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Sustainable Design and Construction Strategy - Oaklands College

October 2025

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VSC Masterplan

240541

Sustainable Design and Energy Strategy

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Sustainable Design and Construction Strategy

1.0 Executive Summary

This Sustainability Statement has been prepared in support of the planning application for the proposed Oaklands College Masterplan Development. It responds to the relevant local, regional, and national planning policies, particularly those set out in the St Albans City and District Council Local Plan 2041, and outlines the strategies adopted to ensure an environmentally responsible, low-carbon, and future ready campus.

The College Masterplan adopts a whole life sustainability approach, placing a strong emphasis on energy efficiency, carbon reduction, water conservation, sustainable drainage, and biodiversity. Environmental considerations have been integrated into all stages of the project, from design through construction and into long term operation.

A key feature of the proposed development is the introduction of a centralised Energy Centre. This facility will provide low carbon heating to both new buildings and refurbished facilities across the campus.

Buildings to be served by the Energy Centre include:

- New Builds: Animal Management, High Needs Centre, Creative Gateway, Film Studio, and the Sports Hall
- New Build Extensions: Refectory
- Refurbished Buildings: Mansion House

This centralised approach supports efficient plant operation, future decarbonisation potential, and improved carbon performance across the campus.

In terms of energy strategy, the development follows low energy design principles, focusing on:

- Passive design through effective building orientation and form
- Enhanced building fabric performance
- Efficient mechanical and electrical systems to reduce operational energy demand

Water efficiency is addressed through the specification of low flow fixtures and fittings across all buildings, ensuring reduced potable water consumption and compliance with best practice targets.

A combination of sustainable drainage systems (SuDS) will be implemented, including green roofs, filter drains, permeable paving, and below ground attenuation tanks. These features will manage runoff sustainably, improve site resilience, and support biodiversity.

A dedicated waste management strategy has been prepared to address both construction and operational waste. This includes provision for appropriate waste segregation, storage, and recycling infrastructure.

In support of wider environmental goals, the scheme will:

- Use environmentally responsible and responsibly sourced materials
- Improve indoor environmental quality by maximising daylight, providing good ventilation, and ensuring thermal comfort
- Support biodiversity through varied, native and nectar rich planting to attract birds, pollinators, and bats
- Maintain good practice standards for external lighting and pollution mitigation

In summary, the Oaklands College Masterplan will deliver a high quality, sustainable development that aligns with the ambitions of the St Albans Local Plan. The proposals demonstrate a commitment to low carbon design, resource efficiency, occupant wellbeing, and long-term environmental responsibility.

2.0 Introduction

2.1 Background

This document has been prepared by CPW LLP on behalf of Oaklands College ("the Applicant") to accompany a Full Planning Application for development and expansion of Oaklands college ("the Application Site") in conjunction with housing developer Taylor Wimpy.

The Oaklands College site lies to the East of St Albans, located off Hatfield Road, as detailed within the Design Access Statement in the planning package.

The application incorporates the demolition of the existing Habitat Centre, Stables, Equestrian Barn, Landmark Building, Amelia Earheart Building, Workshops, Animal Care Unit, Energy Centre, Automotive Centre, LRC and part of Refectory building. With the construction of new Animal Management & Zoo, High Needs, Creative Gateway, Film Studio, Sports/Combat Arena and refurbishment of Refectory and Mansion House.

The re-development scheme 'is committed to integrating Oaklands College's key themes of safety, sustainability, sector scrutiny, stakeholder scrutiny, smart design, strategic planning, and social responsibility into all aspects of its design process. From master planning to detailed design elements, these values are considered at every stage to ensure that the campus not only meets functional requirements but also contributes to a safe, sustainable, and socially responsible learning environment.' DLA Architects.

2.2 Description of the Re-development

The Oaklands College Masterplan shall provide the college with the following new buildings for student learning:

- Animal Management
  A new single-storey, multi-block facility designed to support practical animal care education.
- High Needs Centre
  A dedicated SEND facility that offers a high-quality, inclusive environment for learners requiring significant support.
- Creative Gateway
  A flexible central forum space for exhibitions and performances, a digital learning centre, and modern facilities to consolidate creative disciplines including visual arts, media, and performing arts.
- Film Studio
  A professionally equipped studio space that supports both student learning and potential commercial projects.
- Sports Hall
  A new sports facility designed to competition standards, providing courts for various sports, retractable seating, and inclusive changing and support spaces.
- Refectory
  An extension to the existing learning resource building will be reconfigured into a contemporary dining and social space with the main campus Kitchen as well as catering learning facilities.
- Mansion House
  A refurbishment of the existing mansion house on campus. This historic building will be sensitively restored and repurposed for ongoing educational use.

3.0 Planning Requirements

3.1 Building Regulations Part L2: Buildings other than dwellings

Part L of the Building Regulations enforces minimum standards to ensure that reasonable provision is made for the conservation of fuel and power in buildings by:

a) Limiting heat gains and losses:

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

b) Providing fixed building services which:

- Are energy efficient;
- Have effective controls; and
- Are commissioned.

The BR 2021 mandate the compliance with the following:

- Primary energy rate (kWh/m^2)
- CO_2 emissions (kg/CO_2/m^2)
- Fabric energy efficiency (now requires fabric and airtightness to meet low energy criteria and not rely heavily on LZC.)

A new building must be built to a minimum standard of total energy performance. This is evaluated by comparing calculations of the performance of the “actual building” against calculations of the performance of a theoretical building, called “notional building”.

3.2 The Climate Change Act 2008

The Climate Change Act sets legally binding long-term targets to cut the UK’s carbon, ultimately leading to an 80% reduction in CO2 emissions by 2050. The UK is the first country in the world to set a legally binding target of this nature. It also creates a framework for developing the ability to adapt to future climate change impacts.

3.3 National Planning Policy Framework (2021)

The National Planning Policy Framework (NPPF) document sets out the Government’s planning policies for England and was published in June 2021.

The NPPF is designed to consolidate all policy statements, circulars and guidance documents into a single, simpler National Planning Policy Framework, making the planning system more user-friendly and transparent.

The frameworks’ primary objective is a sustainable development, therefore focussing on the 3 pillars of sustainability. The framework is split into three sections; planning for prosperity (Economic), planning for people (Social) and planning for places (Environmental), each of which outline guidance to tackle issues such as housing, transport infrastructure, climate change, and business and economic development etc.

In regard to climate change, the NPPF supports a reduction in greenhouse gas emissions and the delivery of renewable and low carbon energy. Climate change is covered in Section 14 ‘Meeting the challenge of climate change, flooding and coastal change’. In summary the framework advises:

To support the move to a low carbon future, local planning authorities should:

- plan for new developments in locations and ways which reduce greenhouse gas emissions;

- actively support energy efficiency improvements to existing buildings; and
- when setting any local requirement for a building's sustainability by adopting nationally described standards.

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

  - comply with adopted Local 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.

3.4 EU Energy Performance of Buildings Directive

The EU Energy Performance of Buildings Directive (EPBD) significantly influences planning policy by setting stringent energy efficiency and carbon reduction requirements. Although the UK is no longer in the EU, the directive still impacts best practices, particularly aiming for high sustainability standards or following EU-aligned policies

The EPBD mandates that all new public buildings should be nearly zero-energy (NZEB). This means integrating renewable energy sources, advanced insulation, and efficient HVAC systems during planning.

3.4.1 Display Energy Certificates

Display Energy Certificates and Recommendation Reports are legally required under the Energy Performance of Buildings Directive (EPBD), for all public buildings, that are visited by the public with a floor area over 250m2.

The DEC will show how your building's energy performance compared to the benchmark national average for a building of the same size. While the RR makes recommendations for improvements to the building and energy management techniques to reduce energy use further.

3.5 St Albans City and District Council Planning Policy

St Albans City and District Council's planning policies are designed to manage development in a way that supports sustainable growth, protects the environment, and enhances the quality of life for residents.

Their proposed Local Plan aims to guide development in the area through 2036. The plan focuses on sustainable growth, addressing housing needs, enhancing infrastructure, and protecting the environment. Key elements include:

1. **Housing Development**: The plan outlines areas for new housing, including affordable homes, to meet the growing population's needs.
2. **Economic Growth**: It supports commercial and industrial development to boost local employment and economic activity.
3. **Sustainability**: Emphasis is placed on sustainable building practices, renewable energy, and reducing carbon emissions.
4. **Infrastructure Improvements**: The plan includes proposals for improving transport links, public services, and community facilities.
5. **Environmental Protection**: Policies are designed to protect green spaces, biodiversity, and heritage sites.

The proposed Local Plan has been open to public consultation and review (ending November 2024) to ensure it meets the community's needs and aspirations.

The Oaklands College development shall be required to comply with the following key energy and sustainability policies from the proposed Local Plan.

Strategic Policy SP1 – A Spatial Strategy for St Albans District

The Spatial Strategy for St Albans District aims to ensure the area remains a great place to live, work, and visit by 2041. The Council emphasizes high-quality design that respects local heritage and supports growth with necessary infrastructure, transport improvements, green spaces, and tree planting. The strategy prioritizes sustainable land use, focusing first on developing brownfield sites and addressing the climate emergency through energy and water efficiency and sustainable transport options.

Strategic Policy SP2 – Responding to the Climate Emergency

The Council is committed to addressing Climate Change through both mitigation and adaptation strategies. They support proposals that:

- Reduce whole life-cycle carbon emissions.
- Prioritize the development of previously developed land.
- Improve resilience to climate impacts like higher temperatures, droughts, storms, and heavy rainfall.
- Utilize sustainable locations to minimize travel needs and promote walking, cycling, and public transport.
- Provide on-site renewable energy, high energy efficiency standards, and low carbon energy.
- Encourage sustainable and active travel modes.
- Achieve biodiversity net gain.
- Mitigate flood risks and include Sustainable Drainage Schemes (SuDS).
- Demonstrate tree planting.
- Combine environmental payments through various credits.

These policies are integrated across the plan, addressing sustainable transport, biodiversity, and tree planting.

CE1 – Promoting Sustainable Design, Construction and Building Efficiency

New buildings in St Albans District must be designed for efficient use of energy, water, and materials to reduce greenhouse gas emissions. Applicants need to demonstrate sustainable design and construction through:

- Minimizing carbon, pollution, and energy impacts in new builds, conversions, refurbishments, and extensions.
- Implementing water conservation measures, including greywater recycling and rainwater harvesting, to reduce household water consumption.
- Retrofitting existing buildings to improve energy and water efficiency.
- Using sustainable construction methods and materials with low embodied carbon and recycling demolished materials.
- Minimizing waste through the Circular Economy approach.
- Incorporating Sustainable Drainage Systems (SuDS) in new developments and retrofitting existing buildings.

