooftop PV panels to generate renewable electricity, where suitable. • Consider battery storage for on-site energy optimisation, if applicable.
Ventilation Systems	• Mechanical Ventilation with Heat Recovery (MVHR) to improve air quality.	• Install MVHR systems for energy-efficient ventilation and indoor comfort.
Overheating Mitigation	• Designs to prevent overheating through shading, glazing ratios, and thermal mass.	• Optimise shading strategies and glazing ratios to reduce heat gain in high-rise apartments.
Airtightness	• Air permeability ≤ 3 m³/h.m² @ 50 Pa.	• Implement advanced airtight construction techniques; ensure testing for all units.
Testing Requirements	• Individual airtightness testing for every unit.	• Conduct rigorous testing for all apartments to meet stringent standards.

2.5 BUILDING REGULATION PART L2 FOR NON-DOMESTIC BUILDINGS

The new Part L of the Building Regulations is developed with the aim to improve the energy efficiency requirements and to reduce the associated CO_2e emissions for the regulated energy use in new buildings in Wales.

An extract of some of the key requirements for new buildings (other than dwellings) is reported below.

ACHIEVING THE TARGET EMISSION RATE

The building carbon emission rate (BER) must not exceed the target carbon emission rate (TER), as calculated in line with the 2021 National Calculation Methodology using approved modelling software. The BER and TER are calculated based on the regulated demands of space heating, space cooling, lighting, fans and pumps and domestic hot water heating. Unregulated energy such as plug loads, lifts and escalators are not considered.

In addition, Part L2 Wales (2022) requires the building primary energy consumption (BPEC) to be no greater than the target primary energy consumption (TPEC).

LIMITS ON DESIGN FLEXIBILITY

Each individual element of building fabric and fixed building services must comply with its respective minimum standards as described within the Part L Approved Document 2022.

It should be noted that to comply with the TER, the general performance parameters will need to exceed these minimum standards. The limits on design flexibility exist only to define a backstop in cases where the design team wishes to trade off a poorly performing element against a higher performing element. For example, a design team may choose to relax the requirement for building air tightness to the minimum standard, but they would then need to significantly improve the lighting efficiency or some other component to compensate for the increase in heating energy.

Table 2-5 - Minimum requirement, Part L2A Wales (2022)

Building Fabric Element	Limiting Value for new buildings
Roof (Flat Roof)	0.20 W/m²K
Wall	0.26 W/m²K
Floor	0.22 W/m²K
Windows	1.60 W/m²K
Roof windows, curtain walling	1.8 W/m²K
Rooflights	2.2 W/m²K
Pedestrian doors (including glazed doors)	1.8 W/m²K
Vehicle access and similar large doors	1.30 W/m²K
High-usage entrance doors	3.00 W/m²K

Roof ventilators (inc. smoke vent)	3.00 W/m²K
Air permeability	8.00 m³/(h.m²) at 50Pa

LIMITING THE EFFECT OF SOLAR GAIN IN SUMMER

For each space in the building that is occupied, or mechanically cooled, reasonable provision must be shown for limiting the effects of solar gain in summer. For the purposes of Part L, this could be demonstrated by showing that for each applicable space, the aggregated solar gains from April to September are less than a calculated limit. This test is automatically carried out as part of the Part L analysis and the results are shown on the Building Regulation UK Part L report (BRUKL), reported in the energy strategy document.

(POST COMPLETION) BUILDING PERFORMANCE CONSISTENT WITH THE BER

For the intended performance in use of fuel and power to be achieved, buildings must be constructed and equipped so that the performance is consistent with the BER as calculated at the completion of the building work.

PROVISION FOR ENERGY EFFICIENT OPERATION IN BUILDING

The owner of the building should be provided with sufficient information about the building, its fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is intended and reasonable in the circumstances. A way of showing compliance with this requirement would be to produce a building logbook that may draw upon other documents such as the Operation and Maintenance Manuals.

2.6 THERMAL COMFORT: APPROVED DOCUMENT PART O

Requirement O1 Overheating Mitigation of the Building Regulations states that dwellings, or other buildings containing rooms for residential purposes, should make reasonable provision to:

- Limit unwanted solar gains in summer
- Provide an adequate means to remove heat from the indoor environment

Mechanical cooling can only be used where there is insufficient capacity to remove the heat from the indoor environment.

Compliance with this requirement can be shown by using one of the following two methods:

- The Simplified Method, as set out within Section 1 of the Approved Document O.
- The Dynamic Thermal Modelling Method, as set out within Section 2 of the Approved Document O.

Alignment to Part O of the building regulations will be met as per the standard requirements, with exact strategies developing as the design progresses.

2.7 THERMAL COMFORT: TM52 FOR COMMERCIAL AREA

CIBSE TM52 uses an adaptive approach to thermal comfort where the comfort temperature within the building is related to the outdoor air temperature, based on the tendency for occupants to adapt to higher temperatures. The adaptive thermal comfort criteria only apply to free running buildings, i.e., those without mechanical cooling. This analysis will be carried out during the design process with alignment targeted.

2.8 WELL-BEING OF FUTURE GENERATIONS (WALES) ACT 2015

The Well-being of Future Generations (Wales) Act 2015 aims to improve the social, economic, environmental, and cultural well-being of Wales. It provides a framework for public bodies to ensure that current decisions do not compromise the ability of future generations to meet their own needs.

Table 2-6 - Summary of the Well-Being of Future Generations (Wales) Act 2015

Summary of the policy	
Well-being Goals	• **A Prosperous Wales**: Develop an innovative, productive, and low-carbon society that recognises the limits of the global environment and uses resources efficiently. • **A Resilient Wales**: Maintain and enhance a biodiverse natural environment with healthy functioning ecosystems. • **A Healthier Wales**: Achieve physical and mental well-being for people, promoting healthy lifestyles. • **A More Equal Wales**: Enable people to fulfil their potential no matter what their background or circumstances. • **A Wales of Cohesive Communities**: Create attractive, viable, safe, and well-connected communities. • **A Wales of Vibrant Culture and Thriving Welsh Language**: Promote and protect culture, heritage, and the Welsh language. • **A Globally Responsible Wales**: Contribute to global well-being and ensure Wales takes its fair share of responsibility for sustainable development.

