

SUSTAINABILITY STATEMENT

**21-57 WILLOW WAY
LEWISHAM**

For

Kitewood Estates Ltd



DOCUMENT CONTROL RECORD

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1. INTRODUCTION

This Sustainability Statement has been prepared by Kent Sustainability, an environmental and sustainability specialist, appointed by Kitewood. This statement has been prepared to set out how the 21-57 Willow Way developments responds to national, regional and local policy in support of a planning application for redevelopment of the Willow Way site.

The proposed development consists of 1401m² of employment floorspace and 60 dwellings . By virtue of its size, the proposed development is deemed to be a major development.

The proposed development is located in Upper Sydenham within the London borough of Lewisham and within the Greater London area. The existing site comprises three businesses currently operating, including a vehicle repair / garage, storage / warehouse catering business and a drinks machine repair / servicing business. The sites contain a mix of single storey and double storey buildings with areas of hardstanding, parking, yard areas and shipping containers interspersed between the buildings.



Site Location.

2. Policies and Drivers

2.1. National and International Policy

The Climate Change Act (2008) sets a legally binding target for reducing UK carbon dioxide (CO₂) emissions to zero by 2050. It also provides for a Committee on Climate Change, which sets out carbon budgets binding on the Government for 5-year periods.

The National Planning Policy Framework (NPPF) 2021, reflects the requirements of the Climate Change Act 2008 in paragraphs 153 and 155 as follows:

“Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.”

“New development should be planned for in ways that:

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

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

1. a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
2. b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.”

2.2. Regional Policy: London Plan

The GLA London Plan requires new major developments to reduce their carbon emissions by 100% compared to Part L 2021 Building Regulations standard, with a minimum on-site target reduction of 35%, and an option for any shortfall to net-zero carbon to be offset through a carbon offset payment.

The London Plan is the overall strategic plan for London. It sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2041. It forms part of the development

plan for Greater London. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The key London Plan policies which are relevant to this energy strategy are summarised below:

- Policy SI 2 Minimising greenhouse gas emissions
- Policy SI 3 Energy infrastructure
- Policy SI 4 Managing heat risk

2.2.1. Policy SI 2 Minimising greenhouse gas emissions

Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- i. Be lean: use less energy and manage demand during operation.
- ii. Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
- iii. Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
- iv. Be seen: monitor, verify and report on energy performance.

Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

A minimum on-site reduction of at least 35% beyond Building Regulations is required for major development. Residential development should achieve 10%, and non-residential development should achieve 15% through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1. 1) through a cash in lieu contribution to the borough's carbon offset fund, or
2. 2) off-site provided that an alternative proposal is identified and delivery is certain.

2.2.2. Policy SI 3 Energy infrastructure

Major development proposals within Heat Network Priority Areas should have a communal low- temperature heating system:

- the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
- connect to local existing or planned heat networks
- use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
- use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
- use ultra-low NOx gas boilers
- CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality
- where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

2.2.3. Policy SI 4 Managing heat risk

This policy states that major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1. reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2. minimise internal heat generation through energy efficient design
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. provide passive ventilation
5. provide mechanical ventilation
6. provide active cooling systems.

2.2.4. Local Policy: Lewisham Council

The London Plan is key to Lewisham Council planning policy and should be considered with every planning application.

3. RESPONSE TO LEWISHAM LOCAL DEVELOPMENT FRAMEWORK

Lewisham Local Development Framework Policy	21-57 Willow Way development proposals to meet Sustainability policy requirements:
<p>Lewisham Local Development Framework</p> <p>Core Strategy: Policy 7</p> <p>Climate change and adapting to the effects</p> <p>The Council will adopt a partnership approach to implement the principles of ‘avoidance, mitigation and adaptation’ to reduce Lewisham’s CO2 emissions. This will be achieved by:</p> <ul style="list-style-type: none"> a. raising awareness of climate change issues to promote and incentivise sustainable methods of living and working across the borough b. promoting the sustainable and efficient use of land and improving the integration of land use and transport in accordance with national and regional requirements c. applying the London Plan policies relevant to climate change including those related to: air quality, energy efficiency, sustainable design and construction, retrofitting, decentralised energy works, renewable energy, innovative energy technologies, overheating and cooling, urban greening, and living roofs and walls d. recognising the role that the reuse and modification, where appropriate, of heritage assets can play in securing sustainable development in order to reduce carbon emissions. 	See Appendix 3 Response to London Plan Sustainable Design and Construction SPG.

<p>Lewisham Local Development Framework Policy</p>	<p>21-57 Willow Way development proposals to meet Sustainability policy requirements:</p>
<p>Lewisham Local Development Framework</p> <p>Core Strategy: Policy 8</p> <p>Sustainable design and construction and energy efficiency</p> <ol style="list-style-type: none"> 1. The Council is committed to prioritising the reduction of the environmental impact of all new developments, with a focus on minimising the overall carbon dioxide emissions of the development while improving sustainability aspects through sustainable design and construction, to meet the highest feasible environmental standards during design, construction and occupation. 2. Applications for all new major developments (with a floorspace of 1,000 sq.m or 10 or more residential dwellings) will be required to: <ol style="list-style-type: none"> a. submit a Sustainability Statement and Energy Statement that show how the requirements of London Plan policy and the London Plan SPG Sustainable Design and Construction, or any subsequent document, are met and demonstrate what steps have been taken to minimise the environmental impacts of the proposed development b. maximise the energy and water efficiency measures of the building c. connect to an existing or approved decentralised energy network, safeguard potential network routes, and make 	<p>Core Strategy Policy 8</p> <p>Part 2</p> <p>Development Proposal to provide:</p> <ul style="list-style-type: none"> • 1401m2 Employment floorspace • 60 dwellings. <p>Proposal exceeds the threshold for a major development and thus has a requirement to respond to Policy 8, section 2.</p> <p>Part 2 a-e</p> <ol style="list-style-type: none"> a. See section 3: Response to London Plan Sustainable Design and Construction SPG. See Appendix 1 Energy statement b. Maximise energy and water efficiency. See Appendices 1 & 2. In summary: Carbon emissions within the building will be reduced through an enhanced fabric and energy efficient system. It is proposed that a further reduction will be achieved through the installation of air source heat pumps to serve all of the heating and Domestic Hot Water requirements within each dwelling and the installation of photovoltaic arrays totalling 10 kWp. Commercial units are to be heated via air source heat pumps. c. Connect to decentralised system. See Appendix 2 Energy Statement. In Summary: Having reviewed the London Heat Map it is evident this proposed development is neither within the coverage of an existing district heating network, nor is it within the coverage of a proposed future district heating network. Connection to a district heating network in the short term is therefore not feasible. This site is

Lewisham Local Development Framework Policy	21-57 Willow Way development proposals to meet Sustainability policy requirements:
<p>provision to allow future connection to a network or contribute to its development, where possible within the Regeneration and Growth Areas</p> <p>d. integrate on-site renewable energy generation into the design of a building to ensure CO2 emission reductions are maximised</p> <p>e. fully contribute to CO2 emission reductions in line with the regional and national requirements, and make a financial contribution to an offset fund if this cannot be adequately achieved on site.</p> <p>3. All new residential development (including mixed use) will be required to achieve a minimum of Level 4 standards in the Code for Sustainable Homes from 1 April 2011 and Level 6 from 1 April 2016, or any future national equivalent.</p> <p>4. All minor and major non-residential development will be required to achieve a minimum of Building Research Establishment Environmental Assessment Method 'Excellent' standard, or any future national equivalent.</p> <p>5. The Council supports and encourages the retrofitting of energy saving and other sustainable design measures in existing housing and other development particularly estate renewal, having considered any harm to the significance of historic assets.</p>	<p>however in a Heat Network Priority Area. Heat Network Priority Areas identify where in London the heat density is sufficient for heat networks to provide a competitive solution for supplying heat to buildings and consumers. As there is a possibility that a district heating network will be installed in the vicinity of the site at some point during the lifetime of the building, the detailed design of the building will seek to incorporate the infrastructure required to connect to such a network.</p> <p>d. On site renewable energy. See Appendix 2 Energy Statement. In Summary: Both domestic and non-domestic parts of the building will have heating and domestic hot water provision made by air source heat pumps. In addition a photovoltaic array totalling 10 kWp will be provided to the roof areas.</p> <p>e. Contribute to Co2 emissions reduction. See Appendix 2 Energy Statement.</p> <p>Part 3</p> <p>Code for Sustainable Homes Standards incorporated into current building regulations via the national technical standards. Optional level 110 l/p/d water consumption to be met within the domestic units.</p> <p>Part 4</p> <p>Non-residential elements of the building, i.e. ground floor and mezzanine level to be constructed to shell and core without any fit out and as such can be assessed and certificated as BREEAM Very Good as</p>