These measures aim to enhance resource efficiency and resilience to climate change.

CE2 – Renewable and Low Carbon Energy

St Albans City and District Council aim to increase the use of renewable and low carbon energy in the District. Development proposals must demonstrate the maximization of renewable or low carbon energy use. Major developments need to submit an Energy Statement at the planning application stage, detailing how they will incorporate renewable or low carbon energy, with agreed measures secured through conditions.

In line with the St Albans Local Plan Policy CE2 – Renewable and Low Carbon Energy part c):

The Council will support a range of low carbon and renewable energy solutions including, but not limited to, the following:

i. Solar power, including photovoltaic panels, solar thermal heaters, and maximising passive solar heating through south facing designs;

ii. Wind turbines at different scales;

iii. Decentralised District Heating and Energy Networks; and

iv. Heat Pumps.

Strategic Policy SP3 – Land and the Green Belt

The policy also aims to increase employment floorspace and ensure growth is supported by infrastructure such as schools, healthcare, transport facilities, green spaces, sports and leisure facilities, and renewable energy generation. The Council seeks to protect the Green Belt from inappropriate development, making selective boundary adjustments to enhance overall protection.

LG1 – Broad Locations

Proposals within the defined Broad Locations must follow a coordinated, 'master planned' approach involving input from various stakeholders, including local councils and communities. They must adhere to Local Plan policies, demonstrate excellence in design, energy efficiency, and water management, and provide renewable energy solutions. Necessary infrastructure such as transport, community facilities, and green spaces must be delivered timely. They must integrate well with existing transport networks, retain significant trees, and contribute to sports and recreational spaces. Additionally, proposals should address landscape and heritage impacts, establish community stewardship bodies, and co-locate community facilities to encourage active travel modes.

LG4 – Large, Medium and Small Sites

The Council has allocated smaller sites for growth (smaller in scale than Broad Locations), detailed in Part B of the Local Plan. Proposals for these sites must follow several requirements, including:

- Developing Masterplans for large sites in accordance with the District's Strategic Sites Design Guidance.
- Demonstrating a coordinated approach with input from various stakeholders.
- Adhering to Local Plan policies and site-specific requirements.
- Ensuring excellence in design, energy efficiency, and water management.
- Integrating with and improving the existing transport network.
- Enhancing public open spaces and sports facilities.
- Positively relating to surrounding buildings and landscapes.
- Conducting detailed Heritage Impact Assessments for specific sites.
- Considering topography and landscape impacts.
- Co-locating community facilities to reduce travel and encourage active modes of transport.

These requirements ensure sustainable and well-integrated development within the district.

4.0 Proposed Sustainability Strategies and Measures

4.1 Policy SP1 – A Spatial Strategy for St Albans City and District

Strategic Policy SP1 sets out the overarching vision for growth and sustainable development across St Albans City and District. It emphasises the delivery of high-quality places that meet the needs of communities while protecting environmental assets, enhancing infrastructure, and supporting the transition to a low-carbon economy. This includes careful consideration of land use, climate change mitigation, the delivery of infrastructure, and the protection of the Green Belt.

The proposed redevelopment of Oaklands College aligns strongly with the aims of Policy SP1 by contributing to the delivery of a well-designed, sustainable, and future-ready education environment. The Masterplan enhances the role of Oaklands as a key educational provider in the District, improving the quality of facilities while integrating long-term energy, water, and resource efficiency principles.

Keyways in which the project supports the aims of Policy SP1 include:

Low-Carbon Campus Strategy: The introduction of a centralised low-carbon Energy Centre will serve both new and refurbished buildings. This enables a scalable and efficient energy solution that reduces carbon emissions and supports future integration of renewable and low-carbon technologies.

Efficient Land Use within the Green Belt: While the campus lies within the Green Belt, the proposed development focuses on replacing outdated and inefficient buildings with modern, energy-efficient learning environments. This supports the strategic goal of regenerating previously developed land and avoids unnecessary encroachment into undeveloped Green Belt areas.

Support for Infrastructure and Education Needs: The project directly contributes to the District's infrastructure and employment objectives by enhancing educational facilities for post-16 learners, improving the quality of the built environment, and supporting skills development in key sectors.

Climate and Environmental Resilience: The proposals incorporate sustainable drainage systems (SuDS), enhanced biodiversity through ecological planting, and water-efficient measures across all buildings. These interventions reduce environmental impact, support climate resilience, and promote more sustainable campus operations in line with Policy SP1 objectives.

Design and Placemaking: The Masterplan includes rebalancing the campus towards more student-focused outdoor spaces, improving wellbeing, accessibility, and connection to nature. This aligns with the Local Plan's goals for high-quality placemaking and green infrastructure provision.

4.2 Policy SP2– Responding to the Climate Emergency

This Sustainable Design and Construction Strategy has been prepared by CPW to support planning application for the proposed Oaklands College Masterplan Development. This is to demonstrate how the scheme will incorporate energy efficiency measures, decentralised energy sources and Low and Zero Carbon (LZC) technology solutions to reduce the predicted regulated CO_2 emissions of the new buildings.

Particular emphasis will be given to the Energy Hierarchy for reducing carbon dioxide (CO_2) emissions expressed in the following format:

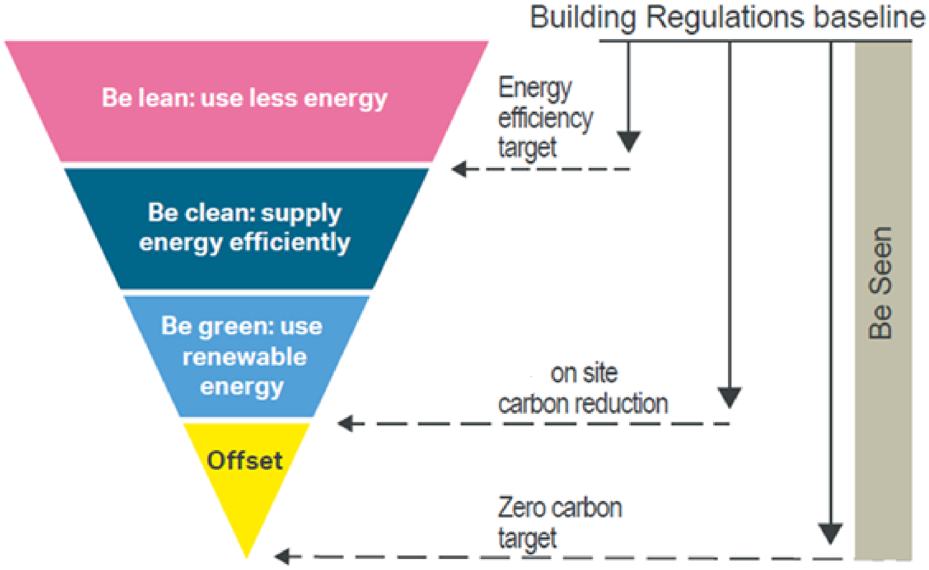

Figure 1 - The energy hierarchy and associated targets *Source: Great London Authority*

4.3 Policy CE1 – Promoting Sustainable Design, Construction and Building Efficiency

In order to deliver an environmentally responsible building, an exemplar approach is being proposed based on low energy design principles.

In summary, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services; such that the building itself is being used as the primary environmental modifier.

Long term energy benefits are best realised by reducing the inherent energy demand of the building in the first instance. These benefits are described in the following sections.

4.3.1 Site Location

The proposed masterplan adopts a holistic site strategy that recognises the importance of placemaking, educational excellence, and community integration. The development prioritises the replacement of legacy buildings that no longer meet current educational standards, delivering teaching environments that respond to future curriculum needs.

Key elements of the strategy include:

- Modernisation of Educational Facilities: Outdated and inefficient buildings will be replaced with contemporary, purpose-built teaching spaces designed to support a modern learning experience.

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- Conservation and Continuity: Existing buildings of historic or ongoing functional value such as the Mansion House and recent development phases will be retained and integrated within the overall site layout.
- Creative Industries Hub: A new Creative Gateway will be developed to provide specialist facilities that support skills and training aligned with Hertfordshire's growing film and television sector.
- Heritage Preservation: The Grade II listed Mansion House will undergo sensitive restoration to protect its architectural and historical value for future generations.
- Enhanced Community Access: The redevelopment will deliver inclusive, accessible areas that encourage social interaction and promote community wellbeing. This includes the creation of a new College Square, upgraded sports amenities, and a revitalised animal care facility with educational and public engagement opportunities.
- Strengthened Campus Identity: The redesigned campus aims to become a focal point for learning and creativity within St Albans, fostering a strong sense of place and local pride.
- Special Educational Needs Provision: A new High Needs Centre will be constructed to accommodate the increasing demand for SEND places in Hertfordshire. These facilities will provide tailored support for students with additional needs within a supportive, local environment.
- Wellbeing and Active Lifestyles: The scheme includes improvements to recreational and sports spaces that will serve students, local sports groups, and the wider community, contributing to both physical and mental health.

In support of sustainability and energy performance goals, the site layout and building design have been developed to make efficient use of available space following demolition. The orientation and form of the new buildings aim to optimise access to natural daylight while mitigating the risk of overheating from excessive solar gain. The massing strategy also considers thermal performance, with a focus on achieving compact forms that reduce the surface area-to-volume ratio, thereby minimising heat losses through the building envelope.

Please refer to the proposed site plans for further details on the spatial layout.