2.9 NATIONAL DEVELOPMENT FRAMEWORK: FUTURE WALES 2040 (FEBRUARY 2021)

National Development Framework: Future Wales 2040 (February 2021) is the Welsh Government's spatial strategy, outlining a long-term vision for sustainable development across Wales. It provides a framework for regional and local planning policies, focusing on creating sustainable, vibrant, and resilient communities.

This plan is integral to the site, ensuring that its design and objectives align with national growth and sustainability goals. A policy summary is shown overleaf in the Table 2-7.

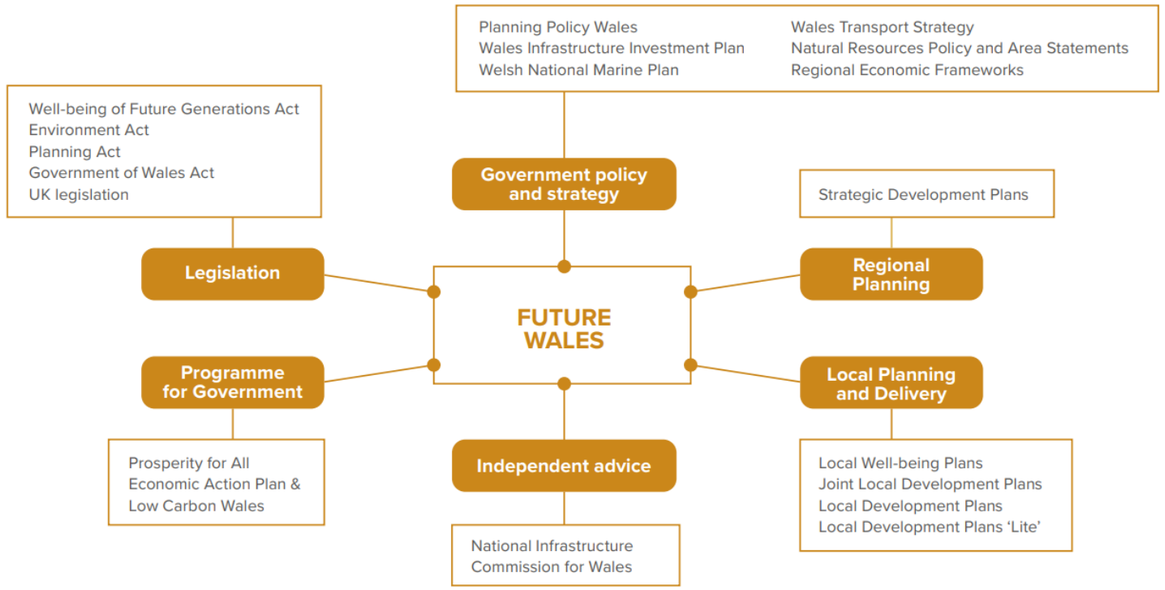


Figure 2-1 - Model of Future Wales Influence.

Table 2-7 - Summary of the Future Wales: The National Plan 2040

Policy 1: Sustainable Places	
Objective	• Prioritise the creation of well-connected, inclusive, and sustainable communities.
Application to Plots 4 & 5	• Mixed-use design promotes social and economic inclusivity. • Integration with Cardiff Central Station ensures sustainable connectivity.
Policy 2: Shaping Urban Growth and Regeneration	
Objective	• Focus on high-density developments in key cities, ensuring efficient land use.
Application to Plots 4 & 5	• The project supports urban regeneration with a high-rise, mixed-use structure, optimising limited urban land resources.
Policy 5: Supporting Cardiff's Growth	
Objective	• Designate Cardiff as a key hub for economic development and sustainable urban growth.
Application to Plots 4 & 5	• Enhances Cardiff's status as a growth area by delivering housing, retail, and public amenities.
Policy 7: Decarbonisation	
Objective	• Drive low-carbon development by incorporating renewable energy and energy-efficient design.
Application to Plots 4 & 5	• Incorporation of photovoltaic (PV) panels to generate renewable energy, where suitable.. • Low-carbon heating systems, such as Air Source Heat Pumps (ASHPs), to meet energy demands sustainably.
Policy 9: Resilient Ecological Networks and Green Infrastructure	
Objective	• Enhance biodiversity and integrate green spaces into developments.
Application to Plots 4 & 5	• Green infrastructure and biodiversity net gain to maximise in line with site constraints and opportunities
Policy 12: Regional Connectivity	
Objective	• Reduce car dependency by promoting public transport, cycling, and walking.
Application to Plots 4 & 5	• Located adjacent to Cardiff Central Station, the project supports a car-free strategy. • Ample cycle storage and pedestrian-friendly designs align with active travel goals.
Policy 13: Infrastructure Requirements	
Objective	• Ensure developments are supported by necessary infrastructure, including utilities and green solutions.
Application to Plots 4 & 5	• Incorporates sustainable drainage systems and efficient energy infrastructure.
Policy 16: Sustainable Tourism	
Objective	• Develop tourism assets sustainably, enhancing the cultural and environmental character of the area.

Application to Plots 4 & 5	• The pavilion and retail spaces contribute to Cardiff's urban vibrancy and attract visitors, enhancing tourism sustainably.

2.10 THE ENVIRONMENT (WALES) ACT 2016 (2022 UPDATE)

The Environment (Wales) Act 2016 is a comprehensive piece of legislation aimed at promoting sustainable management of natural resources in Wales. Here is a summary of its key sustainability policies:

Table 2-8 - Summary of The Environment (Wales) Act 2016.

Summary of the policy	
Sustainable Management of Natural Resources (SMNR)	The Act introduces principles for the sustainable management of natural resources, which include: • Maintaining and enhancing the resilience of ecosystems. • Considering the benefits ecosystems provide. • Taking account of the short, medium, and long-term consequences of actions. • Promoting the benefits for society, economy, and environment. • Encouraging public engagement and collaboration.
Biodiversity and Resilience of Ecosystems Duty	• **Biodiversity Duty:** Public authorities in Wales are required to maintain and enhance biodiversity in exercising their functions. They must also promote the resilience of ecosystems. • **Reporting:** Public authorities must report on the actions taken to fulfil their biodiversity duty.
Climate Change	**Targets for Emission Reduction**: The Act sets statutory emission reduction targets, including: • A minimum of 80% reduction in greenhouse gas emissions by 2050. • Establishing carbon budgets for defined periods to ensure progress towards the long-term target.
Waste Management	**Resource Efficiency**: Promotes resource efficiency and waste reduction, encouraging a circular economy where materials are reused, repaired, and recycled as much as possible.