<p>Lewisham Local Development Framework Policy</p>	<p>21-57 Willow Way development proposals to meet Sustainability policy requirements:</p>
	<p>confirmed by Core Strategy Policy 8 bullet 4. BREEAM pre-assessment held at appendix 2.</p> <p>Part 5</p> <p>Retrofit not appropriate. All existing building to be demolished and recycled where appropriate as part of the development.</p>
<p>Lewisham Local Development Framework</p> <p>Development Management Local Plan: Policy 22</p> <p>Sustainable design and construction</p> <p>1. In addition to those policies in the London Plan and Lewisham’s Core Strategy Policies 7 and 8, the Council will require all developments to maximise the incorporation of design measures to maximise energy efficiency, manage heat gain and deliver cooling using the following hierarchy:</p> <ul style="list-style-type: none"> a. passive solar design to optimise energy gain and reduce the need for heating b. passive cooling design and natural ventilation to slow heat transfer and remove unwanted heat c. mixed-mode cooling, with local mechanical ventilation/cooling provided where required to supplement the above measures, using (in order of preference) low 	<p>Development Management Local Plan: Policy 22</p> <p>Part 1</p> <p>Discussed further within Energy Strategy report held at appendix 2.</p> <p>Part 2</p> <p>Not applicable, no conversion works. All existing building to be demolished and recycled where appropriate as part of the development.</p> <p>Part 3</p> <p>Not applicable, no domestic extensions.</p> <p>Part 4</p> <p>Not applicable, no non-residential extension or conversion work.</p>

Lewisham Local Development Framework Policy	21-57 Willow Way development proposals to meet Sustainability policy requirements:
<p>energy mechanical cooling followed by air conditioning, and</p> <p>d. full-building mechanical ventilation/cooling systems using (in order of preference) low energy mechanical cooling followed by air conditioning.</p> <p>2. For conversions to residential from other uses, the Council will encourage cost effective and proportional energy efficiency measures to be carried out where feasible to a value not exceeding 10% of the overall construction costs.</p> <p>3. For minor residential extensions, the Council will seek to deliver the highest BREEAM standard provision possible for the new part and will encourage improvement of the existing house to be carried out where feasible using energy efficiency measures.</p> <p>4. For non-residential extensions and conversions, the Council will seek to deliver the highest BREEAM standard provision possible for both the new and existing parts of the development. Evidence will be required to justify the standard proposed.</p> <p>In relation to Core Strategy Policy 8 bullet 4, the Council recognises that some industrial (B2 and B8) uses may not be able to provide a minimum of BREEAM 'Excellent' standard, as they are delivering only the 'shell and core' of the building and not a full fit out. In these circumstances the Council will seek to secure the maximum points possible for those sections of the BREEAM assessment that are relevant to delivering the 'shell and</p>	

Lewisham Local Development Framework Policy	21-57 Willow Way development proposals to meet Sustainability policy requirements:
core' and as a minimum, at this stage, the overall BREEAM rating should be 'Very good'. The Council will encourage the use of Allowable Solutions to assist in this process.	

APPENDIX 1: ENERGY STATEMENT

ENERGY STATEMENT

**Proposed development at:
21-57 Willow Way (Site A), Lewisham, London, SE26**



Demolition of existing buildings and redevelopment to provide employment floorspace (Use classes E(g)(i)(ii)(iii)) and residential dwellings including affordable housing and amenity space.

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¹ Achieve Green and Energytest are trading names of Energytest (Commercial) Ltd, Company Registration No. 7013944

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1. Executive Summary

This Energy Statement has been prepared by Achieve Green in support of a full planning application for new-build mixed use development of 1,401m² of workshop / office space and sixty flats at 21-57 Willow Way (Site A), Lewisham, London, SE26.

The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.

A base case has been developed, against which potential savings can be assessed. For this development the base case is the notional building developed for the Building Regulations (2021) assessment and is quantified in terms of CO₂ emissions as the Target Emission Rate (TER) for the building(s).

This proposed development features improved insulation standards when compared against the compliance requirements of Approved Documents L1 and L2 2021 of the Building Regulations. In addition, this proposed development will incorporate a mechanical and electrical specification that surpasses the requirements of Approved Documents L1 and L2 2021. These combined energy efficiency measures lead to a reduction in CO₂ emissions equivalent to 10% of the baseline for the domestic part of the development and 17% of the baseline for the non-domestic part. These meet the target reductions of 10% and 15% respectively, as required by the London Plan.

Having minimised energy consumption in the first instance, the efficient delivery of the remaining energy demands has been considered with reference to the heating and cooling hierarchy in the London Plan. Using the London Heat Map as reference it is evident this proposed development is neither within the coverage of an existing district heating network, nor is there an expectation that a district heating network will be developed at this site in the near future.

Due to its size, this development is not suitable for combined heat and power.

An assessment has been carried out to determine the potential for renewable energy systems to reduce CO₂ emissions further. In order to meet the expectations of the planning policy, the proposal is for air source heat pumps to be installed to meet each of the dwellings heating and Domestic Hot Water demand and a photovoltaic system to be installed on the available roof area of the building. Commercial units are to be heated via air source heat pumps. This development will seek to achieve a reduction in CO₂ emissions equivalent to 57% of the baseline through the installation of air source heat pumps and a 10 kWp PV system.

The total reduction in carbon emissions resulting from energy efficiency measures and the installation of renewable technology is 68% for the domestic part of the development and 56% for the non-domestic part. This surpasses the target reduction of 35%, as required by the London Plan.

A 100% reduction in CO₂ emissions is to be achieved by way of a cash in lieu payment² to the London Borough of Lewisham of £61,328.

2. Introduction

Energy use in buildings is a significant contributor to global CO₂ emissions and global warming. Designing energy efficient buildings and incorporating low and zero carbon energy generation is a vital part of ensuring this development incorporates sustainability as a core part of its design.

This report is produced in line with the requirements of the document “Energy Assessment Guidance - Greater London Authority guidance on preparing energy assessments as part of planning applications (June 2022)”.

The purpose of the report is to assist evaluating parties to understand the energy consumption and performance of the proposed development and consider its performance against the “lean, clean, green” performance standard.

This application seeks by its design to surpass the CO₂ emission target of the baseline by 35% of the regulated energy consumption.

2.1. Overview of the proposed development

The existing site comprises three businesses currently operating, including a vehicle repair / garage, storage / warehouse catering business and a drinks machine repair / servicing business. The sites contain a mix of single storey and double storey buildings with areas of hardstanding, parking, yard areas and shipping containers interspersed between the buildings. The proposed development consists of 1,401m² of workshop / office space and sixty flats. By virtue of its size, the proposed development is deemed to be a major development.

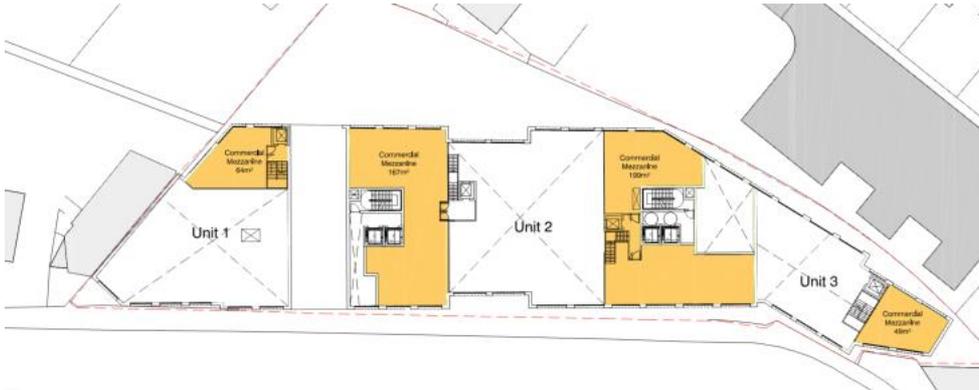
The proposed development is located in Upper Sydenham within the London borough of Lewisham and within the Greater London area.

Proposed ground floor plan:



² Calculated based on a Carbon Offset Price of £95 per tonne for 30 years.

Proposed mezzanine plan:



Proposed first floor plan:



Proposed fourth floor plan:



3. Policies and Drivers

3.1. National and International Policy

The Climate Change Act (2008) sets a legally binding target for reducing UK carbon dioxide (CO₂) emissions to zero by 2050. It also provides for a Committee on Climate Change, which sets out carbon budgets binding on the Government for 5-year periods.

The National Planning Policy Framework (NPPF) 2021, reflects the requirements of the Climate Change Act 2008 in paragraphs 153 and 155 as follows:

“Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.”

“New development should be planned for in ways that:

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

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

- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.”

3.2. Regional Policy: London Plan

The GLA London Plan requires new major developments to reduce their carbon emissions by 100% compared to Part L 2021 Building Regulations standard, with a minimum on-site target reduction of 35%, and an option for any shortfall to net-zero carbon to be offset through a carbon offset payment.