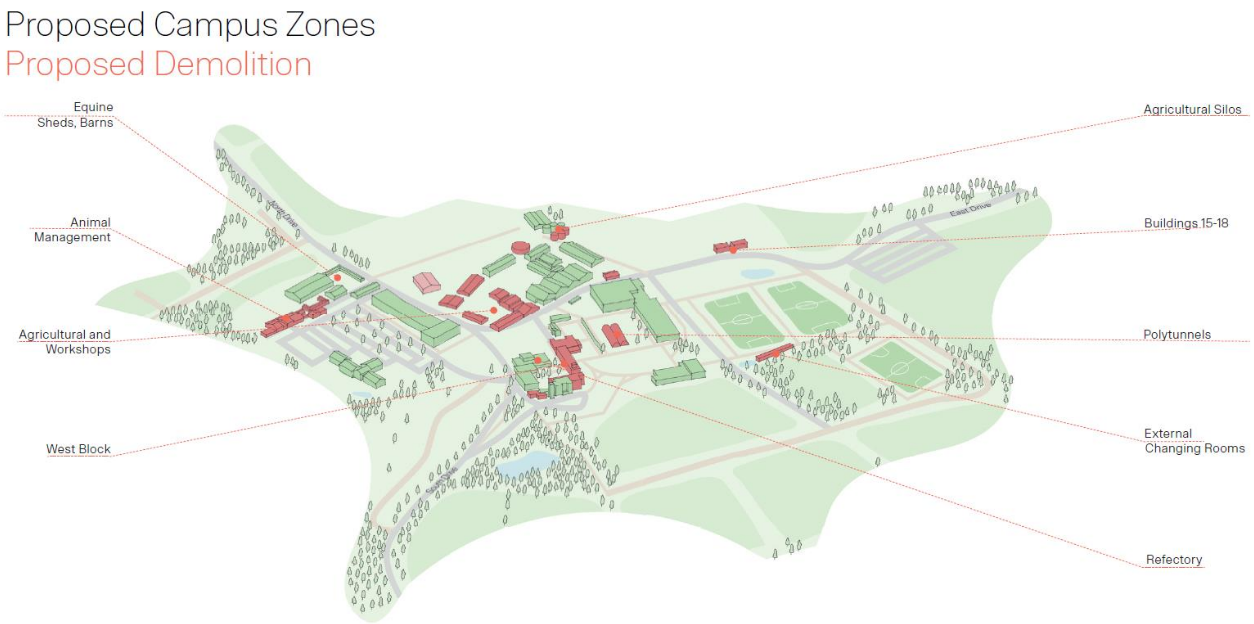

Figure 2 - Proposed Demolition Plan

Figure 3 - Proposed Campus Site Plan

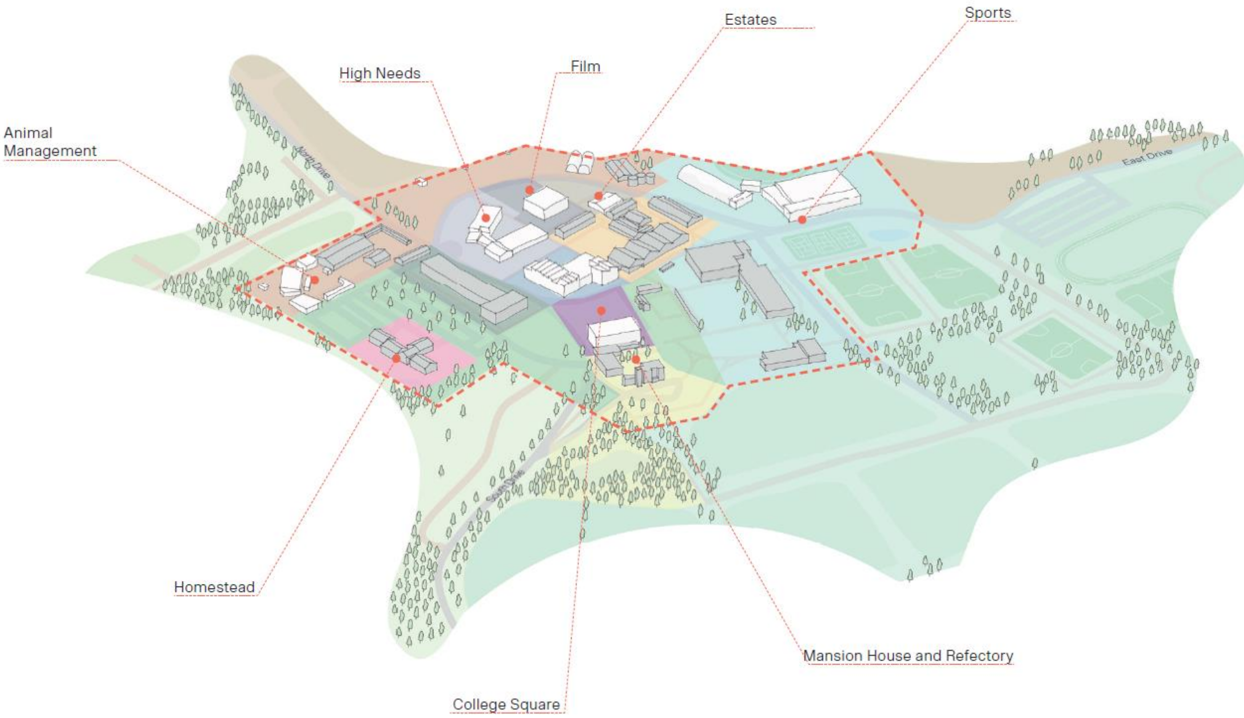

Figure 4 - Proposed Campus Zones

The following is a summary of the proposed buildings:

Animal Management Centre
A new single-storey, multi-block facility designed to support practical animal care education. It will include a visitor-facing reception, an exhibition space, teaching rooms, and specialist small animal areas. Outdoor features such as animal enclosures, an aviary, and quarantine zones will complement learning and enhance biodiversity on site.

High Needs Centre
A dedicated SEND facility that offers a high-quality, inclusive environment for learners requiring significant support. Organised into separate teaching wings with access to sensory spaces, therapeutic areas, and tailored outdoor learning environments, the building is designed to foster independence, comfort, and personal development.

Creative Gateway
This hub will act as a new focal point for the campus, offering a welcoming entrance with a café, informal learning zones, and meeting spaces. It will host a flexible central forum space for exhibitions and performances, a digital learning centre, and modern facilities to consolidate creative disciplines including visual arts, media, and performing arts.

Film and TV Studio
A professionally equipped studio space that supports both student learning and potential commercial projects. The building is tailored for film and broadcast production, offering practical, hands-on experience in alignment with the creative industry's needs.

Sports Hall and Martial Arts Centre
A new sports facility designed to competition standards, providing courts for various sports, retractable seating, and inclusive changing and support spaces. A dedicated first-floor martial arts suite will offer training environments for disciplines such as taekwondo, fencing, and karate, supporting Oaklands' ambition to become a recognised centre for sports excellence.

Refurbished Refectory
The existing learning resource building will be reconfigured into a contemporary dining and social space. The upgraded facility will include diverse eating zones, a modern catering kitchen, student lounges, and quiet areas for relaxation or study. Outdoor seating near the new College Square will encourage social interaction.

Mansion House
This historic building will be sensitively restored and repurposed for ongoing educational use. The refurbishment will retain its architectural significance while improving internal functionality, ensuring the structure remains a valued part of the college's heritage and future.

4.3.2 Be Lean- Reducing Energy Demand through Passive Design

In line with the energy hierarchy, the proposed development for Oaklands College adopts a "Be Lean" approach, focusing on passive design strategies to reduce energy demand at the outset. The design process has prioritised simple yet effective architectural and construction methods to limit the building's reliance on active systems and ensure low baseline energy consumption.

A key starting point was the optimisation of the thermal envelope. Traditional construction methods have been utilised to deliver a robust building fabric that minimises heat loss during the heating season and reduces the risk of overheating during warmer months.

These passive design principles collectively support a fabric-first approach that underpins the energy and sustainability strategy of the campus redevelopment, ensuring that energy efficiency is embedded from the outset.

Sustainable Design and Construction Strategy

The following diagram illustrates the approach the design process has have adopted;

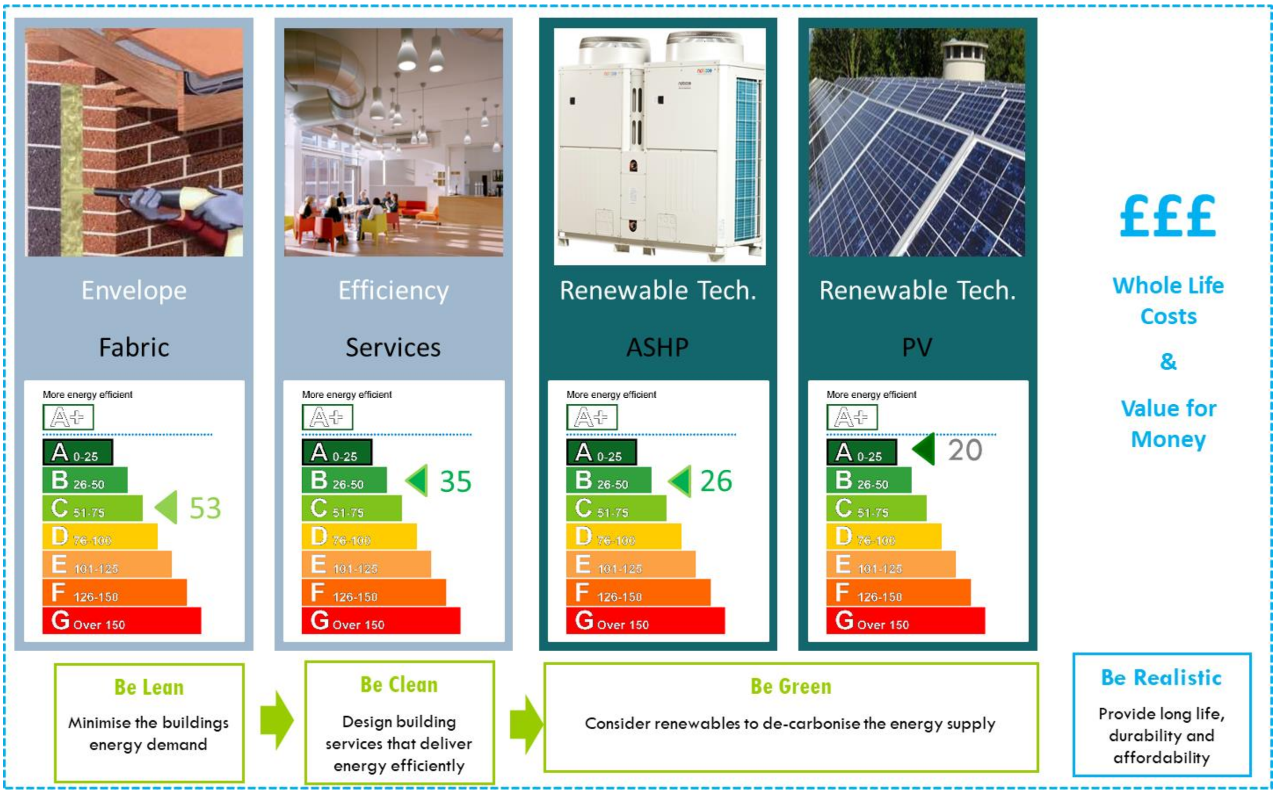

Figure 5 - Proposed RoadMap.