2.11 Prosperity For All: A Low Carbon Wales

"Prosperity for All: A Low Carbon Wales" is a strategic plan by the Welsh Government aimed at tackling climate change and transitioning to a low-carbon economy. Here is a summary of its key sustainability policies:

Overarching Goals

- **Reduce Greenhouse Gas Emissions**: Achieve a 45% reduction in greenhouse gas emissions by 2030 from 1990 levels.
- **Achieve Net Zero**: Target net-zero emissions by 2050.

Table 2-9 - Summary of Prosperity for All: A Low Carbon Wales

Key policy areas	
Power Sector	• **Renewable Energy:** Increase the generation of renewable energy sources such as wind, solar, and hydroelectric power. • **Energy Efficiency:** Promote energy efficiency in power generation and distribution.
Buildings	• **Energy Efficiency in Homes:** Improve the energy efficiency of existing homes through retrofitting and support new builds to meet high energy efficiency standards. • **Public Sector Buildings:** Ensure public sector buildings are exemplars in energy efficiency.
Transport	• **Sustainable Transport:** Invest in public transport, active travel infrastructure (walking, cycling), and low-emission vehicles. • **Electric Vehicles (EVs):** Support the rollout of EV charging infrastructure and incentivise the adoption of electric vehicles.
Industry and Business	• **Decarbonising Industry:** Support industries to adopt low-carbon technologies and practices. • **Circular Economy:** Promote resource efficiency and waste reduction, moving towards a circular economy model.
Agriculture and Land Use	• **Sustainable Farming:** Encourage sustainable farming practices that reduce emissions and enhance carbon sequestration. • **Land Use Management:** Promote the management of land to enhance biodiversity and carbon storage.
Waste	• **Waste Reduction:** Implement measures to reduce waste generation and increase recycling rates. • **Resource Efficiency:** Support businesses and consumers in adopting resource-efficient practices.

2.12 TECHNICAL ADVICE NOTES (TANS)

Technical Advice Notes (TANs) provide detailed planning guidance to support the implementation of Planning Policy Wales (PPW). They address specific aspects of planning and are directly applicable to developments like this site to ensure sustainability, compliance, and high-quality design.

Table 2-10 - Summary of the Technical Advice Notes (TANS)

TAN 2: Planning and Affordable Housing	
Objective	• Guides the delivery of affordable housing as part of developments.
Application to Plots 4 & 5	• The scheme will be evaluated for its potential for affordable housing contributions.
TAN 5: Nature Conservation and Planning	
Objective	• Provides advice on biodiversity conservation and ecological networks.
Application to Plots 4 & 5	• Green infrastructure and biodiversity net gain to maximise in line with site constraints and opportunities
TAN 8: Renewable Energy	
Objective	• Encourages integration of renewable energy sources like wind, solar, and biomass.
Application to Plots 4 & 5	• Installation of photovoltaic panels aligns with this guidance, if applicable.
TAN 11: Noise	
Objective	• Addresses noise pollution management during and after construction.
Application to Plots 4 & 5	• Mitigate noise impacts on nearby properties and ensure comfortable living conditions.
TAN 12: Design	
Objective	• Promotes high-quality, sustainable, and inclusive design for buildings and spaces.
Application to Plots 4 & 5	• Mixed-use design, energy efficiency, and placemaking are core to the project's strategy.
TAN 15: Development and Flood Risk	
Objective	• Provides guidance on managing flood risks and incorporating drainage systems.
Application to Plots 4 & 5	• Includes sustainable drainage solutions (SuDS) to manage surface water effectively.
TAN 18: Transport	
Objective	• Advises on sustainable transport integration, prioritising active travel and public transit.
Application to Plots 4 & 5	• Car-free development supports walking, cycling, and connectivity to Cardiff Central Station.

3 REGIONAL PLANNING POLICY SUMMARY

3.1 Cardiff Central Enterprise Zone

The Cardiff Central Enterprise Zone (CCEZ) is a designated area in Cardiff aimed at fostering economic growth, urban regeneration, and sustainable development. As one of the Welsh Government's strategic growth areas, the zone focuses on creating a hub for financial, professional, and creative industries while supporting mixed-use developments that enhance urban connectivity and sustainability.

Table 3-1 - Summary of the Key Objectives of the CCEZ.

Economic Growth	
Objective	• Position Cardiff as a competitive economic hub for Wales and the UK.
Application to Plots 4 & 5	• The development provides commercial spaces to attract businesses, contributing to job creation and economic diversification.
Urban Regeneration	
Objective	• Transform underutilised urban areas into vibrant, mixed-use districts.
Application to Plots 4 & 5	• The project enhances Central Square with residential, retail, and public amenities, revitalizing the area and contributing to Cardiff's skyline.
Sustainable Development	
Objective	• Promote energy-efficient, low-carbon developments that align with Wales's climate goals.
Application to Plots 4 & 5	• Incorporates photovoltaic panels where suitable and energy-efficient building systems to support net-zero carbon goals.
Connectivity	
Objective	• Enhance transportation links and promote active travel to reduce car dependency.
Application to Plots 4 & 5	• Adjacent to Cardiff Central Station, the project supports car-free living and integrates with public transit and cycling networks.
Placemaking	
Objective	• Create high-quality, well-designed public spaces that improve liability and attract residents and visitors.
Application to Plots 4 & 5	• Includes a pavilion and retail spaces that enhance the public realm and foster community interaction.

3.2 CARDIFF CAPITAL REGION CITY DEAL

The Cardiff Capital Region City Deal is a transformative investment program aimed at driving economic growth, improving connectivity, and promoting sustainability across Southeast Wales. The initiative is a collaboration between the UK Government, Welsh Government, and 10 local authorities, including Cardiff. It aligns with the Plots 4 and 5, Central Square, City Centre, Cardiff by supporting its objectives for economic revitalisation, urban connectivity, and sustainable development.