The London Plan is the overall strategic plan for London. It sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2041. It forms part of the development plan for Greater London. London boroughs’ local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The key London Plan policies which are relevant to this energy strategy are summarised below:

- Policy SI 2 Minimising greenhouse gas emissions
- Policy SI 3 Energy infrastructure
- Policy SI 4 Managing heat risk

3.2.1. Policy SI 2 Minimising greenhouse gas emissions

Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- i. Be lean: use less energy and manage demand during operation.
- ii. Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
- iii. Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
- iv. Be seen: monitor, verify and report on energy performance.

Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

A minimum on-site reduction of at least 35% beyond Building Regulations is required for major development. Residential development should achieve 10%, and non-residential development should achieve 15% through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

- 1) through a cash in lieu contribution to the borough's carbon offset fund, or
- 2) off-site provided that an alternative proposal is identified and delivery is certain.

3.2.2. Policy SI 3 Energy infrastructure

Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system:

- 1) the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
 - a) connect to local existing or planned heat networks
 - b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
 - c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
 - d) use ultra-low NOx gas boilers

- 2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality
- 3) where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

3.2.3. Policy SI 4 Managing heat risk

This policy states that major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1. reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2. minimise internal heat generation through energy efficient design
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. provide passive ventilation
5. provide mechanical ventilation
6. provide active cooling systems.

3.2.4. Local Policy: Lewisham Council

The London Plan is key to Lewisham Council planning policy and should be considered with every planning application.

3.2.5. Project policy

Planning policy leads to an on-site target reduction equal to:

- 10% (for the domestic part of the development) and 15% (for the non-domestic part) below those of a development compliant with Part L 2021 of the Building Regulations through energy efficiency measures alone ("Be Lean" stage); and
- 35% of the Regulated CO₂ emissions compared to the baseline through the application of the Energy Hierarchy.

Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall (including to net-zero carbon, where applicable) will be provided off-site or through a cash in lieu contribution to the relevant borough.

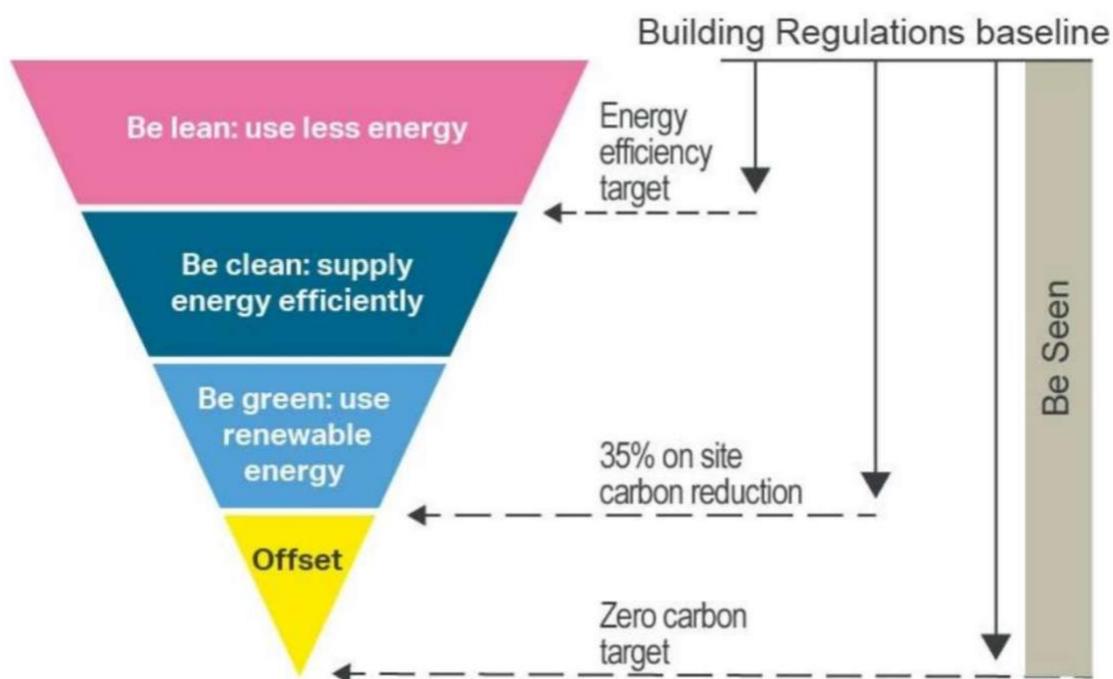
3.2.5.1. Designing for thermal comfort

All flats within the development will be designed to achieve full compliance with Approved Document O: Overheating mitigation. An assessment of overheating risk will therefore form part of the detailed design of the development.

4. Energy hierarchy

In line with best practice the proposed energy strategy for this development will follow the principals of the energy hierarchy.

The energy hierarchy has three priorities, seeking to reduce energy use before meeting remaining demand by the cleanest means possible:



- 1) Be lean – use less energy: Optimise the building fabric, glazing, and structure to minimise energy consumption in the first instance by using low U-values and good air tightness, and ensure that active systems run as energy efficiently as possible.
- 2) Be clean – supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible, such as combined heat and power (CHP).
- 3) Be green – use renewable energy: When the above design elements have been reasonably exhausted, supply energy through renewable sources where practical.

5. Establishing the baseline

For buildings that are wholly new in construction, the baseline is the Target CO₂ Emission Rate (TER) from Approved Document L1 (domestic) and L2 (non-domestic).

The baseline calculations are based on buildings that are the same size and shape as the proposed buildings and have the same exposed facades.

6. Energy efficient design measures (“be lean”)

Enhancing the thermal performance of the building envelope helps to future-proof the structure and also yields the greatest CO₂ savings. Adding renewable technology will then yield maximum carbon reductions with lower long-term costs for the developer.

6.1. Domestic development

The proposed development will achieve compliance with Approved Document L1 of the Building Regulations (2021) without reliance on the contribution of renewable technology³.

The following energy-efficient design measures are proposed:

	Proposed development	L1 2021 requirements
External wall U-value (W/m²K)	0.16	0.26
Sheltered wall U-value (W/m²K)	0.14	0.26
Roof U-value (W/m²K)	0.11	0.16
Exposed floor U-value (W/m²K)	0.11	0.18
Window U-value (W/m²K)	0.80	1.60
Air permeability	4 m ³ /h.m ²	8 m ³ /h.m ²
Thermal bridging	Y=0.07	Y=0.20

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and electrical systems with efficiencies that surpass the requirements of Approved Document L1 2021:

	Proposed development	L1 2021 requirements
Lighting efficacy	80 lm/W	75 lm/W
Heating controls	Time and temperature zone controls	Programmer, thermostat and TRVs.

6.1. Non-domestic development

³ Under Approved Document L1 2021, the notional dwelling specification that is used to calculate the TER includes on-site renewable generation from PV. For the purpose of estimating savings from "Be Lean" measures only, the DER calculation for this stage of the energy hierarchy includes PV savings matched to the notional dwelling.

The proposed non-domestic development will achieve compliance with Approved Document L2 2021 without reliance on the contribution of renewable technology⁴.

The following energy-efficient design measures are proposed:

	Proposed development	L2 2021 requirements
Ground floor U-value (W/m ² K)	0.11	0.18
External wall U-value (W/m ² K)	0.17	0.26
Roof U-value (W/m ² K)	0.13	0.16
Window U-value (W/m ² K)	1.40	1.60
External door U-value (W/m ² K)	1.20	1.60
Air permeability	3.0 m ³ /h.m ²	8 m ³ /h.m ²

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and electrical systems with efficiencies that surpass the requirements of Approved Document L2 2021:

	Proposed development	L2 2021 requirements
Lighting efficacy	115 lm/W	80 lm/W
Lighting controls	Photoelectric dimming	Manual switching
Mechanical ventilation with heat recovery	SFP 1.0 W/l/s, heat recovery 80%	SFP 2.0 W/l/s

7. Energy efficient systems (“be clean”)

7.1. Combined heat and power

Combined heat and power (CHP) systems use relatively cheap and clean fuels (such as natural gas) to generate heat and electricity on site. A typical CHP system uses combustion of natural gas to drive a turbine that produces electricity. The heat generated is captured and used to produce hot water.

As losses are minimised the carbon footprint of the energy generated is very low. However this is dependent on there being sufficient year-round local heat demand to fully utilise the heat generated by the CHP plant. An example would be developments of at least 500 dwellings, universities or hospitals.

Due to its size, this development is not suitable for combined heat and power.

7.2. District heating networks

In a district heating network heat is supplied from one or more central energy centres to multiple buildings within the network. Supply to multiple buildings guarantees high year-round local heat demand which in turn allows the

⁴ Under Approved Document L2 2021, the notional building specification that is used to calculate the TER can include on-site renewable generation from PV. For the purpose of estimating savings from “Be Lean” measures only, the BER calculation for this stage of the energy hierarchy includes PV savings matched to the notional building.

use of low carbon technologies within the energy centre, such as combined heat and power systems. Large plant and aggregated demand allows systems within the energy centre to run more efficiently.