Fabric First Energy Strategy – Thermal Envelope

In support of the "Be Lean" principles outlined in the energy hierarchy, Oaklands College adopts a fabric-first approach as the foundation of its energy efficiency strategy. Prioritising passive design and high thermal performance ensures that the building's inherent energy demand is minimised before relying on active systems or renewable technologies. This approach aligns with our wider sustainability objectives and helps futureproof the development against tightening energy regulations.

The proposed buildings will be constructed with a high-performance building envelope that significantly exceeds the limiting standards set out in Building Regulations Part L 2021. This will reduce heat losses in winter, limit solar gains in summer, and enhance overall thermal comfort for occupants, all of which contribute to lower operational energy use and carbon emissions.

Key aspects of the strategy include:

- Enhanced U-values for roofs, walls, floors, and glazing that improve heat retention and contribute to reduced space heating demands.
- Very low air permeability, targeted between 1.0–3.0 $m^3/h \cdot m^2$ at 50 Pa, which limits uncontrolled infiltration and supports more efficient mechanical ventilation.
- Optimised glazing with improved U-values and selective solar control to balance daylight access with solar gain management, helping to reduce lighting loads and avoid overheating.
- Careful detailing to minimise thermal bridging across junctions and penetrations, improving both performance and durability of the building fabric.

The table below summarises the anticipated building fabric performance compared to current regulatory limits and notional targets:

Table 01 – Proposed Construction Performance Parameters

Elements	BR Limiting Fabric Standards (W/m²K)	Notional/Target Fabric Standards Side-lit (W/m²K)	Proposed U-values for New Buildings (W/m²K)
Roof U-value (flat roof)	**0.18**	**0.15**	**0.12**
Roof U-value (pitched roof)	**0.16**		
External Wall U-value	**0.26**	**0.18**	**0.15**
Ground Floor U-value	**0.18**	**0.15**	**0.10**
All other window, roof window, curtain walling U-value	**1.60**	**1.40**	**1.20**
Rooflight U-value	**2.20**	**2.10**	**1.20**
Pedestrian door U-value	**1.60**	**1.90**	**-**
Air permeability at 50Pa	**8.00**	**3.00 - 5.00**	**1.00 - 3.00**

These performance levels reflect a strong commitment to reducing energy consumption at source. The selection of construction materials and methods will support robust and buildable detailing to ensure these values are achieved on site.

As the design progresses, these values will be optimised through detailed thermal modelling Part L assessments. Further refinement of envelope specifications may be undertaken to optimise both energy performance and cost-effectiveness in line with the overall sustainability and compliance objectives for the development.

4.3.3 Thermal bridging

Thermal bridging is a pathway in the building where heat transfers at a higher rate than in its surrounding. It occurs in every building. Apart from reduced building's energy efficiency, it can create a risk of condensation, moisture and eventually mould build-up. All effort is to be made to reduce the impact of the thermal bridges on the building performance.

4.3.4 Air Tightness

With the improved U-values, air tightness of the building increasingly has a much greater impact on the energy consumption of any building and hence its CO2 emission. The more airtight the building, the less energy is required to heat the building in winter. Part L of the Building Regulations states that air permeability must be less than 8m3/h/m2 @50Pa. Experience working with the regulations has shown that it is usually necessary to make improvements on this figure to achieve Building Regulations compliance, which assumes that a notional building has an infiltration value of 3-5m3/h/m2@50Pa.

4.3.5 Additional Be Lean Active Design Measures

The table below shows some of the 'Be Lean' active design measures incorporated within the MEP systems design to demonstrate our approach.

Items	'Be Lean' Active Benefits
Zoned building services	The building to contain separate zonings to ensure energy is not wasted elsewhere in the facility.
Heat recovery ventilation	The ventilation system to utilise heat recovery ventilation as part of a mixed-mode ventilation strategy that is deployed to maximise energy efficiency.
Automatic monitoring of all energy sub-metering	Out of range alarms shall be triggered when the energy consumption of the building exceeds the typical consumption levels to highlight to the facilities staff that excessive energy use has occurred.
Variable speed pumping	Variable speed pumping on all secondary circuits reduces energy consumption associated with distribution significantly and improves heat pump performance.
Lighting Efficiency	LED's should be used through as a cost effective measure to reduce lighting electrical energy use.
On-demand control to teaching spaces	The room-by-room ventilation, heating and lighting controls ensure that energy efficiency is maximised in every space where the amount of air delivered is variable to suit the space.
Lighting Controls	Within all occupied spaces daylight controls shall be used to limits excessive artificial lighting when sufficient levels can be achieved naturally. Automatic absence control also ensures that lights do not remain on when spaces are empty.

Table 02 - Be Lean Active Design Measures

4.4 The Cooling Hierarchy

The cooling hierarchy of measures shall be followed to reduce the demand for cooling within the development at Oakland College's new higher education buildings. These measures include the following:

Minimising Internal Heat Gains – Pipework will be designed and insulated to minimise heat loss into the building. Additionally, high-efficiency LED lighting and energy-efficient equipment will be specified to reduce internal heat loads.

Reducing Solar Gains – A low G-Value glazing specification has been targeted to minimise solar gains. External shading solutions, such as brise-soleil and vertical fins, will be considered to further mitigate overheating risks while maintaining adequate daylight levels. A good g-value of 0.4 has also been applied to further reduce incoming solar irradiation while still maintaining a high light transmittance of >70%.

To find the most appropriate solution, careful consideration needs to be given to window design to optimise daylight and heat gains in winter and mitigate overheating in summer as per following diagram.

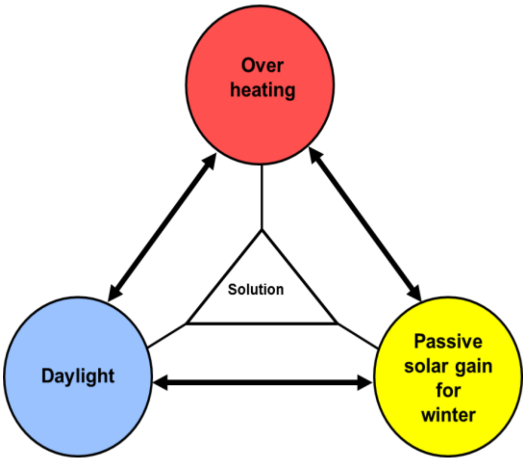

Figure 6 - Window Design Considerations

Thermal Mass – Thermal mass is incorporated through the floor build-up, internal walls and roof, which will comprise of concrete elements within their construction. While suspended ceilings may be required for acoustic control in teaching spaces, further investigation will be undertaken to determine how best to utilise and expose the thermal mass of concrete floors and walls to help regulate internal temperatures effectively.

Passive Ventilation – Natural ventilation strategies will be maximised where feasible, including the provision of openable windows and cross-ventilation in appropriate areas.

Mechanical Ventilation – High-efficiency supply and extract systems will be specified with thermal wheel heat recovery and heater batteries to minimise energy use. The system will also incorporate a 'free cooling' strategy by bypassing the heat recovery unit during summer months when outside air temperatures are lower than indoor conditions, reducing reliance on active cooling.

4.5 Overheating Analysis

Overheating can pose a significant risk to comfort and wellbeing in educational settings, particularly in classrooms and highly glazed areas such as refectories, learning zones, and libraries. In response, the design incorporates passive strategies and follows best practice to limit overheating risk and ensure spaces remain comfortable throughout warmer periods.

The assessment has been carried out in line with the adaptive thermal comfort approach outlined in CIBSE TM52: The Limits of Thermal Comfort, using the TM52 tool within IES to evaluate performance against comfort criteria under current weather conditions.

The methodology is supported by guidance from EN 15251 and CIBSE KS16, which focus on practical strategies to manage and mitigate overheating in non-domestic buildings.

The design is shaped by the Cooling Hierarchy and meets the local policy by maximising passive measures and minimising reliance on mechanical cooling.

Key strategies include:

- Optimised glazing ratios and shading elements to control solar gain while maintaining adequate daylight
- Natural and assisted ventilation strategies, including the potential for night-time cooling
- High-performance building fabric and airtight construction to reduce internal heat build-up
- Zoning and layout designed to limit exposure to overheating in regularly occupied spaces

At this stage, analysis has been based on current weather data. Future climate files (DSYs) have not yet been tested but will be considered at the next design stage to ensure long-term resilience and compliance with overheating mitigation targets. This will help future-proof the building design and maintain occupant comfort as climate patterns evolve.

4.5.1 Design Criteria

The TM52 Adaptive Comfort analysis tool within IES shall be utilised to ensure overheating is limited within the following parameters and apply to all non-teaching, occupied spaces.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September). The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than 3 per cent of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperatures rise and its duration. This criterion sets a daily limit for acceptability. To allow for the severity of overheating the weighted exceedance shall be less than or equal to 6 in any one day.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable. To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed 4K.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

The **BB101 Adaptive Comfort** analysis applicable to teaching spaces is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than 40 hours.

Criteria 2:

In line with the parameters stated under Criteria 2 in the TM52 section.

Criteria 3:

In line with the parameters stated under Criteria 3 in the TM52 section.

The first of these criteria (Criterion 1) defines a minimum requirement for the overheating risk assessment.

The two additional criteria (Criterion 2 & 3) are primarily measures of short-term discomfort and should be reported for information only. If a school design fails to meet the Criterion 2 or Criterion 3 then designers should consider potential overheating mitigation measures and indicate which are viable for the project. The use of these three performance criteria together aims to ensure that the design is not dictated by a single factor but by a combination of factors that will allow a degree of flexibility in the design.

4.5.2 Location Data

Weather File	London_GTWDSY1_2020High50

The weather files are selected based on the site's surrounding characteristics, particularly the number and height of nearby buildings. Since the site is not enclosed by tall structures and lacks a dense urban envelope, the Gatwick weather file has been chosen as it closely reflects the site's actual microclimate.

4.5.3 Internal Heat Gains

Internal heat gains have been assessed across the entire development, comprising **the Refectory, Sports Hall, Creative Gateway, Animal Management, High Needs, Film Studio and Mansion House.**

The calculation of internal loads is based on space function, occupancy density, equipment specifications, and expected operational schedules. Gains have been categorised into occupant, equipment, and lighting contributions, aligned with CIBSE guidance and actual use case data provided.

All buildings are assumed to be occupied five days per week.