Table 3-2 - Summary of the Cardiff Capital Region City Deal.

Policy/Guidance	Description	Relevance to Plots 4 & 5 Cardiff
Economic Growth	• Foster innovation and create high-value jobs across the region.	• Provides retail and commercial spaces that attract businesses and support job creation.
Sustainable Transport	• Develop efficient, low-carbon transport systems to reduce car dependency.	• Proximity to Cardiff Central Station supports public transit, walking, and cycling. • Incorporates bicycle storage facilities and pedestrian-friendly design.
Urban Regeneration	• Transform city centres into vibrant, sustainable communities.	• Revitalises Central Square with mixed-use design and public spaces.
Low-Carbon Development	• Promote renewable energy and energy efficiency to achieve net-zero goals.	• Incorporates photovoltaic (PV) panels and energy-efficient building designs, where suitable. • Supports Cardiff's decarbonisation goals by adhering to Part L standards.
Connectivity and Infrastructure	• Improve regional and digital connectivity to boost economic and social integration.	• Strategically located within the Cardiff Central Enterprise Zone, enhancing accessibility.

3.3 STRATEGIC DEVELOPMENT PLAN (SDP)

The Strategic Development Plan (SDP) for the Cardiff Capital Region provides a framework for sustainable growth and regional planning, ensuring cohesive development across the area. It builds upon National Development Framework: Future Wales 2040 (February 2021and aligns with local plans to address housing, employment, infrastructure, and environmental priorities.

Table 3-3 - Key Components of the Strategic Development Plan (SDP).

Policy/Guidance	2025 Future Homes Standard Requirements	Application to Plots 4 & 5 Cardiff
Policy G1: Strategic Growth Areas	• Identifies Cardiff as a core growth area for housing, employment, and infrastructure.	• Plots 4 & 5 aligns by providing housing, retail, and public spaces in the city centre.
Policy S2: Sustainable Transport	• Focuses on reducing car dependency and improving public transport connectivity.	• Proximity to Cardiff Central Station supports active travel and car-free living.
Policy E1: Employment and Skills	• Encourages developments to support job creation and workforce development.	• Provides commercial spaces and generates employment opportunities.
Policy C1: Climate Resilience	• Emphasises renewable energy integration and carbon reduction.	• Incorporates PV panels, where suitable, and efficient heating systems like ASHPs.
Policy B1: Biodiversity and Green Spaces	• Requires developments to enhance biodiversity and integrate green infrastructure.	• Green infrastructure and biodiversity net gain to maximise in line with site constraints and opportunities

3.4 BREEAM CERTIFICATION

BREEAM (Building Research Establishment Environmental Assessment Method) is one of the world's leading sustainability assessment frameworks for non-domestic buildings. The site is targeting BREEAM Excellent Rating for non-residential elements and will be applicable to the pavilion only.

BREEAM certification is a critical component of sustainability planning for non-residential buildings in Wales, with requirements varying based on building floor area:

- **Up to 250 m²:** Exempt from BREEAM requirements.
- **251–1,000 m²:** No BREEAM certification required; however, a 10% improvement over the Target Emission Rate (TER) specified in the current Part L of the Building Regulations is mandated.
- **1,001–2,000 m²:** BREEAM 'Very Good' certification is required, with an 'Excellent' rating specifically for Energy Credits (ENE01).
- **Over 2,000 m²:** BREEAM 'Excellent' certification is required.

These requirements reflect the mandatory regional planning policy for larger non-residential developments, ensuring alignment with Wales's sustainability and decarbonization goals. By meeting these benchmarks, developments contribute to reducing carbon emissions, improving energy efficiency, and enhancing environmental performance.

Key Requirements for BREEAM Excellent:

1. **Energy and Carbon Efficiency:**
    - Minimize energy demand through optimized building fabric, high-efficiency systems, and renewable energy integration.
    - Achieve significant carbon reductions compared to baseline compliance.
2. **Sustainable Materials:**
    - Use responsibly sourced and low-impact materials.
    - Ensure durability and adaptability for future use.
3. **Health and Well-Being:**
    - Maximize indoor environmental quality through effective ventilation, daylighting, and acoustic performance.
    - Incorporate biophilic design principles, if possible.
4. **Water Efficiency:**
    - Reduce water consumption through low-flow fixtures and efficient irrigation systems.
    - Incorporate water recycling strategies, such as rainwater harvesting.
5. **Waste and Resource Management:**
    - Implement waste reduction strategies during construction and operation.
    - Ensure recycling facilities are available for occupants.

4 LOCAL PLANNING POLICY SUMMARY

4.1 Cardiff Local Development Plan (LDP) 2006-2026 & Replacement LDP 2021-2036

The Cardiff Local Development Plan 2006-2026 (2016) provides a framework for sustainable growth and development in Cardiff, addressing housing, infrastructure, environmental protection, and economic growth. It aims to transform Cardiff into a vibrant, sustainable, and inclusive city while addressing current and future needs.

The Replacement LDP 2021–2036 is an updated framework designed to address emerging challenges and opportunities in Cardiff's development, replacing the 2006–2026 plan. It prioritises sustainability, climate resilience, and inclusive urban growth to support Cardiff's vision as a modern, sustainable capital city. It is envisaged this will be formally adopted in April 2026.

Plots 4 and 5, Central Square development aligns with several objectives and policies in the emerging Replacement LDP, particularly regarding sustainable urban regeneration, housing, and transport.

Table 4-1 - Summary of Replacement LDP 2021-2036 applicable to the project.