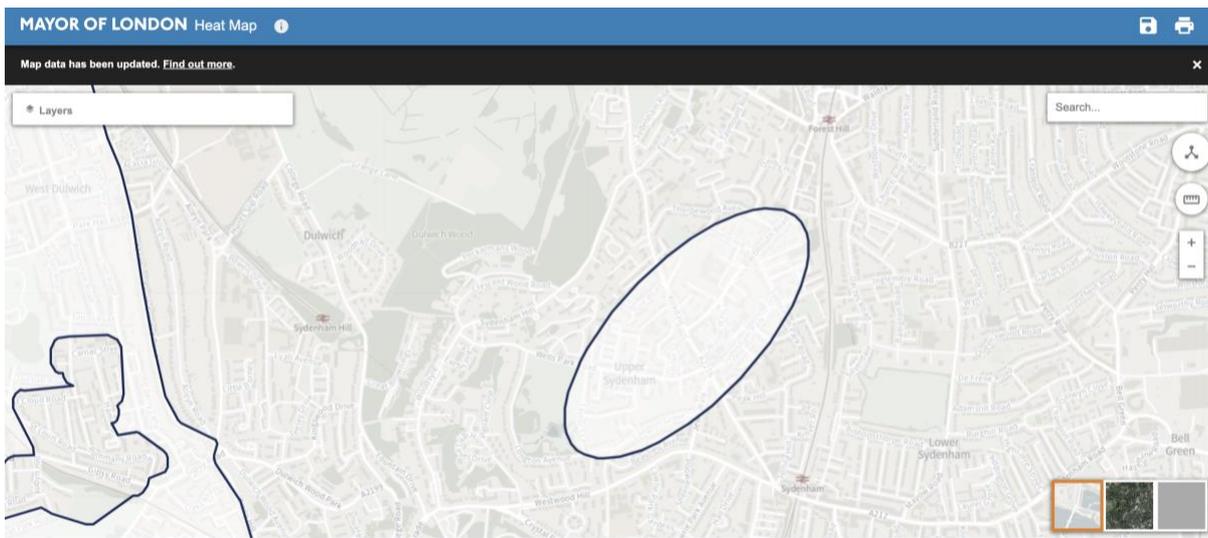
Hot water is distributed within the network via highly insulated pipes. To connect to the network individual boilers are replaced with separately metered heat exchangers.

London Plan Policy requires new developments to connect to an existing district heating network if one is available. Where there is no existing network, but potential for a future network has been identified, major developments should incorporate the infrastructure required to connect to the network. This may include installing centralised heating plant connected to individual heat exchangers within each dwelling.

Having reviewed the London Heat Map it is evident this proposed development is neither within the coverage of an existing district heating network, nor is it within the coverage of a proposed future district heating network. Connection to a district heating network in the short term is therefore not feasible.

This site is however in a Heat Network Priority Area. Heat Network Priority Areas identify where in London the heat density is sufficient for heat networks to provide a competitive solution for supplying heat to buildings and consumers. As there is a possibility that a district heating network will be installed in the vicinity of the site at some point during the lifetime of the building, the detailed design of the building will seek to incorporate the infrastructure required to connect to such a network.

London Heat Map showing existing and proposed district heating networks, energy centres, proposed transmission routes and the Heat Network Priority Area:



Due to its size and location, this development is not suitable for district heating.

8. Low and zero carbon energy sources (“be green”)

8.1. Photovoltaics

Solar photovoltaics (PV) capture the sun's energy using photovoltaic cells. The cells convert sunlight into electricity, which can be utilised on site or transferred into the National Grid. PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the

sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on a roof.

The power of a PV cell is measured in kilowatts peak (kWp). This is the rate at which the cell generates energy at peak performance in full direct sunlight.

Photovoltaics offer high CO₂ savings, are simple to install and suitable for most buildings. The only limiting factor for PV is the availability of suitable roof space.

Feasibility assessment: Feasible and appropriate. There is sufficient unshaded roofspace available for a photovoltaic installation.

8.2. Heat Pumps

Heat pumps collect low temperature heat from renewable sources (such as the air or ground) and concentrate the heat to a usable temperature via a reverse refrigeration cycle. Useable heat is transferred to the dwelling via a heat exchanger and can be used for low temperature central heating and domestic hot water, though an immersion top-up may be required for DHW.

Heat pumps have some impact on the environment as they generally use grid supplied electricity to run the pumps. It is common for heat pumps to have a coefficient of performance of three, meaning that for every 1kWh of electricity used, over 3kWh of heat can be generated. The renewable component of the output is therefore taken as the difference between the output energy and the input energy, in this scenario the heat pump will be deemed to have delivered 2kWh of renewable energy.

Ground source heat pumps require external horizontal ground loops, or as is more likely in built-up environments, vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space.

Air source heat pumps have a slightly lower seasonal efficiency than ground source heat pumps, but require less space. Noise and space considerations should be assessed when determining an appropriate site for external condensing units.

Feasibility assessment: Feasible and appropriate for primary heating and Domestic Hot Water.

8.3. Solar thermal

Solar thermal systems, use free heat from the sun to warm domestic hot water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable.

Solar thermal systems are most appropriate for buildings with high year-round domestic hot water demand.

Although a typical solar thermal system will be able to meet half the annual domestic hot water demand for a dwelling, many will use electricity to run pumps within the system.

Feasibility assessment: Feasible and appropriate for Domestic Hot Water.

8.4. Wind turbines

Wind turbines use blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine: Pole mounted and building mounted. Pole mounted turbines are free standing and are erected in a suitably exposed position, and are often about 5kW to 6kW in size. Building mounted turbines are smaller and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Large scale turbines, in exposed locations offer one of the best financial returns of all renewable energy systems as the payback of the system increases dramatically with the size of the turbine. However small-scale systems offer much lower levels of performance and recent studies have questioned the viability and output from such systems, particularly in urban environments.

Feasibility assessment: Inappropriate location.

8.5. Biomass

Biomass heating systems, burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. The carbon dioxide emitted when wood is burned is the same amount that was absorbed over the months and years that the plant was growing. The process is sustainable as long as new plants continue to grow in place of those used for fuel. There are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, but as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels.

When specifying biomass heating systems is important to consider the potential technical issues surrounding delivery and storage of fuel.

Although the CO₂ savings from biomass are substantial, the high levels of NO_x emissions can make biomass systems unsuitable for urban environments.

Feasibility assessment: Feasible but inappropriate in this urban setting.

8.6. Proposed low and zero carbon energy sources

With carbon emissions within the building already reduced through an enhanced fabric and energy efficient systems, it is proposed that a further reduction will be achieved through the installation of **air source heat pumps** to serve all of the heating and Domestic Hot Water requirements within each dwelling and the installation of **photovoltaic arrays totalling 10 kWp**. Commercial units are to be heated via air source heat pumps.

9. Results: Calculated CO₂ savings

9.1. Domestic CO₂ savings

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon dioxide emissions for domestic buildings
	(Tonnes CO ₂ per annum)
Baseline: Part L 2021 of the Building Regulations Compliant Development	59.4
After energy demand reduction	53.7
After heat network / CHP	53.7
After renewable energy	18.9

Table 2: Regulated carbon dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: Savings from energy demand reduction	5.8	10%
Be clean: Savings from heat network / CHP	0.0	0%
Be green: Savings from renewable energy	34.8	59%
Cumulative on site savings	40.6	68%
Annual savings from off-set payment	18.9	
Cumulative savings for off-set Payment	566	
Cash in-lieu contribution (£)	53,726	

9.2. Non-domestic CO₂ savings

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon dioxide emissions for non-domestic buildings
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	(Tonnes CO ₂ per annum)
Baseline: Part L 2021 of the Building Regulations Compliant Development	6.0
After energy demand reduction	5.0
After heat network / CHP	5.0
After renewable energy	2.7

Table 4: Regulated carbon dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	1.0	17%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	2.3	39%
Total Cumulative Savings	3.3	56%
Annual savings from off-set payment	2.7	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	80	-
Cash in-lieu contribution (£)	7,602	

9.3. Site total

Table 5: Site wide regulated carbon dioxide emissions and savings

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	65.5		
Be lean	58.7	6.8	10%
Be clean	58.7	0.0	0%
Be green	21.5	37.1	57%
Total Savings	-	43.9	67%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	645.6	-

APPENDIX 2: BREEAM PRE-ASSESSMENT

BREEAM Industrial 2018 Scheme

The proposed development will fall under the BREEAM Industrial 2018 scheme.

The overall rating of the building's environmental performance is given using terms PASS, GOOD, VERY GOOD, EXCELLENT or OUTSTANDING.