The approach is as follows:

Lighting Gains:

- Assumed to be 10 W/m² across all areas, following BB101 guidance.

Equipment Gains:

- Creative Gateway: Based on detailed analysis of actual equipment listed per space (e.g., number of computers, smartboards, specialist equipment).
- All other buildings: Applied as 10–15 W/m² depending on space type, aligned with BB101 guidance.

Creative Gateway

Each space was reviewed for specific equipment loads:

- Studios and Specialist Rooms (e.g., Media Studies, Music Production Suite, IT Rooms):

Equipment gains vary depending on the number and type of devices. For example:

- Media Studies: 25 PCs + Smartboard → ~15 W/m²
- Music Production Suite: 24 Macs + AV control → ~15 W/m²
- Classrooms with 1 PC + Smartboard → ~10 W/m²
- Drama and Dance Studios: Lighting rigs and sound desks → ~10–12 W/m²

Refectory / High Needs Building

Spaces include classrooms, therapy rooms, sensory pods, life skills kitchens, and medical areas.

Occupancy: 2–36 depending on function

Equipment Gains:

- General Rooms (e.g., classrooms, quiet rooms): 10 W/m²
- Specialist Areas (e.g., physio, sensory, kitchens): up to 15 W/m²

Sports Hall

Sports Hall: 2635 m², up to 2700 spectators during events

- Ancillary Spaces: Medical, press, changing rooms, training rooms, etc., with occupancy between 2–25

Equipment Gains:

- General: 10 W/m²
- Media/Press/Hospitality: up to 15 W/m²

Film Studio

Occupancy: 50 (Film Studio) 5 (Seminar/Green Room)

Equipment Gains:

- 15 W/m² (to reflect AV equipment, filming lights, editing gear)

4.5.4 Ventilation Strategy

The ventilation strategy across the campus prioritises passive design, with a strong emphasis on natural ventilation through openable windows. Where passive means are insufficient to maintain indoor comfort and air quality, mechanical ventilation systems have been incorporated and tailored to the use and performance requirements of each building.

Natural Ventilation

Openable windows are the primary means of passive ventilation and summertime heat removal in most buildings. This strategy helps reduce reliance on mechanical systems and supports compliance with BB101 thermal comfort criteria.

Animal Management Building: Utilises fully openable windows fitted with louvres on the external façade. This configuration achieves an estimated 68% free area for ventilation.

High Needs Building: Similarly, classrooms and occupied spaces are fitted with fully openable windows and external louvres, allowing approximately 68% free area.

Creative Gateway: The same window and louvre system is adopted, enabling natural cross-ventilation in most teaching and creative spaces.

Film Studio Building: The majority of spaces are mechanically ventilated; however, the Seminar Room includes openable windows with 100 mm restrictors for controlled passive ventilation.

Refectory: Utilises fully openable windows fitted with louvres on the external façade. This configuration achieves an estimated 90% free area for ventilation when the room temperature is between 22°C to 26°C. The louvres above the windows have been modelled as door and have been kept 80% open.

Sustainable Design and Construction Strategy

Mechanical Ventilation

Mechanical systems are implemented where natural ventilation alone cannot meet comfort or air quality requirements, particularly in spaces with high occupancy or limited facade exposure.

Sports Hall

All windows are fixed, and the building relies entirely on mechanical ventilation via an AHUs system. The system provides:

- 12 l/s/person of fresh air supply.
- Peak lopping mode activates when internal temperature reaches 22°C or above, supplying tempered air at 16°C.
- Night purge is enabled between 10:00 PM and 6:00 AM to remove excess heat, helping to reduce next-day temperatures.

High Needs Building

Each classroom is equipped with a Monodraught HVR Zero APX hybrid ventilation unit. These units support night purging through the windows when the external air temperature exceeds 15°C during nighttime hours.

Other spaces are ventilated at a rate of 12 l/s/person via mechanical means.

Film Studio Building

Occupied spaces are served by mechanical ventilation systems designed to deliver 10 l/s/person.

Animal Management

Mechanical ventilation is provided at a rate of 12 litres per second per person. Multiple ventilation strategies were assessed during design development, with the following approach offering the best results in mitigating the risk of overheating:

- When internal room temperature is below 28°C and higher than the external air temperature, the system introduces external air for ventilation.
- When internal room temperature reaches or exceeds 28°C, a peak lopping strategy is activated, supplying tempered air at 18°C to prevent further temperature rise.
- A night purge strategy is also implemented when the outside air temperature remains above 15°C during night hours (between 10:00 PM and 6:00 AM), helping to reduce internal temperatures ahead of the following day, particularly in classrooms.

Creative Gateway

- The mechanical ventilation system provides 12 litres per second per person of external air. The auxiliary and peak lopping ventilation strategy is controlled based on internal air temperature and carbon dioxide (CO_2) levels, as follows:
- When internal air temperature is greater than 22°C but less than 24°C, or when CO_2 concentration exceeds 1000 parts per million and internal temperature is below 24°C, the system activates auxiliary ventilation to maintain comfort and air quality.
- When internal air temperature exceeds 24°C, a peak lopping strategy is deployed, delivering tempered air at 18°C to help prevent overheating.

Refectory

- The Refectory building employs a mechanical ventilation strategy that supplies 12 litres per second per person of external air when internal room temperatures are maintained between 22°C and 26°C during occupied hours.
- To manage potential overheating, a peak lopping mode is activated when internal temperatures exceed 26°C, delivering tempered air at 18°C to maintain thermal comfort and indoor air quality.

4.5.5 Results

Animal Management

All the occupied spaces pass the TM52 and BB101.

Film Studio Building

Comfort Cooling required to both Film Studio and Green Room spaces to pass TM52

Sports Hall

3 spaces require comfort cooling in order to pass the TM52 Overheating Criteria. All other occupied spaces pass the TM52

High Needs

All the occupied spaces pass the TM52 and BB101.

Refectory

All the occupied spaces pass the TM52.

Creative Gateway

All the occupied spaces pass BB101 and TM52.

The study has established that with the application of passive design measures and the use of the hybrid and natural ventilation systems, the risk of Overheating within the Refectory, Sports Hall, Creative Gateway, Animal Management, High Needs, Film Studio and Mansion House can be greatly reduced with a high level of thermal comfort achieved throughout. The proposed design demonstrates compliance with 2020High50 weather files. To assess resilience under more extreme conditions, both teaching and non-teaching spaces will need to be tested using the 2080 weather files, which represents a global warming scenario. While the building performs well overall to address future warming scenario future adaptations such as external shading devices, increased ventilation rates, lower g-value glazing, or retrofitted cooling coils can be implemented based on evolving user needs.

Refer to Appendix B for BB101 and TM52 Overheating Assessment results spreadsheets.

4.6 Water Efficiency Measures

Water efficiency solutions should focus on reducing potable water demand, improving water reuse, and enhancing leak detection. Here are key strategies to achieve to meet water efficiency measures:

- Low-Flow Fixtures & Fittings
  - Install water-efficient taps, showers, and WCs with flow restrictors and aerators.
  - Use dual-flush toilets
  - Sensor-activated or push taps to minimize wastage.
  - Waterless urinals to eliminate flushing needs.
- Efficient Appliances
  - Dishwashers and washing machines with low water consumption.
  - Install water-efficient kitchen taps with a maximum flow rate of 3-5 L/min

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4.6.1 Water Monitoring & Leak Detection:

- Submetering & Real-Time Monitoring
  - Water meters with automatic monitoring to track usage and detect anomalies.
  - Smart meters linked to a BMS (Building Management System) for real-time alerts.
- Leak Detection Systems
  - Leak detection implemented in mains-fed water systems to prevent excessive losses.
  - Use moisture sensors in critical areas (e.g., plant rooms, kitchens, and WCs).
  - Fit shut-off valves that automatically isolate water supply in case of a leak.

4.7 Waste Management and Circular Economy Approach

The proposed development at Oaklands College is committed to minimising waste generation and promoting a circular economy approach, in line with local and national sustainability policies. This section outlines the measures incorporated to ensure efficient waste management during both construction and operational phases.

1. Circular Economy Principles

The development follows circular economy principles to reduce material waste, increase resource efficiency, and encourage recycling and reuse. This aligns with the local plan's sustainability objectives by:

- Prioritising the use of recycled and sustainably sourced materials in construction.
- Designing for longevity, adaptability, and deconstruction, ensuring materials can be repurposed at the end of their life cycle.
- Minimising material waste through modular construction techniques and efficient procurement strategies.

2. Construction Waste Management

A Construction Waste Management Plan (CWMP) will be implemented to reduce and properly manage waste during the construction phase. Key strategies include:

- Minimising on-site waste through efficient design and prefabrication methods.
- Segregating construction waste for recycling and reuse where possible.
- Setting waste diversion targets, ensuring a high percentage of materials are kept out of landfills.
- Working with suppliers to reduce packaging waste and select materials with minimal environmental impact.

3. Operational Waste Facilities and Management

The development incorporates a sustainable waste management strategy to ensure long-term efficient waste handling for occupants. Measures include:

- Dedicated recycling and waste storage areas to facilitate effective waste segregation.
- Composting facilities to support organic waste management where applicable.
- Clear waste signage and guidance to encourage responsible waste disposal and recycling habits.
- Provisions for future adaptability, allowing for expansion of waste management infrastructure if needed.

4.8 Policy CE2 – Renewable and Low Carbon Energy

A summary of the feasibility process is tabulated below, and an overview of each viable technology is given subsequently.