Policy	Title	Key Guidance	Relevance to Plots 4 & 5 Cardiff
Policy SP1	Delivering Sustainable Growth	Focus on high-density urban developments in strategic growth areas.	Contributes to urban regeneration in the Cardiff Central Enterprise Zone.
Policy SP2	Responding to Climate Change	Mandates decarbonisation and integration of renewable energy systems.	Low zero carbon technologies and energy-efficient systems align with climate goals.
Policy SP4	Affordable Housing	Ensure developments contribute to Cardiff's affordable housing needs.	Evaluates potential for affordable housing contributions.
Policy SP6	Enhancing Biodiversity	Protect and enhance natural habitats and achieve biodiversity net gain.	Green infrastructure and biodiversity net gain to maximise in line with site constraints and opportunities
Policy SP8	Sustainable Transportation	Reduce reliance on private vehicles and encourage public transport and cycling.	Car-free design and proximity to Cardiff Central Station promote sustainable commuting.
Policy SP10	High-Quality Design	Ensure developments meet high standards of design and sustainability.	Mixed-use design integrates residential, retail, and public spaces to foster community.
Policy SP11	Economic Growth	Support Cardiff's economy through job creation and investment.	Commercial spaces provide opportunities for businesses and employment.

4.2 CARDIFF'S SUPPLEMENTARY PLANNING GUIDANCE (SPG)

Cardiff's Supplementary Planning Guidance (SPG) documents provide detailed advice to support the implementation of the Cardiff Local Development Plan (LDP). These documents ensure that developments meet specific goals related to design, sustainability, transport, and environmental considerations.

Table 4-2 - Summary of the Key Objectives of the Cardiff's Supplementary Planning Guidance (SPG).

Tall Buildings SPG	
Objective	• Ensure tall buildings are well-designed and contribute positively to Cardiff's skyline.
Application to Plots 4 & 5	• The project's 50-storey design respects Cardiff's urban context and enhances its skyline. • Considers safety, wind mitigation, and shadowing impacts.
Green Infrastructure SPG	
Objective	• Integrate green spaces and enhance ecological value in developments.
Application to Plots 4 & 5	• Green infrastructure and biodiversity net gain to maximise in line with site constraints and opportunities
Sustainable Transport SPG	
Objective	• Located next to Cardiff Central Station, the project supports car-free living.
Application to Plots 4 & 5	• Includes bicycle storage and pedestrian-friendly pathways.
Waste Collection and Storage Facilities SPG	
Objective	• Ensure developments include efficient waste management systems.
Application to Plots 4 & 5	• Incorporates dedicated waste storage areas for residential and commercial units.

Managing Transportation Impacts SPG	
Objective	• Manage the transport implications of new developments, including parking and accessibility.
Application to Plots 4 & 5	• Complies with reduced parking standards by prioritising sustainable transport options.
Energy SPG	
Objective	• Encourage energy efficiency and integration of renewable energy
Application to Plots 4 & 5	• PV panels (where suitable) and energy-efficient systems reduce operational energy demands.

5 ASPIRATIONAL TARGETS

Rider Levett Bucknall (RLB), accredited and licensed BREEAM Assessors and Fitwel Ambassadors, have been appointed by the Applicant to conduct BREEAM and Fitwel assessments for the site submitted as part of the Planning Application. The site is to be assessed under 3 separate accreditations: BREEAM New Construction Residential for the residential building, BREEAM New Construction UK for the Pavilion, and Fitwel Multi-Family Residential for the entire development.

The aspirational goal is to achieve BREEAM Excellent Rating for non-residential elements and will be applicable to the pavilion only.

BREEAM and Fitwel Preliminary Assessment Reports are available as part of the Planning Application submission. The BREEAM Assessments intend to encourage efficient use of materials and the creation of resilient homes, reduce carbon emissions and protect biodiversity while promoting circular design principles. Additionally, a Fitwel Multi-Family Residential Assessment will cover site-wide Sustainability, Health and Wellbeing Considerations.

The Sustainability Strategy for Plots 4 and 5, Central Square development aligns with the National Development Framework: Future Wales 2040 (February 2021) and the Cardiff Local Development Plan 2006-2026 (2016). This accreditation strategy aims to facilitate the transition to a low-carbon future and upgrade public benefits.

Below are the targets for the site:

- BREEAM New Construction UK for the pavilion with aspirational target of ‘Excellent’ rating and ‘Very Good’ as minimum required. This is a mandatory requirement.
- BREEAM New Construction UK Residential for main tower with aspirational target of ‘Excellent’ rating and ‘Very Good’ as minimum required. This is aspirational only.
- Fitwel Multi-family Residential with aspirational target 3 Stars (maximum available).This is aspirational only.
- Future General Contractor and Sub-Contractors to be registered with Considerate Construction Scheme. This is aspirational only.

6 BASELINE CARBON EMISSIONS – PLOTS 4 & 5 CARDIFF

The baseline energy demand and carbon emissions for the site development will be established through dynamic simulation modelling, based on current regulatory methodologies from Part L (2021) of the Building Regulations.

Energy modelling will be performed using the IES Virtual Environment (VE) suite to assess whole-building performance. For residential units, SAP 10.2 calculations will be conducted using Elmhurst Design software, covering a representative selection of 18 apartment type units. These selected units represent typical layouts and orientations across the 50-storey tower, allowing for reliable extrapolation of the total development's emissions.

For non-residential and communal areas—including corridors and proposed ground-floor commercial spaces—modelling will be undertaken using SBEM (Simplified Building Energy Model) methodology within the IES VE platform. This approach ensures consistent and accurate assessment of regulated energy consumption for non-domestic spaces, in line with compliance requirements.

The modelling will consider both regulated and unregulated emissions across residential and non-domestic areas, including communal corridors and proposed ground-floor commercial spaces. All calculations will be undertaken using an appropriate carbon emissions assessment methodology aligned with Welsh planning policy and guidance, such as those outlined in Planning Policy Wales (PPW) and Net Zero Wales Carbon Budget frameworks.

The modelling strategy will demonstrate:

- Full compliance with Part L 2021 TER/DER/BER requirements
- A targeted ≥35% reduction in regulated carbon emissions over the baseline
- Compliance with Target Fabric Energy Efficiency (TFEE) criteria

7 BE LEAN: DEMAND REDUCTION

To reduce operational energy demand and carbon emissions at source, a 'Be Lean' strategy will be adopted for the proposed development. This will include improvements to fabric performance, energy-efficient building services, and ventilation design that meet or exceed Part L (2021) standards.

7.1 BUILDING FABRIC

The building envelope will be optimised to reduce energy consumption using passive design principles. A façade strategy will be developed to manage solar gain, maximise daylighting, and ensure thermal performance. This includes analysis of U-values, g-values, and shading performance across multiple orientations.