The BREEAM rating bands are as follows:

RATING	SCORE
PASS	30
GOOD	45
VERY GOOD	55
EXCELLENT	70
OUTSTANDING	85

The rating is determined from the total number of BREEAM criteria met and their respective environmental weighting. The environmental weighting for each section is as follows:

1 BREEAM Pre-assessment

Issue Category	Weighting %
Management	11
Health and Wellbeing	14
Energy	16
Transport	10
Water	7
Materials	15
Waste	6
Land Use and Ecology	13
Pollution	8

To achieve a BREEAM rating, the minimum percentage score must be achieved and the minimum standards (i.e. number of credits achieved, see below) applicable to that rating level complied with.

Minimum Standards

BREEAM Issue	BREEAM Rating/ Minimum number of credits				
	Pass	Good	Very Good	Excellent	Outstanding
Man 3- Responsible Construction practices				1	2
Man 4- Commissioning and handover			1	1	1
Man 5- Aftercare				1	1
Ene 1- Reduction of co2 emissions				4	6
Ene 2- Energy Monitoring			1	1	1
Wat 1- Water consumption		1	1	1	2
Wat 2- Water monitoring		1	1	1	1
Mat 3- Responsible Sourcing	1	1	1	1	1
Wst 1- Construction site waste management					1
Wst 3- Operational waste				1	1

The Pre-assessment for this Industrial building is based on the current design intent and relates to those credits which have potential to be achieved. The following scores were achieved, resulting in a suggested score of 60.0% Very Good'.

Section	Credit Title	Credit No	Credits awarded	Max credits available
Management	Project brief and design	Man 1	2	4
	Life cycle cost and service planning	Man 2	1	4
	Responsible Construction practices	Man 3	4 Excellent level	6
	Commissioning and Handover	Man 4	1 Outstanding level	1
	Aftercare	Man 5	N/A	N/A
Health & Wellbeing	Visual comfort	Hea 1	2	3
	Indoor air quality	Hea 2	N/A	N/A
	Thermal Comfort	Hea 4	N/A	N/A
	Acoustic performance	Hea 5	1	1
	Safety and security	Hea 6	1	1
	Safe & Healthy Surroundings	Hea 7	1	2
Energy	Reduction of CO2 emissions	Ene 1	4	9
	Energy monitoring	Ene 2	N/A	N/A
	External Lighting	Ene 3	1	1
	Low and zero carbon technologies	Ene 4	1	3
	Energy Efficient transportation systems	Ene 6	N/A	N/A
Transport	Transport assessment and travel plan	Tra 1	2	2
	Sustainable Transport measures	Tra 2	8	10
Water	Water consumption	Wat 1	N/A	N/A
	Water monitoring	Wat 2	1 Outstanding level	1
	Water leak detection and prevention	Wat 3	1	1

Section	Credit Title	Credit No	Credits awarded	Max credits available
Materials	Life cycle impacts	Mat 1	0	7
	Environmental impacts from construction products	Mat 2	0	1
	Responsible sourcing of materials	Mat 3	4 Outstanding level	4
	Designing for durability and resilience	Mat 5	1	1
	Material efficiency	Mat 6	0	1
Waste	Construction and waste management	Wst 1	4 Outstanding level	5
	Recycled aggregates	Wst 2	0	1
	Operational waste	Wst 3	1	1
	Adaption to climate change	Wst 5	0	1
	Functional Adaptability	Wst 6	2	2
Land use and Ecology	Site selection	LE 1	2	2
	Identifying and understanding the risks and opportunities for the site	LE 2	2	2
	Minimising impact on existing site ecology	LE 3	1 Outstanding level	3
	Change and enhancement of ecological value	LE 4	2	4
	Long term impact on biodiversity	LE 5	1	2
Pollution	Impact of refrigerants	Pol 1	N/A	N/A
	Local air quality	Pol 2	N/A	N/A
	Surface water run off	Pol 3	4	5
	Reduction of night time light pollution	Pol 4	1	1
	Noise attenuation	Pol 5	N/A	1
Innovation	Innovation	Inn 1	1	
Total			60.0%	

Key

- **Green** indicates that the credit is likely to be achieved if sufficient evidence is provided.
- **Amber** indicates that there is the potential to score additional credits.
- **Red** indicates that it is very unlikely that the credit will be achieved given the design and the budget.

2 Summary

This BREEAM Pre-assessment has been based on the design and information available at this stage with the design having progressed to planning stage drawings.

We have provided a BREEAM timeline guidance note in Appendix 2 that visually demonstrates those credits that must be met at Preparation and Brief and Concept Design.

**APPENDIX 3: RESPONSE TO LONDON PLAN SUSTAINABLE
DESIGN AND CONSTRUCTION SPG**

APPENDIX 3: RESPONSE TO LONDON PLAN SUSTAINABLE DESIGN AND CONSTRUCTION SPG	
RESOURCE MANAGEMENT	
LAND	
Optimising the use of land	
Mayor's Priority	
Through both their Local Plans and planning decisions, boroughs should ensure development patterns reflect the strategic spatial vision for London's growth as set out in Chapter 2 of the London Plan.	Noted.
Mayor's Priority	
Through both their Local Plans and planning decisions, boroughs should aim for 100% of development to be delivered on previously developed land.	Land is previously developed. 100% redevelopment.
Mayor's Priority	
Developers should optimise the scale and density of their development, considering the local context, to make efficient use of London's limited land.	Discussed within design and access statement.
Local food growing	
Mayor's Priority	
To protect existing established food growing spaces.	Previously developed land, no effect on existing food growing spaces.
Mayor's best practice	
To provide space for individual or communal food growing, where possible and appropriate.	Communal food growing cannot be achieved. Ground floor set out as commercial uses and activities and blue badge parking spaces. Ground floor space to the rear is not suitable for the provision of play space and therefore it is proposed that the play space is split between the three communal residential terraces. As a result, the communal roof terraces will provide the play space requirements as required by London Plan policy and an area of general residential amenity. Therefore, it is not reasonably possible to provide communal food growing facilities at roof level.

Mayor's best practice	
To take advantage of existing spaces to grow food, including adapting temporary spaces for food growing.	
SITE LAYOUT AND BUILDING DESIGN	
Mayor's best practice	
Any existing buildings that can be practically refurbished, retrofitted, altered, or extended should be retained and reused.	<p>The existing buildings comprise a mix of low level buildings, generally in a poor condition. Originally built in the 60s and 70s and not suitable for refurbishment as a result of layout and condition. Refurbishment would provide the best use and most efficient use of land as required by NPPF.</p> <p>Discussed in greater depth within Design and Access Statement.</p>
Mayor's best practice	
A mix of uses, where suitable should be included to provide a range of services commensurate to the public transport accessibility.	

Mayor's Priority	
<p>The design of the site and building layout, footprint, scale and height of buildings as well as the location of land uses should consider:</p> <p>Existing features</p> <ul style="list-style-type: none"> • the possible retention and reuse of existing buildings and structures; and • the retention of existing green infrastructure, including trees and other ecological features, and potential for its improvement and extension; • access routes to public transport and other facilities that minimise the use of private transport ; <p>New design of development</p> <ul style="list-style-type: none"> • the existing landform; • the potential to take advantage of natural systems such as wind, sun and shading; • the principles sets out London Plan policies 7.1 and 7.6; • the potential for adaption and reuse in the future; • potential for incorporating green infrastructure, including enhancing biodiversity; • potential for incorporating open space, recreation space, child play space; • energy demands and the ability to take advantage of natural systems and low and zero carbon energy sources; • site wide infrastructure; • access to low carbon transport modes; • the promotion of low carbon transport modes, including walking and cycling ; • potential to address any local air quality, noise disturbance, flooding and land contamination issues; and • the potential effect on the micro-climate. 	<p>Retention of buildings not practical and would not achieve best land use under NPPF. All trees along common boundaries to the north and east will be retained, protected for the duration of the works and included into the development. Site is sustainably located and the scheme is car free except for blue badge spaces and therefore seek to optimize the access to public transport</p> <p>Discussed in greater depth in Design and Access Statement.</p>
Energy and carbon dioxide emissions	
Mayor's Priority	
<p>The overall carbon dioxide emissions from a development should be minimised through the implementation of the energy hierarchy set out in London Plan policy 5.2.</p>	

Mayor's Priority

Developments should be designed to meet the following Regulated carbon dioxide standards, in line with London Plan policy 5.2.

Residential buildings

Year	Improvements beyond 2010 Building Regulations
1 st October 2013 - 2016	40 per cent
2016 - 2031	Zero carbon

Non-domestic buildings

Year	Improvements beyond 2010 Building Regulations
1 st October 2013 - 2016	40 per cent
2016 - 2019	As per the Building Regulation requirements
2019 - 2031	Zero carbon

The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.