Renewable and Low Carbon Technologies Feasibility				
Technology	**Brief Description**	**Benefits**	**Issues/Limitations**	**Feasible for Site?**
Solar Photovoltaic	Solar photovoltaic panels convert solar radiation into electrical energy through semiconductor cells. They are not to be confused with solar panels which use the sun's energy to heat water (or air) for water and space heating.	Low maintenance/no moving parts Easily integrated into building design No ongoing costs Income generated from Feed-in Tariff (FIT)	Any overshadowing reduces panel performance Panels ideally inclined at 30° to the horizontal facing a southerly direction	Yes
Solar Thermal	Solar thermal energy can be used to contribute towards space heating and hot water requirements. The two most common forms of collector are panel and evacuated tube.	Low maintenance Little/no ongoing costs Income generated from Renewable Heat Incentive (RHI) scheme	Must be sized for the building hot water requirements Panels ideally inclined at 30° to the horizontal facing a southerly direction	Possible
Ground Source Heat Pump (GSHP)	GSHP systems tap into the earth's considerable energy store to provide both heating and cooling to buildings. A number of installation methods are possible including horizontal trench, vertical boreholes, piled foundations (energy piles) or plates/pipe work submerged in a large body of water. The design, installation and operation of GSHPs is well established.	Minimal maintenance Unobtrusive technology Flexible installation options to meet available site footprint Income generated from Renewable Heat Incentive (RHI) scheme	Large area required for horizontal pipes Full ground survey required to determine geology More beneficial to the development if cooling is required Integration with piled foundations must be done at an early stage	No, not suitable on this site, expensive

Renewable and Low Carbon Technologies Feasibility				
Technology	**Brief Description**	**Benefits**	**Issues/Limitations**	**Feasible for Site?**
Air Source Heat Pump	Electric or gas driven air source heat pumps extract thermal energy from the surrounding air and transfer it to the working fluid (air or water).	Efficient use of fuel Relatively low capital costs	Specialist maintenance More beneficial to the development if cooling is required Requires defrost cycle in extreme conditions Some additional plant space required	Yes
Wind Turbine *(Stand-alone column mounted)*	Wind generation equipment operates on the basis of wind turning a propeller, which is used to drive an alternator to generate electricity. Small scale (1kW – 15kW) wind turbines can be pole or roof mounted.	Low maintenance/ongoing costs Minimum wind speed available *(www.bwea.com)* Excess electricity can be exported to the grid Income generated from Feed-in Tariff (FIT)	Planning issues Aesthetic impact and background noise Space limitations on site Wind survey to be undertaken to verify 'local' viability	No, not suitable on this site
Wind Turbine *(Roof Mounted)*	As above	Low maintenance/ongoing costs Minimum wind speed available *(www.bwea.com)* Excess electricity can be exported to the grid Income generated from Feed-in Tariff (FIT)	Planning issues Aesthetic impact and background noise Structural/vibration impact on building to be assessed Proximity of other buildings raises issues with downstream turbulence Wind survey to be undertaken to verify 'local' viability	No, not suitable on this site

Renewable and Low Carbon Technologies Feasibility				
Technology	**Brief Description**	**Benefits**	**Issues/Limitations**	**Feasible for Site?**
Bio-Renewable Energy Sources *(Automated feed – wood-fuel boiler plant)*	Modern wood-fuel boilers are highly efficient, clean and almost carbon neutral (the tree growing process effectively absorbs the CO_2 that is emitted during combustion). Automated systems require mechanical fuel handling and a large storage silo.	Stable long-term running costs Potential good CO_2 saving Income generated from Renewable Heat Incentive (RHI) scheme	Large area needed for fuel delivery and storage Reliable fuel supply chain required Regular maintenance required Significant plant space required	No, not suitable on this site
Fuel Cells and Fuel Cell Combined Heat and Power	Fuel cells convert the energy of a controlled chemical reaction, typically involving hydrogen and oxygen, into electricity, heat and water vapour. Fuel cell stacks operate in the temperature range 65°C – 800°C providing co-generation opportunities in the form of Combined Heat and Power (CHP) solutions.	Zero CO_2 emissions if fired on pure hydrogen and low CO_2 emissions if fired on other hydrocarbon fuels Virtually silent operation since no moving parts High electrical efficiency Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme	Expensive Pure hydrogen fuel supply and distribution infrastructure limited in the UK Sufficient base thermal and electrical demand required Some additional plant space required Reforming process, used to extract hydrogen from alternative fuels, requires energy; lowering overall system efficiency	No, expensive, emerging technology

Table 3 - Renewable and Low Carbon Technology Feasibility

4.8.1 Solar Panels (Photovoltaic)

Solar photovoltaic panels (PVs) convert solar radiation into electrical energy through semiconductor cells. PVs are available in a number of forms including mono-crystalline, polycrystalline, amorphous silicon (thin film). For maximum yield they should be un-shaded, facing south and installed at an incline of 30º to the horizontal. Mono-crystalline PVs have the highest efficiency, typically around 20%. PV technology is considered feasible on this project and can be incorporated onto the roof level of the building. The PV installation can help generate onsite electricity to support building loads or even be exported to the grid and provide a form of carbon offset.

4.8.2 Wind Turbines

Micro wind turbines are a suitable option for small-scale renewable energy projects, particularly in areas with consistent wind patterns. They are ideal for residential, rural, and remote locations where they can provide a decentralized power source, reducing reliance on the grid. These turbines are relatively easy to install and maintain, making them accessible for homeowners and small businesses. Additionally, they contribute to reducing carbon footprints and promoting sustainable energy practices.

However, there are several considerations to keep in mind when integrating micro wind turbines into a project. The initial cost can be a barrier, although it is generally lower than that of larger wind turbines. Site selection is crucial; the turbines need to be placed in locations with adequate wind speeds to be effective. Urban areas with tall buildings and other obstructions may not be ideal due to turbulence and reduced wind flow. Noise and aesthetic concerns can also be factors, particularly in residential neighbourhoods.

Moreover, regulatory and zoning requirements must be considered before installation. Local regulations may dictate the height and placement of wind turbines, and obtaining the necessary permits can be a lengthy process. It's also important to evaluate the long-term maintenance needs and potential environmental impacts, such as effects on local wildlife. By carefully considering these factors, micro wind turbines can be a viable and effective component of a renewable energy strategy.

4.8.3 Decentralised District Heating and Energy Networks

The use of a 'heat network' has been considered for the Oaklands College site. A heat network is a localised system that distributes heat generated from a central source to multiple buildings within a specific area, such as the Oaklands College site. These networks typically use a combination of renewable energy sources, such as biomass, solar thermal, or heat pumps, and conventional sources like natural gas to generate heat energy. The heat is transported through insulated pipes (typically below ground) to provide space heating and hot water to connected buildings.

The challenge for the deployment of a centralized heat network at Oaklands College is due to the age, thermal performance and costs associated with modifications, of the existing buildings to operate on a heat network. Typically, the existing buildings at Oaklands College are designed to utilise 'high grade' heat energy (around 80°C) to provide space heating and domestic hot water, which is delivered from gas fired appliances (boilers).

The proposed new buildings at Oakland College provide an opportunity to utilise a 'low grade' heat energy, generated from low carbon heat sources, such as air/ground source heat pumps, due to their improved levels of insulation, resulting in low heat demands. Typically, low grade heating appliances generate heat up to 50 °C which, when used in conjunction with appropriate heat emitters, is sufficient to fully heat new buildings.

As the Oaklands College site shall be a combination of buildings requiring 'low' and 'high grade' heat energy, therefore the heat network would need to operate to meet the energy demands of the greatest energy demand building. Therefore, until thermal and heating/domestic hot water system upgrades are undertaken to the retained campus buildings, a 'high grade' energy heat network would be required.

A 'high grade' heat network could be provided using a cascaded heat pump arrangement. In a cascade system, multiple heat pumps are connected in series, to provide temperature stages, to cascade an increase in heating water temperature up to 80°C.

Alternatively, an 'hybrid' system could be utilised, in which heat pumps generate heating water temperatures up to 50 °C, which is then topped up to 80°C using gas fired boilers.

Advantages of Heat Networks

Rationalisation of heating plant across the college's campus. A centralised 'energy centre' would remove the need for individual independent heating systems across the campus buildings, reducing the amount of primary and secondary plant/ancillaries (expansion vessels, pumps, control panels etc.) and their associated operational and maintenance costs.

Improved resilience. Typically, energy centres are designed to incorporate primary plant resilience. Using 'standby' or 'backup' heat generators in the event of failure, to ensure that the heat network shall remain operation in the event of equipment failure.

Heat Networks can use 'hybrid' arrangements which wouldn't be viable at a building level. Combinations of energy sources can be used including, air/ground source heat pumps, combined heat and power (CHP) systems and conventional gas fired boilers. Similarity heat networks provide the opportunity to utilise heat rejection from industrial processes, to serve buildings within their proximity.

Space saving. A heat network offers significant space-saving benefits at the building level. By centralizing the heating system, individual buildings no longer need separate boilers or heating units, freeing up valuable space that can be repurposed for other uses. This is particularly advantageous in densely populated areas like college campuses, where maximizing usable space is crucial.

Disadvantages of Heat Networks

High initial capital costs. Heat networks require higher initial capital expenditure associated with larger capacity centralised plant (typically from a specialist manufacturer), the installation of the heat network below ground distribution pipework (including required groundworks) and the construction of the centralised 'energy centre'. Any return on investment, of choosing a heat network over localised heat generators, would be over a long-term period.

Interdependency of the connected buildings. A centralised approach to heat generation shall require the heat network to operate to meet the requirements of the building with the greatest energy demands. Therefore, in the case of Oaklands College, high grade heat energy shall be required which shall be detrimental to efficiency of the primary heating plant (from utilising a cascade heat pump arrangement) or carbon reductions (through having to utilise gas fired boiler plant).

Specialist Maintenance is required. Typically, due to larger capacities required, heat generators (within energy centres) are manufactured and maintained by specialist contractors. Which could increase ongoing associated maintenance costs for operation of the heat network.

Energy losses associated with the distribution of heat energy over large areas. Modern pipework insulation materials do minimise heat loss from pipework, however a proportion of generated energy is lost through the distribution via underground pipes.