A target U-value of less than 1.0 W/m²K has been set for the windows, to be achieved using triple-glazed units as the baseline. While the initial light transmittance target was 60%, this is difficult to meet with the available coating options, so a revised target of 50% is recommended to maintain supply chain flexibility. The target g-value is understood to be between 0.4 and 0.5, although triple-glazed units with centre-pane U-values as low as 0.5–0.6 W/m²K may result in g-values closer to 0.3, which will be considered during specification.

In line with Part L limiting values, the maximum allowable U-values for building elements are: 0.26 W/m²K for external walls, 1.6 W/m²K for windows, 0.16 W/m²K for roofs, and 0.18 W/m²K for floors. The air permeability shall not exceed 8 m³/h·m² at 50Pa.

7.2 BUILDING SERVICES

Residential Units will incorporate:

- Mechanical Ventilation with Heat Recovery (MVHR) systems, e.g., Nuaire MRXBOX ECO-2 units.
- Water source heat pumps (WSHPs) for space heating and domestic hot water. The WSHPs are connected to a water fed ambient loop system from corridors as part of a 5G communal heating network.
- The WSHPs can reverse cycle to provide chilled water to the apartment; however, the type of emitter needs to be agreed at the next stage of the design.
- 100% low-energy LED lighting with assumed efficacy of 100 lm/W in SAP calculations.

Amenity and Non-Domestic Areas will include:

- Shell & core fit-out for retail/commercial spaces, with future tenant performance managed via landlord agreements.
- Water source heat pumps connected to the central ambient loop. These can provide heating and chilled water to the amenity areas. The heating and cooling can be distributed via fan coil units in the spaces. To be developed in the next stage of the design.
- Low energy lighting with occupancy/daylight sensors and time switches for parasitic load reduction.
- Mechanical Ventilation with Heat Recovery (MVHR) systems
- Centralised Building Management System and intelligent building control

8 OVERHEATING ANALYSIS

In line with best practice guidance and local policy requirements, this section sets out the future approach to reducing overheating risk and limiting reliance on active cooling systems for the proposed development in Cardiff. The strategy will align with the nationally recognised Cooling Hierarchy, which prioritises passive design and energy efficiency.

Dynamic thermal models will be developed in IES VE to assess the overheating risk in both residential and non-residential areas. Simulations will be conducted using the following CIBSE weather files:

- DSY1 2020 High50: Typical warm summer
- DSY2 2020 High50: Short, intense heatwave
- DSY3 2020 High50: Prolonged heat event

All spaces will be evaluated using CIBSE TM52 and TM59 criteria, using a staged approach to apply mitigation measures progressively, in line with the cooling hierarchy.

8.1 PART O COMPLIANCE – DOMESTIC UNITS

Building Regulations Part O aims to reduce the risk of high indoor temperatures in homes by limiting solar gains and ensuring adequate removal of excess heat.

Overheating risk will be assessed using CIBSE TM59, which requires:

- Living rooms, kitchens, bedrooms: ≤3% of occupied hours exceed comfort threshold ($\Delta T \geq 1°C$)
- Bedrooms (10pm–7am): Operative temperature ≤26°C for ≥99% of occupied hours

8.2 TM52 CRITERIA – ADAPTIVE COMFORT FOR NATURALLY VENTILATED SPACES

TM52 outlines three overheating criteria. A room is classified as overheating if two or more criteria fail:

- Frequency: $\Delta T \geq 1°C$ for no more than 3% of occupied hours (May–Sept)
- Severity: Weighted exceedance (We) ≤ 6 per day
- Absolute Temperature Limit: ΔT must not exceed 4°C

Comfort categories (Table 8-1) define acceptable temperature bands. Category II (±3K) will be selected as the target for all domestic spaces.

Table 8-1 - Categories of Building Types within CIBSE TM52

Category	Explanation	Suggested acceptable range (K)
I	High level of expectation only used for spaces occupied by very sensitive and fragile persons	± 2
II	Normal expectation (for all new buildings and renovations)	± 3

III	A moderate expectation (used for existing buildings)	± 4
IV	Values outside the criteria for the above categories (only acceptable for a limited period)	> 4

9 BE CLEAN: HEATING INFRASTRUCTURE

After reducing consumption through energy efficiency measures, the next step will consider low-carbon technologies to further reduce CO_2 emissions.

9.1 CONNECTION TO AN AREA-WIDE HEAT NETWORK

There are no existing or planned heat networks to be constructed within the build programme timescale in the vicinity. Phase two of the city-wide heat network is currently in very early review phase and will not align with required time scales for delivery. Therefore, on-site heat networks are proposed and have been instructed by the site for the planning application:

- A 5G network consisting of air source heat pumps to generate low grade heat at 20 - 25°c.
- An ambient loop of water is circulated around the development, via risers and ceiling voids.
- Water source heat pumps are individually installed for each unit/apartment, uplifting communal ambient loop water source heat for comfort heating and domestic hot water (DHW).
- Rejected heat from cooling loads uplifts the temperature of the ambient loop.

9.2 INDIVIDUAL HEATING SYSTEM

No individual heating systems are proposed; all heating is via communal networks with local in space units as outlined in section 9.1

10 BE GREEN: RENEWABLE ENERGY

A range of renewable energy technologies will be assessed for their feasibility in contributing to on-site energy generation and carbon reduction, in accordance with local planning policies and Welsh Government sustainability objectives. These will cover:

10.1 WIND POWER

Wind power is not proposed. The urban nature of the site, with surrounding buildings causing turbulent wind conditions, renders wind turbines ineffective. Visual, architectural, and aviation constraints further limit their viability.

10.2 BIOMASS HEATING

Not suitable due to its contribution to air pollution, a key concern in designated Air Quality Management Areas (AQMAs), including parts of Cardiff. It also poses logistical challenges in terms of fuel delivery, storage, and maintenance, making it impractical for this site.

Heat pump systems are the preferred technology and take priority over biomass/biofuel heating as aligned to best practice as well as local and national planning policy requirements.