This proposed development features improved insulation standards when compared against the compliance requirements of Approved Documents L1 and L2 2021 of the Building Regulations. In addition, this proposed development will incorporate a mechanical and electrical specification that surpasses the requirements of Approved Documents L1 and L2 2021. These combined energy efficiency measures lead to a reduction in CO₂ emissions equivalent to 10% of the baseline for the domestic part of the development and 17% of the baseline for the non-domestic part. These meet the target reductions of 10% and 15% respectively, as required by the London Plan.

An assessment has been carried out to determine the potential for renewable energy systems to reduce CO₂ emissions further. In order to meet the expectations of the planning policy, the

	<p>proposal is for air source heat pumps to be installed to meet each of the dwellings heating and Domestic Hot Water demand and a photovoltaic system to be installed on the available roof area of the building. Commercial units are to be heated via air source heat pumps. This development will seek to achieve a reduction in CO₂ emissions equivalent to 57% of the baseline through the installation of air source heat pumps and a 10 kWp PV system.</p> <p>The total reduction in carbon emissions resulting from energy efficiency measures and the installation of renewable technology is 68% for the domestic part of the development and 56% for the non-domestic part. This surpasses the target reduction of 35%, as required by the London Plan.</p> <p>A 100% reduction in CO₂ emissions is to be achieved by way of a cash in lieu payment⁵ to the London Borough of Lewisham of £61,328.</p>
<p>Mayor's best practice</p>	<p>The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using</p>

	Government approved SAP 10 and SBEM software.
Developments should contribute to ensuring resilient energy infrastructure and a reliable energy supply, including from local low and zero carbon sources.	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.
Mayor's best practice	
Developers are encouraged to include innovative low and zero carbon technologies to minimise carbon dioxide emissions within developments and keep up to date with rapidly improving technologies.	
Energy demand assessment	
Mayor's Priority	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.
Development applications are to be accompanied by an energy demand assessment	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.
Use less energy	
Mayor's Priority	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the

	Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.
The design of developments should prioritise passive measures.	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.
Mayor's best practice	
Developers should aim to achieve Part L 2013 Building Regulations requirements through design and energy efficiency alone, as far as is practical.	
Efficient energy supply	
Mayor's Priority	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.
Where borough heat maps have identified district heating opportunities, boroughs should prepare more detailed Energy Master Plans (EMPs) to establish the extent of market competitive district heating networks.	The design has been developed to address the energy performance policy requirements of The London Plan 2021. A target CO ₂ reduction has therefore been set at 35% relative to the Building Regulations 2021, through the application of the energy hierarchy. Results have been calculated using Government approved SAP 10 and SBEM software.

<p>Developers should assess the potential for their development to:</p> <ul style="list-style-type: none"> • connect to an existing district heating or cooling network; • expand an existing district heating or cooling network, and connect to it; or • establish a site wide network, and enable the connection of existing buildings in the vicinity of the development. 	
<p>Mayor's Priority</p>	
<p>Where opportunities arise, developers generating energy or waste heat should maximise long term carbon dioxide savings by feeding the decentralised energy network with low or zero carbon hot, and where required, cold water.</p>	
<p>Renewable energy</p>	
<p>Mayor's Priority</p>	<p>With carbon emissions within the building already reduced through an enhanced fabric and energy efficient systems, it is proposed that a further reduction will be achieved through the installation of air source heat pumps to serve all of the heating and Domestic Hot Water requirements within each dwelling and the installation of photovoltaic arrays totalling 10 kWp. Commercial units are to be heated via air source heat pumps.</p>
<p>Boroughs and neighbourhoods should identify opportunities for the installation of renewable energy technologies in their boroughs and neighbourhoods.</p>	
<p>Mayor's Priority</p>	
<p>Major developments should incorporate renewable energy technologies to minimise overall carbon dioxide emissions, where feasible.</p>	
<p>Carbon dioxide off-setting</p>	
<p>Mayor's Priority</p>	
<p>Where developments do not achieve the Mayor's carbon dioxide reduction targets set out in London Plan policy 5.2, the developer should make a contribution to the local borough's carbon dioxide off-setting fund.</p>	<p>The total reduction in carbon emissions resulting from energy efficiency measures and the installation of renewable technology is 68% for the domestic part of the development and 56% for the non-domestic part. This surpasses the target reduction of 35%, as required by the London Plan.</p> <p>A 100% reduction in CO₂ emissions is to be achieved by way of a cash in lieu payment⁶</p>

	to the London Borough of Lewisham of £61,328. Refer to Energy Statement held at appendix 1.
Retrofitting	
Mayor's Priority	
Mayor's Priority	
Where works to existing developments are proposed developers should retrofit carbon dioxide and water saving measures.	Not applicable, new buildings.
Monitoring energy use	
Mayor's best practice	
Developers are encouraged to incorporate monitoring equipment, and systems where appropriate to enable occupiers to monitor and reduce their energy use.	As well as higher insulation standards and renewable energy installations. All domestic units will be provided with Gas and Electric smart meters to monitor energy usage and assist in the planning and reduction of energy usage. The shell and core non domestic units will be provided with advice on monitoring of energy usage and will be required to include monitoring equipment as a contractual requirement within their fit out installation.
Supporting a resilient energy supply	
Mayor's best practice	

Developers are encouraged to incorporate equipment that would enable their schemes to participate in demand side response opportunities.	
Water efficiency	
Mayor's Priority	
Developers should maximise the opportunities for water saving measures and appliances in all developments, including the reuse and using alternative sources of water.	
Mayor's Priority	
Developers should design residential schemes to meet a water consumption rate of 105 litres or less per person per day.	The development commits to achieving a water consumption rate of 105 litres per person per day to domestic units.
Mayor's Priority	
New non-residential developments, including refurbishments, should aim to achieve the maximum number of water credits in a BREEAM assessment or the 'best practice' level of the AECB (Association of Environment Conscious Building) water standards.	In the non domestic units the development commits to achieving maximum number of water credits in a BREEAM assessment or the 'best practice' level of the

	AECB (Association of Environment Conscious Building) water standards.
Mayor's Priority	
Where a building is to be retained, water efficiency measures should be retrofitted.	No retained buildings
Mayor's Priority	
All developments should be designed to incorporate rainwater harvesting.	Rainwater harvesting prospects are limited on the communal amenity terraces due to the play space and general amenity requirements. However, the roof levels will be finished with a biosolar roof providing limited rainwater attenuation and would harvest/store rainwater to maintain the green roof planting.
Mayor's best practice	
All residential units, including individual flats / apartments and commercial units, and where practical, individual leases in large commercial properties should be metered.	All domestic and non domestic units to have individual water metering.
Materials and waste	
Design phase	
Mayor's Priority	
<p>The design of development should prioritise materials that:</p> <ul style="list-style-type: none"> ○ have a low embodied energy, including those that can be re-used intact or recycled; at least three of the key elements of the building envelope (external walls, windows roof, upper floor slabs, internal walls, floor finishes / coverings) are to achieve a rating of A+ to D in the BRE's <i>The Green Guide</i> of specification; ○ can be sustainably sourced; at least 50% of timber and timber products should be sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of forestry Certification (PEFC) source; ○ are durable to cater for their level of use and exposure; and <p>will not release toxins into the internal and external environment, including those that deplete stratospheric ozone</p>	the development commits to achieving the material standards of the London Plan Sustainable Design and Construction SPG:
Mayor's Best Practice	

<p>The design of developments should maximise the potential to use pre-fabrication elements.</p>	
<p>Construction phase</p>	
<p>Mayor's Priority</p>	
<p>Developers should maximise the use of existing resources and materials and minimise waste generated during the demolition and construction process through the implementation of the waste hierarchy.</p>	<p>A site analysis including a pre-demolition and pre-refurbishment audits will be carried out to determine opportunities for reusing existing materials and / or components. The existing materials on site will be reviewed to determine if they meet the required functionality of the new building design. Where no such opportunities exist, good practice measures will be taken in the demolition to ensure maximum recovery of materials through recycling. All elements from the deconstruction phase that cannot be reused on site will be sent to organisations for onward use where feasible.</p> <p>Investigations will be carried out to establish where possible the extent of reuse, including reuse of materials and components from other, and its practicality as early as possible. Throughout this process, carbon impacts will also be considered to ensure they are not compromised in material selection.</p> <p>Utilisation of BRE SmartWaste or similar will be made a contractual requirement. SmartWaste does allow for a pre-demolition audit allowing for the efficient re-use of materials, reduction of environmental impact and the more detailed identification of opportunities for salvage, reuse and recycling.</p> <p>The project will consider all opportunities for managing waste on site.</p>

On site segregation and recycling

Sequencing of works to minimise waste, i.e. avoiding later alterations and to phase casting of concrete etc to allow re-use of formwork as an example.

Planning deliveries to avoid waste and damage of materials though prolonged storage, weather exposure and damage.