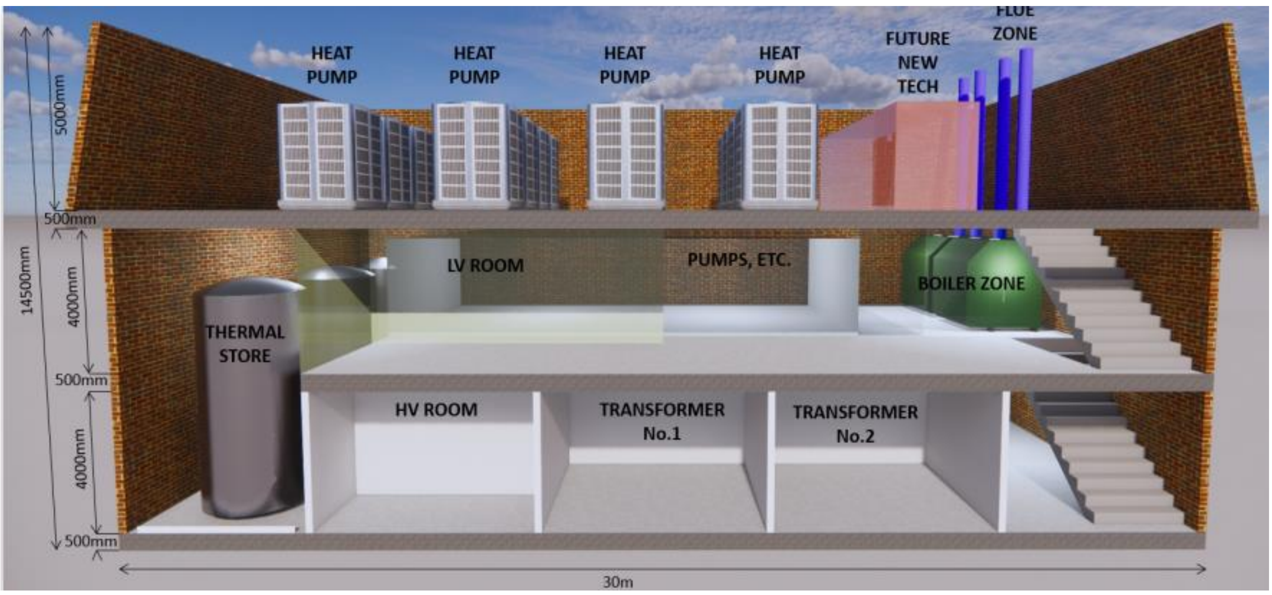


Figure 7 - Example of space planning for an energy centre on a previous CPW project

Heat networks at Oaklands College

The Oaklands College masterplan project presents an opportunity for the deployment of a heat network.

The key to utilizing a heat network shall be through careful planning and design of the energy centre. In the short term the energy centre would be designed to generate low grade heat energy (as discussed above) to allow the network to serve the new buildings.

Once improvements to building fabric and upgrades to heating/hot water systems within existing buildings they could also be incorporated into the heat network in the future to aide the decarbonisation of the campus.

4.8.4 Heat Pumps

An alternative approach to a 'centralised' heat network strategy to the campus, is a 'de-centralised' LTHW heating strategy using Air Source Heat Pumps (ASHP's).

Air source heat pumps using air to water

Space heating would be provided by a low temperature hot water (LTHW) heating system served by air source heat pumps (ASHPs.)

Rooms would receive their heat from underfloor heating (UFH,) radiators, trench heaters, heater batteries mounted in ductwork and air handling plant, over door heaters and fan coil units (FCUs.)

The secondary heating system, which includes the distribution pipework, emitters, pumps and controls would be designed to operate at flow and return temperatures that optimise the system efficiency. This would entail the LTHW flow temperature not exceeding 55ºC and a suitable return temperature to ensure a sensible selection of heat emitter sizes. The design flow and return temperatures for each type of heat emitter would be set at the next stage of design. The difference in flow and return temperature is known at the 'delta T'. In addition, weather compensation would reduce the flow temperature further as far as possible when the outside temperature is warmer to increase efficiency further.

Heat pumps selected for heating systems operate at a very low delta T of around 5ºC. This means that if they are required to operate with a flow temperature of 55ºC, then the heating system return temperature must be above 50ºC. This does not marry with the generally higher delta Ts of the heating system emitters which generally range between 10-25ºC. To mitigate this anomaly, the primary heating system will incorporate a combination of heat pumps, thermal storage and control valves to optimise the performance of the plant.

It should be noted that packaged ASHPs are located externally. The units must be located within a well-ventilated, external compound on the roof or at ground level. It is important to ensure that enough space is maintained between the units and the building and or compound fence to allow liberal heat exchange with the ambient air. Fencing or screening must allow free movement of air and be set a reasonable distance away from the plant to prevent cold air accumulating in winter and permit maintenance access. An internal plant room is also required to house the pumps, controls, thermal store etc. Preferably, in close proximity to the compound.

During certain ambient conditions (generally around 2ºC or less) ASHP units can freeze, and frost will appear on the heat exchanger fins. This is normal and the ASHP will detect this and automatically revert to a defrost cycle to melt the ice build-up. This could happen regularly in winter, and it is possible that the heating to the building will be suspended for 5-10 mins every hour during these times. To mitigate the impact of this, the thermal stores mentioned previously will also be designed to ensure that the flow of heat to the emitters is continuous throughout these defrost cycles. This is common for all ASHPs.

Careful consideration is necessary where heat pumps are being applied to an existing building to replace fossil fuel-based heating systems that operated at a higher system flow temperature. Unless significant thermal envelope improvements have been undertaken to the building, energy costs are likely to be much higher due to the large cost differential between electricity and gas. Electricity is typically 3 to 4 times more expensive than gas, however selection of emitters at low flow temperatures and upgrade of the building envelope can limit or even eliminate this cost penalty. There may also be periods when external ambient temperature is exceptionally low, say below -5ºC, when the indoor temperature could, as a consequence, fall below the design temperature, typically around 21ºC. This is due to the fact that ASHP output reduces significantly at lower external ambient temperature. Building owner and occupant's expectations will therefore need to be managed and occupants may need to adjust their dress code to minimise discomfort.

4.8.5 Predicted Site Heat Demand

Building	Annual Heating Demand MWh	Annual DHW Heating Demand MWh
Animal Management	14.86	13.85
High Needs	55.45	41.90
Film Studio	23.94	2.38
Creative Gateway	81.94	75.98
Sports Hall	85.27	699.83
Refectory	9.31	60.33
Mansion House	307.32	-
Total	578.09	894.28

Table 4 - Building Heat Demand Breakdown

4.9 Carbon Emission Calculation

The energy efficiency measures; efficient district heating system and PVs installations will greatly reduce the carbon emissions of the development as compared to a typical building regulations compliant development. This aligns with both the Local Plan and the sustainable aspirations of the College.

The energy demand and carbon emission of the development were assessed using a dynamic simulation model (DSM). DSM is a method used to demonstrate compliance with Approved Document Volume 2 for non-domestic buildings.

The simulation software used in this study is the computer program IES Virtual Environment (IES-VE), is an approved software to undertake building energy rating calculations in accordance with Part L2 (2021) of the Building Regulations.

The outputs derived from the software were then applied to estimate the baseline energy demands and CO2 emissions from the development.

Weather data used are known as a 'Test Reference Year' (TRY) and are obtained via CIBSE. The weather file used for the dynamic simulation of proposed development was London_TRY.epw, as this is the closest relevant 'TRY' weather file in respect to the proposed site location.

The calculation demonstrates how the scheme will incorporate energy efficiency measures and Low and Zero Carbon (LZC) technology solutions to reduce the predicted regulated CO2 emissions of the development.

4.9.1 Predicted Carbon Emissions and Energy Demand

		Animal Management	High Needs Centre	Film Studio	Creative Gateway	Sports Hall	Refectory
Carbon (kg CO_2/sqm)	Target Emission Rate (TER)	4.83	10.9	6.59	6.22	35.32	19.9
	Building Emissions Rate (BER)	2.8	3.46	3.28	3.7	14.03	7.78
Energy (kWh/sqm)	Notional Energy Consumption by End Use	30.9	48.4	38.45	43.9	168.76	96.62
	Actual Energy Consumption by End Use	28.84	39.96	34.21	38.47	154.7	84.36
Renewables	PV Area (sqm)	140	180	190	500	0	300

Table 5 - Carbon Emission and Primary Energy Use following Part L Assessments

The BRUKL documents presenting the results of the Part L assessments for each of the new buildings are included within Appendix A.

4.10 Policy SP3- Land and the Green Belt

Policy SP3 – Land and the Green Belt focuses on the protection and management of Green Belt land, ensuring that development within or near these areas is carefully considered to prevent urban sprawl, preserve openness, and safeguard the environment. Oaklands College is located within the Green Belt, as indicated in the St Albans City & District Council's planning documents, shown in the figure below:

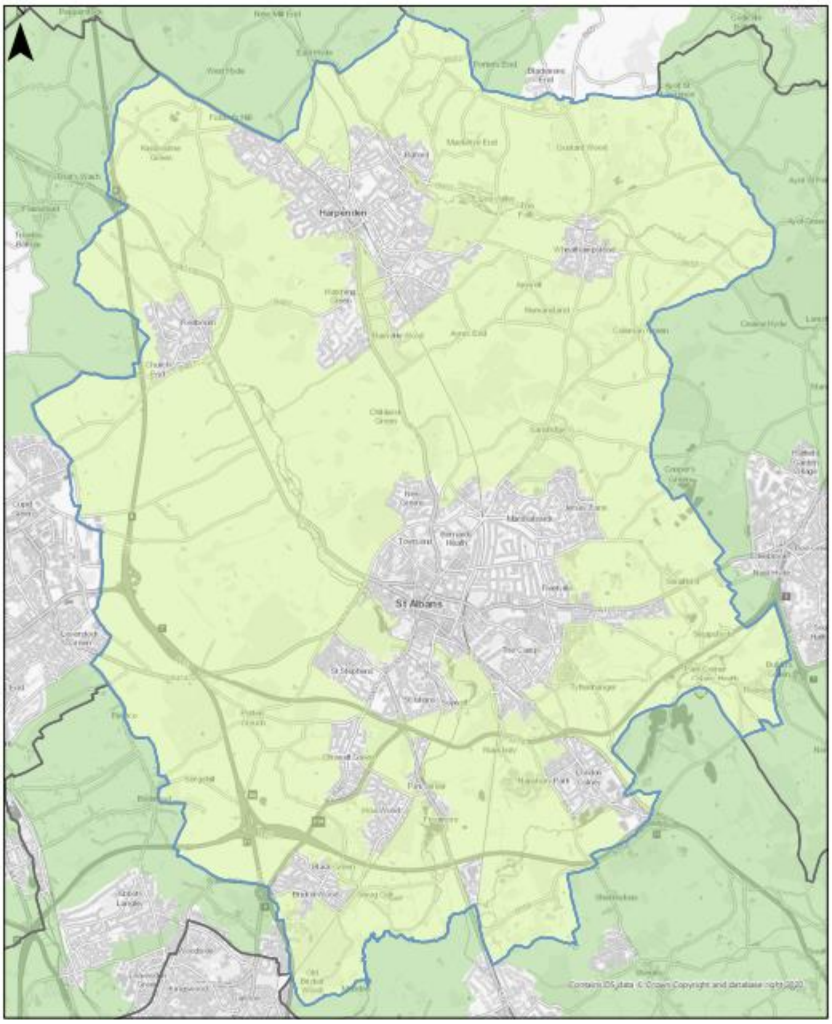


Figure 8 - St Albans Green Belt Review *Source: Green Belt Review 2023 - Report*

The proposed development at Oaklands College has been carefully designed to respect the principles of Green Belt preservation, ensuring that its impact on the openness of the landscape is minimised. The development aligns with the objectives set out in Policy SP3 – Land and the Green Belt by incorporating the following key measures:

Minimising Visual Impact: The massing and scale of the buildings have been optimised to blend with the existing built environment, ensuring that new structures do not dominate the landscape. The positioning of buildings has been carefully considered to avoid breaking important sightlines across the Green Belt.