10.3 GROUND SOURCE HEATING/COOLING

While potentially technically viable, the site lacks the required space for ground loops or boreholes required to effectively work without complications. Therefore, ground source systems are not recommended for this development.

10.4 SOLAR THERMAL HOT WATER (STHW)

STHW is not proposed due to limited roof space and the preference for PV systems, if applicable, which offer better winter performance and simpler integration for energy generation.

10.5 AIR SOURCE HEAT PUMPS (ASHPS)

Air source heat pumps are proposed as the primary heat generator for the 5G network to generate low grade heat at 20 - 25°c.

10.6 5G AMBIENT LOOP

A 5th Generation (5G) Ambient Loop is a low-temperature water network, typically maintained at 20–25°C by central air source heat pumps. Water source heat pumps (WSHPs) in apartments and amenity areas extract or reject heat as needed, allowing simultaneous heating and cooling across spaces. This energy-sharing approach reduces central plant demand and supports low-carbon operation, making it the preferred suitable option for consideration.

10.7 PHOTOVOLTAIC (PV) PANELS

A feasibility study will be completed for inclusion of PVs and will identify if any area of roof-mounted panels, on both the main build and pavilion, is available.

10.8 SEASONAL EFFICIENCY

Predicted heating and cooling loads will be modelled using real-world data adjusted for local climate conditions (based on TRY weather files for Cardiff) and typical energy use patterns.

10.9 SYSTEM MONITORING

A full Building Management System (BMS) will be implemented to ensure optimal operation of building services. Sub-metering will follow good practice as per CIBSE TM39. Domestic units will be fitted with smart meters to ensure transparency and minimise the need for physical access.

Table 10-1 – Description of the Low or Zero Carbon Technologies

TECHNOLOGY	PROS, CONS & FEASIBILITY COMMENTS	
AIR SOURCE HEAT PUMP (ASHP) 	**A device which uses heat pump technology to provide heating and cooling, using electricity as a power source. Can be either 'air-to-water' or 'air-to-refrigerant'** ✓ *feasible*	
	PROS ▪ Can serve a significant proportion of heating for certain types of buildings, including offices, airports, sports facilities etc. ▪ Can generate heat and chilled water with a seasonal coefficient of performance > 300%, with favourable conditions. ▪ It can gradually reduce the carbon footprint of the building with the further de-carbonisation of the electricity grid.	**CONS** ▪ Not always effective at providing heat during periods of exceptional cold weather (<-10°C). ▪ Rooftop plant / external plant requirements. ▪ Not fully renewable, since it uses fossil-fuel derived electricity with a high carbon factor. This factor, however, is expected to reduce significantly with the de-carbonisation of the grid. ▪ Expensive system to run, due to the higher tariff of electricity
GROUND SOURCE HEAT PUMP (GSHP)	**Similar to air source heat pumps this technology uses electricity to provide heating and/or cooling for buildings. Ground source heat pumps use the ground as the heat exchanger as opposed to the air** ✗ *Not recommended*	

TECHNOLOGY	PROS, CONS & FEASIBILITY COMMENTS	
	**PROS** ▪ Can serve a significant proportion of heating and cooling demands for certain types of buildings, including offices, airports, sports facilities etc. ▪ Can generate heat energy and chilled water with a seasonal coefficient of performance > 400%	**CONS** ▪ Expensive solution due to the costs associated with excavating boreholes – typically £5-10k per borehole (providing around 5 kW heating and cooling each. ▪ Potential problems associated with installing pipework deep underground, due to leaks/ blockages and cross contamination of heated and cooled elements in ground or aquifer ▪ Payback period can be long (40-60 years).
WATER SOURCE HEAT PUMP 	**Similar to air source and ground source heat pumps, this technology uses electricity to provide heating and/or cooling for buildings. Water source heat pumps use a body of water (a dock, for example) as the heat exchanger as opposed to the air or ground** ✗ *unfeasible (as a primary energy source).* ✓ *feasible (as part of the 5g heat network, using ambient loop heat)*	
	PROS ▪ Can serve a significant proportion of heating and cooling for certain types of buildings, including offices, airports, sports facilities etc. ▪ Can generate heat and chilled water with seasonal coefficient of performance of up to 500%.	**CONS** ▪ Can only produce heat up to around 45°C, therefore hot water usually has to be boosted using gas-fired boilers. ▪ Licences may require (for open abstraction) to extract from/ discharge to water bodies (local Environment Agency for example) which can be a long process. ▪ Must be directly adjacent to a suitable water source otherwise piping can be very complex and costly

TECHNOLOGY	PROS, CONS & FEASIBILITY COMMENTS
PHOTOVOLTAICS 	**Panels or sheets which can generate electricity directly from sunlight, which can be installed on the roofs or facades of buildings, or as a standalone 'array'.** ✓ *feasible (space limited and to be defined at detailed design stage)* **PROS** ▪ **Fully renewable** (energy generated is from sunlight). ▪ Can generate/offset a significant proportion of the building's electricity consumed. ▪ Can be installed on the roof of the building(s). ▪ 'Spare' electricity can be exported/sold back to the local distribution network (national grid), providing this is arranged and the correct equipment is installed. Surplus can also be stored if battery storage is provided. ▪ Electricity generation profile from PVs matches an office's occupancy profile, so most of the energy can be consumed on site. **CONS** ▪ A significant area of clear, unshaded roof space is typically required with access for cleaning and maintenance.
SOLAR THERMAL (WATER COLLECTOR HEATING) 	**Collectors which generate heat directly from sunlight can be installed on the roofs / walls of buildings to make a contribution towards satisfying the domestic hot water demand** ✗ *unfeasible* **PROS** ▪ **Fully renewable** (energy generated is from sunlight). ▪ Can reduce a building's hot water demand by up to 50% and be installed on the roof of the building. ▪ **CONS** ▪ A significant area of clear, unshaded and optimally orientated roof space is typically required with access for cleaning and maintenance. ▪ Normally ineffective during winter and periods of cold weather ▪ Requires centrally generated, stored and distributed heat for hot water provision. ▪ Long term maintenance issues leads to poor life time performance