On site processing of materials, i.e. crushing of concrete and masonry to provide aggregate, within appropriate confines and with dust suppression.

Recycling best Practice to be established and monitored:

Throughout the project, consider what materials and wastes will be generated and ensure that waste facilities are appropriate for each phase of the development.

- Sort different waste materials on-site.
- Use waste containers of appropriate sizes to facilitate waste segregation and locate containers (e.g. skips or wheelie bins) close to working areas.
- Clearly label waste containers on-site to promote effective segregation. Use consistent labelling across site to prevent confusion. Labels should contain images or materials icons to assist staff and sub-contractors who may not have English as their first language.

- Train staff on practical ways to manage and handle materials to maximise their re-use, recycling and recovery potential.
- Keep hazardous wastes out of mixed waste skips. This reduces waste gate fees and increases the value of materials.

**Recycling best Practice to be established and monitored:
(continued)**

- Avoid the creation of waste by carrying out works in the correct order to minimise the need for remedial actions.
- Consider the number of waste containers and storage areas, and their locations, to ensure it is easy for site staff to use the waste facilities.
- Make sure to put a waste container near to all re-use and/or recycling containers to prevent recycling containers being used for general waste.
- Determine how to move materials / recyclables and waste around the site. How will they get into the correct containers? Who is responsible?
- Towards project completion, consider undertaking a full site waste audit to help understand how waste types and quantities might change during final site clean-up.

- Prior to completion, consider how excess materials segregated for on-site re-use will be managed. Can they be donated to local community projects for re-use or is recycling of source segregated materials more viable? When procuring suppliers, consider the use of 'take back' schemes and where this is offered, ensure there is a dedicated, well labelled container.

Reducing Waste

- 'Just-in-time' delivery strategies can reduce waste created by improper storage and weather damage.
- Arrange deliveries of materials to align with project construction stages. This will help avoid materials being stored on-site longer than necessary and reduce the risk of damage.
- To avoid deterioration of materials, keep protective packaging on and ensure storage areas are secure and weatherproof.
- Materials that have been damaged and wasted due to inadequate storage should be used as an examples in toolbox talks to highlight the importance of best practice to site workers. Photographs of damaged material could be kept to

aid discussions and help prevent re-occurrence.

- When bad weather is forecast, pay extra attention to securing and protecting materials.
- Reject materials which have been damaged during transit and request they be returned to the supplier. This will prevent damaged materials, which are not fit for purpose, becoming your responsibility.
- Plan where bulk materials are stored to minimise transportation around the site.
- Move materials around the site as little as possible – breakage is more likely to happen during movement causing materials to be unusable.
- Return, sell or donate unused and salvaged materials.
- Engage with local charities and schools as they may be willing to support with this, for example materials could be used in classroom lessons or for landscaping works. Engage on-site staff in this process and make it personal to them to ensure 'buy in'.
- Repair items (e.g. pallets) so they can be re-used or returned to the supplier.

SUITABLE AND EASILY ACCESSIBLE STORAGE SPACE AND COLLECTION SYSTEMS TO SUPPORT RECYCLING AND RE-USE.

A Waste Management Strategy will be a contractual obligation on the successful principal contractor with waste and re-use planning commencing prior to demolition as a combined demolition audit and site waste management plan. The strategy confirms the hierarchy of waste management will be adopted in accordance with national policy requirements. The waste management methods include preparation for reuse and material recovery. The strategy will aim to support innovative design features to the proposed development to use materials in their current state and form (for example reuse of soils), this can occur either on or off site. The scale of the site lends itself to store materials and manage construction so that vehicle movements off-site can be minimised. For example, if appropriate, areas for temporary stockpiling of materials will be assigned.

A strategy will be put in place to minimise the space taken by storage of new materials. Frequently used items will be placed in easy to access areas. This will increase efficiency and minimise wastage due to damage. Prolonged storage of materials on site will be avoided, where possible, and implementation of 'just in time' deliveries will be encouraged.

Options also include using waste materials found on site and recycling / recovering them into an alternative form that can be used for any construction purposes (for example crushing concrete for road construction material). By recycling onsite,

	<p>carbon emissions associated with the proposed development are also reduced, rather than materials being taken away from the application site.</p> <p>During the construction phase, materials recovered from any on-site works may be suitable for reuse on-site, reducing costs of transportation and procurement of virgin materials. This combined with considerate design practice, such as balancing any cut and fill of materials, will help to minimise construction waste in line with the waste hierarchy which seeks to eliminate, reduce, reuse and recycle.</p> <p>Reusable packing solutions with key product manufacturers will be explored at the earliest opportunity. Solutions may include flat pallets, bulk bags, steel stillages and returnable cabledrums.</p> <p>Operational Waste</p> <p>Waste reduction during the operational phase will be spotlighted. Signage will be provided in communal waste storage facilities to encourage correct use of the recycling service.</p>
Occupation phase	
Mayor's Priority	
Developers should provide sufficient internal space for the storage of recyclable and compostable materials and waste in their schemes.	Residents and building occupants will be persuaded to reduce and prevent waste through good practice measures such as
Mayor's Priority	providing information packs to residents about how the waste segregation and recycling scheme operates. The
The design of development should meet borough requirements for the size and location of recycling, composting and refuse storage and its removal.	information should also include

	<p>details on waste prevention schemes within the local area.</p> <p>Both the residential and commercial spaces will be provided with policy compliant levels of refuse facilities. Residential bin stores will be provided at ground floor in separate bin stores for the two different residential cores and each commercial unit will be provided with a dedicated bin store directly accessible from their own commercial unit and also the street.</p>
Nature conservation and biodiversity	
Mayor's Priority	<p>No net loss of quality and quantity of biodiversity will arise from the development.</p> <p>A preliminary ecological appraisal has been undertaken and has been submitted in support of the planning application for Willow Way. The habitats recorded on the existing site are noted as being of negligible ecological value as such the partial loss of these habitats on site is not an ecological constraint. The site has been identified as having potential to support roosting bats in buildings and birds. Further surveys in respect of roosting bats have been recommended.</p> <p>Potential constraints to the development have been identified and possible mitigation and compensation measures have been recommended. Mitigation measures include sensitive timings of works and replacement opportunities for nesting birds. Enhancement measures include the provision on integrated bat and bird boxes. It is considered that on completion of the further surveys</p>
There is no net loss in the quality and quantity of biodiversity.	
Mayor's Priority	
<p>Developers make a contribution to biodiversity on their development site.</p>	

	and that all recommended compensation and mitigation measures are followed then the development has the potential to accord with all relevant London Borough of Lewisham, including policy 12 and national planning policy.
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Climate change adaptation	
Tackling increased temperature and drought	
Overheating	
Mayor's Priority	
Developers should include measures, in the design of their schemes, in line with the cooling hierarchy set out in London Plan policy 5.9 to prevent overheating over the scheme's life- time	All flats within the development will be designed to achieve full compliance with Approved Document O: Overheating mitigation. An assessment of overheating risk will therefore form part of the detailed design of the development.
Heat and drought resistant planting	
Mayor's Best practice	
The design of developments should prioritise landscape planting that is drought resistant and has a low water demand for supplementary watering.	The development proposed to prioritise planting that is drought resistant, in particular to the level 4 roof garden area. The actual planting design will form part of the detailed design of the development.
Resilient foundations	
Mayor's Best practice	
Developers should consider any long term potential for extreme weather events to affect a building's foundations and to ensure they are robust	It is expected that the foundation solution for the buildings will be a piled solution and as such would be provided at a depth that would not be substantially affected by extreme weather events.

Increasing green cover	
Urban greening	
Mayor's Priority	

Developers should integrate green infrastructure into development schemes, including by creating links with wider green infrastructure network.	
Mayor's Priority	
Major developments in the Central London Activity Area (CAZ) should be designed to contribute to the Mayor's target to increase green cover by 5% in this zone by 2030.	At the time of the planning application the only identifiable planting on the plot is four small trees located at the south of the plot, adjacent to the Willow Way public footpath. The proposal include communal green areas at ground floor a biosolar roof and a roof garden area at level 4. Maximum opportunities for green cover have been proposed by the development.
Trees	
Mayor's Priority	
Developments should contribute to the Mayor's target to increase tree cover across London by 5% by 2025.	Not applicable. Although maximum opportunity to green site and provide wildlife friendly habitats will form part of the detailed design development.
Mayor's Priority	
Any loss of a tree/s resulting from development should be replaced with an appropriate tree or group of trees for the location, with the aim of providing the same canopy cover as that provided by the original tree/s.	To enable this development to take place it is necessary to remove five small Category C trees within the plot boundary along willow Way. All other trees to the site perimeter will be protected for the duration of the works and incorporated into the detailed design. Planted areas are to provide wildlife friendly habitats and will form part of the detailed design.
Flooding	
Surface water flooding and Sustainable drainage	
Mayor's Priority	
Through their Local Flood Risk Management Strategies boroughs should identify areas where there are particular surface water management issues and develop policies and actions to address these risks	Site located in Flood Zone 1 so low probability of flooding and site area is less than 1ha so a detailed site specific FRA would not normally be required.
Mayor's Priority	
Developers should maximise all opportunities to achieve greenfield runoff rates in their developments	
Mayor's Priority	