Landscaping and Green Infrastructure: The proposal includes extensive native tree planting, hedgerows, and ecological corridors to reinforce the rural character of the area and provide natural screening. This approach helps integrate the development into the landscape while enhancing biodiversity.

Low-Impact Design: The use of green roofs, permeable surfaces, and soft landscaping reduces the visual prominence of the built form while supporting stormwater management and ecological resilience.

Material Selection: Sustainable materials with a natural aesthetic will be used to ensure that the buildings complement the existing rural setting. Timber cladding, green façades, and earthy tones will help blend the development into its surroundings.

Lighting Strategy: A sensitive external lighting design will be implemented to prevent light pollution, ensuring that the night-time character of the Green Belt is preserved while maintaining safety and security.

4.10.1 Sustainability and Environmental Considerations

The project integrates a comprehensive sustainability strategy, exceeding minimum regulatory requirements to deliver high environmental performance while supporting the objectives of local and national planning policies. Key sustainability measures include:

1. Energy Efficiency and Low Carbon Design

The buildings will be designed to high energy efficiency standards, incorporating enhanced insulation, airtightness, and passive solar design to reduce operational energy demand.

A fabric-first approach will be adopted to minimise the need for mechanical heating and cooling.

On-site renewable energy generation will be incorporated, including solar photovoltaics (PV) and air-source heat pumps to reduce reliance on fossil fuels.

2. Biodiversity and Ecological Enhancements

The landscaping strategy prioritises biodiversity net gain, incorporating wildflower meadows, pollinator-friendly planting, and habitat creation to support local wildlife.

3. Sustainable Transport and Connectivity

Enhanced pedestrian and cycle infrastructure will be provided to promote active travel.

The site will offer electric vehicle (EV) charging points, supporting the transition to low-emission transport.

Public transport accessibility will be improved, with measures to encourage sustainable commuting options for students and staff.

4.11 Policy LG1 & LG4 – Broad Locations & Large, Medium and Small Sites

Policies LG1 and LG4 of the St Albans Local Plan reinforce the broader sustainability principles set out in SP1–SP3 and CE1–CE2 but apply them specifically to designated development areas such as Broad Locations and larger allocated sites. While these policies share goals with earlier strategic ones, such as high standards in design, energy performance, and environmental resilience, they provide a more detailed framework for ensuring site-wide coordination, stakeholder engagement, and infrastructure delivery.

The Oaklands College redevelopment aligns strongly with the intentions of LG1 and LG4, meeting and exceeding the expectations for comprehensive, sustainable campus planning within a Green Belt context.

Coordinated Masterplan Approach

The development has been designed as a cohesive masterplan, replacing outdated buildings with modern, purpose-built facilities. It responds to educational needs, community integration, placemaking, and climate resilience. Proposals have been developed in close consultation with stakeholders and follow a phased, infrastructure-led delivery model.

Sustainable Design and Construction Strategy

Design Quality and Integration

Architectural quality and contextual sensitivity have guided the design of all new buildings. The proposals maintain a strong sense of place, integrate historic assets like the Mansion House, and respond positively to the site's semi-rural setting through appropriate scale, massing, and materiality. Outdoor areas, including College Square and green corridors, enhance the site's usability, wellbeing, and biodiversity.

Energy Efficiency and Carbon Reduction

The scheme follows a low-carbon, fabric-first approach that exceeds current Building Regulations. Dynamic simulation modelling confirms significant reductions in energy use and regulated carbon emissions. A central Energy Centre, use of air source heat pumps, and roof-mounted PVs support long-term carbon savings and enable future flexibility as technologies evolve.

Water Management and Drainage

Sustainable water use is addressed through specification of low-flow fixtures, sub-metering with leak detection, and efficient appliances. SuDS elements such as permeable paving, green roofs, attenuation tanks, and filter drains contribute to effective surface water management while supporting biodiversity and amenity value.

Alignment with Infrastructure and Sustainability Objectives

The masterplan supports active travel through upgraded pedestrian and cycle routes, EV charging infrastructure, and future public transport integration. These measures reduce reliance on car travel and encourage more sustainable patterns of use.

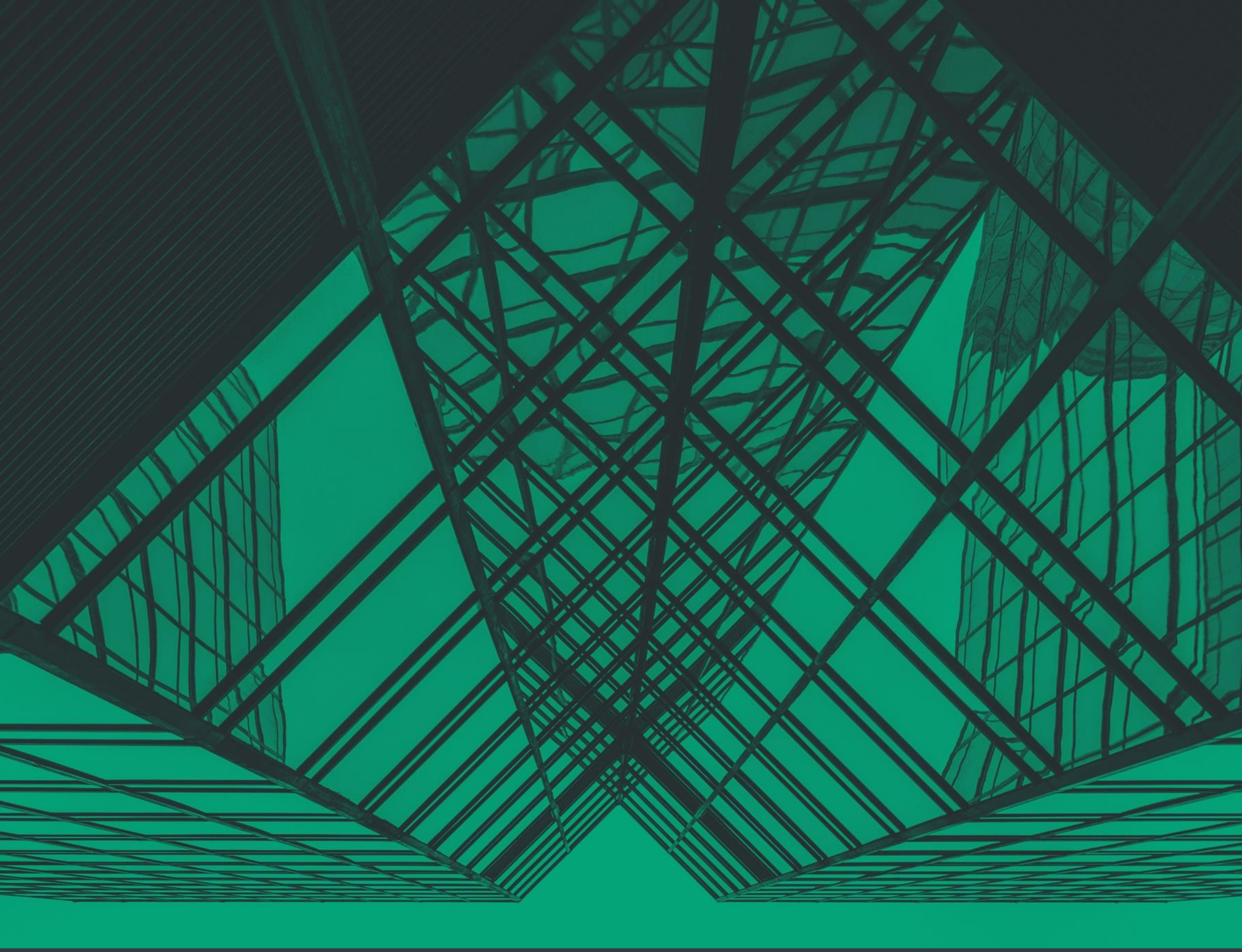
5.0 Summary and Conclusions

The Oaklands College Masterplan sets out a robust, forward-thinking framework for delivering a sustainable and high-performing educational environment aligned with local, regional, and national sustainability objectives. The strategy prioritises a whole life approach to sustainability, integrating low carbon design principles, efficient resource management, and enhanced biodiversity.

Key outcomes and strategic achievements include:

- **Energy and Carbon Reduction:**
  A centralised Energy Centre is proposed to serve both new and refurbished buildings, promoting efficient heating through a high-grade heat network and future ready infrastructure. The "Be Lean" approach has been adopted, with emphasis on enhanced thermal envelope performance, passive design, and energy efficient systems, resulting in significant reductions in operational energy use and carbon emissions.
- **Ventilation and Comfort:**
  Natural and hybrid ventilation strategies have been implemented where feasible, supported by mechanical systems with heat recovery and peak lopping to ensure thermal comfort. Overheating assessments confirm compliance with TM52 and BB101 standards under current climate scenarios, with provisions to test future scenarios.
- **Water Efficiency and Leak Detection:**
  All buildings are designed to minimise water consumption using low flow fixtures, efficient appliances, and intelligent leak detection systems integrated with the BMS.
- **Waste and Circular Economy:**
  A comprehensive construction and operational waste strategy has been developed, focused on reduction, segregation, recycling, and reuse of materials. Circular economy principles are embedded through material selection and adaptability of design.
- **Renewables and Low Carbon Technologies:**
  Viable renewable technologies include solar PVs and air source heat pumps. While options like wind turbines and biomass are deemed unsuitable due to site constraints, decentralised and centralised low-carbon systems are appropriately balanced.
- **Biodiversity and Green Infrastructure:**
  Landscape strategies enhance biodiversity through native planting, SuDS, and ecological corridors, aligning with green belt sensitivities and supporting environmental resilience.
- **Policy Alignment:**
  The scheme aligns with multiple planning policies including SP1–SP3, CE1–CE2, and LG1–LG4, demonstrating excellence in design, sustainability, and community benefit.

Conclusion:
The redevelopment of Oaklands College reflects a clear commitment to long-term sustainability, low-carbon operation, and educational excellence. The proposed strategy not only ensures compliance with planning and regulatory frameworks but also promotes a resilient and resource efficient learning campus for future generations.



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