TECHNOLOGY	PROS, CONS & FEASIBILITY COMMENTS
BIOMASS BOILER 	**A type of boiler which typically uses wood chips, pellets or logs to heat water for space heating and domestic hot water, although other sources of biomass can be used** ✗ *unfeasible* **PROS** ▪ Typically considered renewable (providing sustainable forestry techniques are used and locally sourced). ▪ Can provide very low carbon heating given an appropriate location, within 30-40 miles of a sustainable woodchip source and with suitable access for deliveries and storage. **CONS** ▪ Potentially high maintenance, particularly if woodchip is used. ▪ Not particularly effective when high cooling loads exist on the site – an alternative technology such as ground source heat pumps could serve heating and cooling loads with a single technology. ▪ Efficiencies of up to 100% compared to heat pumps of >300%
5G AMBIENT LOOP 	**A low-temperature water network (typically 20–25°C) that distributes thermal energy via a central loop. Individual water source heat pumps (WSHPs) in apartments and shared spaces extract or reject heat as needed for heating or cooling. The loop is typically maintained by central ASHPs and enables internal energy sharing.** ✓ *feasible* **PROS** ▪ Vert efficient heating and cooling with individual heat pumps per apartment. ▪ Enables energy sharing between units, improving overall system efficiency**.** **CONS** ▪ Requires complex infrastructure and higher installation costs. ▪ Performance depends on electricity and system management.

11 SUSTAINABILITY CERTIFICATIONS AND TARGETS

The aspirational goal is to achieve a BREEAM Excellent Rating. This is mandatory for the pavilion only. BREEAM and Fitwel Preliminary Assessment Reports are available as part of the Planning Application submission. The BREEAM Assessments intend to encourage efficient use of materials and the creation of resilient homes, reduce carbon emissions, and protect biodiversity while promoting circular design principles. Additionally, a Fitwel Multi-Family Residential Assessment will cover site-wide Sustainability, Health, and wellbeing considerations.

The Sustainability Strategy for Plot 4 and 5, Central Square development aligns with the National Development Framework: Future Wales 2040 (February 2021) and the Cardiff Local Development Plan 2006-2026 (2016). This accreditation strategy aims to facilitate the transition to a low-carbon future and upgrade public benefits.

This Energy and Sustainability Statement demonstrates the comprehensive approach to sustainable development for Plots 4 and 5, Central Square, City Centre, Cardiff. The strategy ensures environmental, social, and economic benefits, aligning with Cardiff Council Planning requirements.

11.1 MANAGEMENT

The Applicant will appoint contractors who will prioritise site organisation to minimise impact on neighbouring businesses and the public through implementation of a Construction and Environmental Management Plan. Procedures will be established to ensure site tidiness, effective communication, environmental protection, waste minimization, recycling, site safety, and energy/water control. The sub-contractor will comply with the Considerate Constructors Scheme.

11.2 HEALTH AND WELLBEING

The environmental design of the site aims to provide good visual, thermal, and acoustic comfort with minimal energy use. The design will ensure high levels of natural daylight to support the health and wellbeing of building users.

A Daylight and Sunlight study has been developed to assess natural daylight levels within residential dwellings and neighbouring properties. An Overheating Risk Assessment outlines strategies to mitigate the risk of overheating in regularly occupied zones and will be conducted in due course.

11.3 ENERGY, LOW AND ZERO CARBON ENERGY GENERATION

The development aims to reduce carbon emissions, addressing embodied carbon, construction-related carbon, and operational carbon. The energy strategy demonstrates a comprehensive approach to reducing carbon emissions associated with the proposed development, according to the methodology and approach set out using the energy reduction hierarchy of ‘Be Lean, Be Clean and Be Green’.

11.4 WATER

Site-specific flood risks have been assessed. Low-flow water fittings will be installed where suitable, targeting a 25% reduction in water use over the BREEAM baseline. Minimisation of water usage on site through efficient water fixtures and intelligent controls.

11.5 TRANSPORT

A Transport Assessment and Travel Plan have been prepared, reviewing transport options to and from the site. The Travel Plan includes:

- Accessibility to public amenities and transport links
- High-quality pedestrian routes
- Safety for all users, including those with disabilities
- Cycle storage facilities to promote sustainable travel
- Efficient delivery and access for service/emergency vehicles

11.6 MATERIALS

The development will use materials efficiently and minimise waste. A whole-life approach to building design will reduce material use and future refurbishment costs. Materials will be sourced responsibly, prioritising suppliers with environmental credentials (e.g., FSC timber, BES6001/ISO14001/CARES certification). A Life Cycle Assessment methodology will be used to evaluate environmental impacts, and an Embodied Carbon Reduction Strategy will improve the development’s carbon footprint.

11.7 WASTE

A Construction and Environmental Management Plan is developed to promote resource efficiency and assess material reuse and recycling.

11.8 ECOLOGY

An ecology report has been produced, concluding that the site has ecological value to wildlife. Due to the site's limited potential to support protected or notable species, no further ecological surveys or supervision are recommended for the Proposed Development, although general mitigation measures, including best environmental practice, provision of replacement habitat, and pollinator-friendly planting, should be incorporated to ensure compliance with relevant legislation and planning policy.

11.9 POLLUTION

A Noise Impact Assessment ensures that noise levels are within acceptable limits, and appropriate glazing will be specified to mitigate noise risks. Light pollution will be minimised through time clocks and compliance with ILP. Guidance notes. A Flood Risk Assessment is being undertaken to assess flood risk. An Air Quality

Assessment is being undertaken to assess measures to reduce dust and particulate matter risks during construction.

12 CONCLUSION

The proposed development has been designed to prioritise energy efficiency, carbon reduction, and climate resilience in line with national and local policy objectives. Through a combination of enhanced building fabric performance, efficient building services, and a commitment to passive design principles, the scheme aims to significantly reduce operational energy demand and associated emissions. Beyond core sustainability principles, the scheme will also be evaluated for its potential for affordable housing contribution.

Opportunities for further carbon savings, such as low-carbon technologies, have also been identified and will be developed as the design progresses. The strategy aligns with local and national planning policy, the energy hierarchy, and demonstrates a clear pathway toward compliance with Part L (2021) and broader sustainability goals.

WSP House
70 Chancery Lane
London
WC2A 1AF

wsp.com