<p>When designing their schemes developers should follow the drainage hierarchy set out in London Plan policy 5.13</p>	<p>The existing site is developed with buildings and hardstanding and is 100% impermeable.</p> <p>The proposed redevelopment to provide:</p> <p>The surface water offsite flow rate will be reduced to a practical minimum of 2ls^{-1} which is less than 10% of the pre development flow rate.</p> <p>An attenuation tank will be used to balance volumes generated by the site prior to discharge for all storms up to and including the 100 year event with a 40% allowance for climate change.</p>
<p>Mayor's Priority</p>	
<p>Developers should design Sustainable Drainage Systems (SuDS) into their schemes that incorporate attenuation for surface water runoff as well as habitat, water quality and amenity benefits.</p>	<p>Due to the underlying ground strata being unsuitable for infiltration features, it is proposed to discharge surface water to the Thames Water combined sewer in Willow Way at a restricted rate with an attenuation tank provided under the rear parking court to temporarily store the excess surface water volumes in larger storms.</p> <p>The surface water offsite flow rate will be reduced to a practical minimum of 2ls^{-1} which is less than 10% of the pre development flow rate.</p> <p>An attenuation tank will be used to balance volumes generated by the site prior to discharge for all storms up to and including the 100 year event with a 40% allowance for climate change.</p>
<p>Flood resilience and resistance of buildings in flood risk areas</p>	
<p>Mayor's Priority</p>	

Development in areas at risk from any form of flooding should include flood resistance and resilience measures in line with industry best practice.	Site located in Flood Zone 1 so low probability of flooding and site area is less than 1ha so a detailed site specific FRA would not normally be required.
Flood Risk Management	
Mayor's Priority	
Developments are designed to be flexible and capable of being adapted to and mitigating the potential increase in flood risk as a result of climate change.	Site located in Flood Zone 1 so low probability of flooding and site area is less than 1ha so a detailed site specific FRA would not normally be required. An attenuation tank will be used to balance volumes generated by the site prior to discharge for all storms up to and including the 100 year event with a 40% allowance for climate change.
Mayor's Priority	

Developments incorporate the recommendation of the TE2100 plan for the future tidal flood risk management in the Thames estuary.	
Mayor's Priority	
Where development is permitted in a flood risk zone, appropriate residual risk management measures are to be incorporated into the design to ensure resilience and the safety of occupiers.	Flood Zone 1 development.
Other sources of flooding	
Mayor's Priority	
All sources of flooding need to be considered when designing and constructing developments.	

POLLUTION MANAGEMENT	
Land contamination	
Mayor's Priority	
Developers should set out how existing land contamination will be addressed prior to the commencement of their development.	Contaminated land assessment to form part of planning application for Willow Way development.
Mayor's Priority	
Potentially polluting uses are to incorporate suitable mitigation measures.	
Air quality	
Mayor's Priority	

Developers are to design their schemes so that they are at least 'air quality neutral'.	<p>An Air Quality Assessment has been produced and will be submitted as a supporting document to the Willow Way planning application. The AQA reports as follows:</p> <p>The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction. It has also identified the air quality conditions that future residents and users will experience and whether or not the proposed development is air quality neutral (as required by the London Plan).</p> <p>The assessment has been based on measurements made during 2019, and pre-pandemic activity, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the Covid-19 pandemic.</p> <p>Construction Impacts</p> <p>The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.</p> <p>Operational Impacts</p> <p>The assessment has demonstrated that pollutant concentrations will be well below the objectives at the proposed development in the earliest possible opening year of 2025. PM2.5 concentrations may continue to marginally exceed the GLA target in</p>
Mayor's Priority	
Developments should be designed to minimise the generation of air pollution.	
Mayor's Priority	
Developments should be designed to minimise and mitigate against increased exposure to poor air quality.	
Mayor's Priority	
Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out in Appendix 7.	
Mayor's Priority	
Developers and contractors should follow the guidance set out in the emerging <i>The Control of Dust and Emissions during Construction and Demolition SPG</i> when constructing their development.	

2025, but this is widespread throughout London.

As the proposed development is car-free and does not include any on-site combustion, it will have no significant effect on local air quality.

The overall operational air quality effects of the proposed development are judged to be 'not significant'.

Air Quality Neutral

As the development is car-free and has no onsite combustion, the proposed development is considered to be air quality neutral and therefore complies with the requirement that all new developments in London should be at least air quality neutral.

Policy Implications

Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 185 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 186, as it will not affect compliance with relevant limit values or national objectives.

Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 185 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 186, as it will not affect compliance with relevant limit values or national objectives.

	<p>The proposed development is compliant with Policy SI 1 of the London Plan in the following ways: it will not cause exceedances of legal air quality limits; it will not create unacceptable risk of high level of exposure to poor air quality; and It will be air quality neutral.</p> <p>The proposed development is also consistent with Policy 9 of the LB of Lewisham’s Core Strategy, as “<i>any negative air quality impacts</i>” associated with the proposed development, which are primarily associated with the construction phase, will be minimised through mitigation. The proposed development also aligns with a number of measures outlined in the LB of Lewisham’s air quality action plan associated with reducing emission from developments and buildings.</p>
<p>Noise</p>	
<p>Mayor’s Priority</p>	
<p>Areas identified as having positive sound features or as being tranquil should be protected from noise.</p>	<p>Draft Noise and Acoustic Impact Assessment to provide more detail.</p> <p>Calculations have been undertaken to determine the acoustic requirements for the glazing and ventilation to the proposed apartments. Specifications have been provided for the external façade elements, in order to achieve suitable internal noise levels in line with British Standard 8233 and WHO Guidelines.</p> <p>Noise levels in external amenity areas will be within the constraints identified in BS 8233.</p> <p>On the above basis, it is considered that an appropriate acoustic environment can be provided to the proposed residential properties, both externally and internally, and</p>

	<p>there is considered no reason, on noise grounds, why planning consent should be refused.</p> <p>Limiting criteria for the new commercial units has been established, in terms of noise from new building services plant in line with BS 4142 and the sound insulation performance of separating floors and walls between commercial and residential uses.</p>
Mayor's Priority	
Noise should be reduced at source, and then designed out of a scheme to reduce the need for mitigation measures.	
Light pollution	
Mayor's Priority	
Developments and lighting schemes should be designed to minimise light pollution.	<p>Lighting design to be progressed as part of the detailed design of the development. It is expected that the lighting design will be conditioned. Medium sized development with commercial uses at ground floor and residential properties above No unusual lighting impacts are expected.</p>
Water pollution	
Surface water runoff	
Mayor's Priority	

<p>In their aim to achieve a greenfield runoff rate developers should incorporate sustainable urban drainage systems (SuDS) into their schemes which also provide benefits for water quality.</p>	<p>The post development surface water offsite flow rate will be reduced to a practical minimum of 2ls^{-1} which is less than 10% of the pre development flow rate.</p> <p>An attenuation tank will be used to balance volumes generated by the site prior to discharge for all storms up to and including the 100 year event with a 40% allowance for climate change.</p>
<p>Mayor's best practice</p>	
<p>Encourage good environmental practice to help reduce the risk from business activities on the London water environment.</p>	<p>Surface water runoff during construction phase is to form a contractual requirement for the appointed contractor as part of their overall responsibilities. The contractor will prepare the necessary documentation and methodology regarding how they intend to manage the surface water run-off during the main construction works.</p>
<p>Mayor's best practice</p>	
<p>Encourage those working on demolition and construction sites to prevent pollution by incorporating prevention measures and following best practice.</p>	
<p>Wastewater treatment</p>	
<p>Mayor's Priority</p>	
<p>Residential developments discharging domestic sewage should connect to the public foul sewer or combined sewer network where it is reasonable to do so.</p>	<p>Foul and surface water flows will be conveyed to the Thames Water combine sewer in Willow Way to the west</p> <p>The surface water offsite flow rate will be reduced to a practical minimum of 2ls^{-1} which is less than 10% of the pre development flow rate.</p> <p>An attenuation tank will be used to balance volumes generated by the site prior to discharge for all storms up to and including the 100 year event with a 40% allowance for climate change.</p>
<p>Mayor's Priority</p>	
<p>Commercial developments discharging trade effluent should connect to the public foul sewer or combined sewer network where it is reasonable to do so subject to a trade effluent consent from the relevant sewerage undertaker.</p>	
<p>Mayor's Priority</p>	
<p>Developments should be properly connected and post-construction checks should be made by developers to ensure that mis-connections do not occur.</p>	

