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## Sustainability and Energy Statement

Banbury Oil Depot, Tramway Road, Banbury, OX16 5TD

**A REPORT PREPARED**

**FOR AND ON BEHALF OF MOTOR FUEL GROUP LTD**

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For and on behalf of  
Paragon Building Consultancy Limited

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## PREFACE

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## SUSTAINABILITY STATEMENT

CLIENT NAME: Motor Fuel Group Ltd  
 .....  
 PROPERTY ADDRESS: Banbury Oil Depot  
 Tramway Road, Banbury  
 .....  
 INSPECTION DATE: n/a  
 .....



### 1.0 INTRODUCTION

<b>1.1</b>	<b>Background</b>
1.1.1	Paragon Building Consultancy Limited has been instructed by Motor Fuel Group Ltd c/o Frampton Planning Ltd to prepare a Sustainability Statement for the proposed development Banbury Oil Depot, Tramway Road, Banbury. The Sustainability Statement has been prepared to support the planning application in response to the local, regional and national legislation the Design and Access Statement and other supplemental environmental reports submitted with the planning application.
1.1.2	The main aim of this report is to provide an assessment of the sustainability credentials for the proposed development and to describe how the applicable sustainability policies and standards can be met at the Reserved Matters detailed design stage.
1.1.3	The information provided in this report should be treated as indicative at this stage and should be used to inform the planning application for the proposed development with respect to relevant national, regional and local planning policies.
<b>1.2</b>	<b>Description of Developments</b>
1.2.1	Outline planning application for the redevelopment of the Banbury Oil Depot, to include the demolition/removal of buildings and other structures associated with the oil depot use and the construction of up 143 apartments, and increase the community/retail/commercial space, with all matters (relating to appearance landscaping, scale and layout) reserved except for access off Tramway Road. This development forms part of the Canalside regeneration area. The site can be safely accessed from Tramway Road. The site plan is presented in Figure 1.1.

1.2.2

Figure 1: Site plan



## 2.0 PLANNING POLICIES

	<p>This section summarises the relevant energy policy context for the development. The national, regional and local policies and regulations related to energy and sustainability are summarised below.</p>
<p><b>2.1</b></p>	<p><b>National Planning Policy Framework (2018)</b></p>
<p>2.1.1</p>	<p>The National Planning Policy Framework (NPPF) document sets out the Government’s planning policies for England and was updated February 2019.</p>
<p>2.1.2</p>	<p>The NPPF is designed to consolidate all policy statements, circulars and guidance documents into a single, simpler National Planning Policy Framework, making the planning system more user-friendly and transparent. The framework’s primary objective is a sustainable development, therefore focussing on the 3 pillars of sustainability. The framework is split into three sections; planning for prosperity (Economic), planning for people (Social) and planning for places (Environmental), each of which outlines guidance to tackle issues such as housing, transport infrastructure, climate change, business and economic development, etc.</p>
<p>2.1.3</p>	<p>In regard to climate change, the NPPF supports a reduction in greenhouse gas emissions and the delivery of renewable and low carbon energy. Climate change is covered in Section 14 <i>‘Meeting the challenge of climate change, flooding and coastal change’</i>. In summary the framework advises:</p>
<p>2.1.4</p>	<p>To support the move to a low carbon future, local planning authorities should:</p> <ul style="list-style-type: none"> <li>• plan for new developments in locations which reduce greenhouse gas emissions</li> <li>• actively support energy efficiency improvements to existing buildings</li> <li>• adopt nationally described standards when setting any local requirement for a building’s sustainability</li> </ul>
<p>2.1.5</p>	<p>In determining planning applications, local planning authorities should expect a new development to:</p> <ul style="list-style-type: none"> <li>• comply with adopted Local Planning policies on local requirements for decentralised energy supply, unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable</li> <li>• take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption</li> </ul>

2.2	<p><b>Cherwell District Council North Oxfordshire adopted local plan</b></p>
2.3.1	<p><b>Policy ESD 1: Mitigating and Adapting to Climate Change</b></p> <p>Measures will be taken to mitigate the impact of development within the District on climate change. At a strategic level, this will include:</p> <ul style="list-style-type: none"> <li>• Distributing growth to the most sustainable locations as defined in this Local Plan.</li> <li>• Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars.</li> <li>• Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction).</li> <li>• Promoting the use of decentralised and renewable or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy).</li> </ul> <p>The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:</p> <ul style="list-style-type: none"> <li>• Taking into account the known physical and environmental constraints when identifying locations for development.</li> <li>• Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling.</li> <li>• Minimising the risk of flooding and making use of sustainable drainage methods, and</li> <li>• Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).</li> </ul> <p>Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).</p>
2.3.2	<p><b>Policy ESD 2: Energy Hierarchy and Allowable Solutions</b></p> <p>In seeking to achieve carbon emissions reductions, we will promote an 'energy hierarchy' as follows:</p> <ul style="list-style-type: none"> <li>• Reducing energy use, in particular by the use of sustainable design and construction measures</li> <li>• Supplying energy efficiently and giving priority to decentralised energy supply</li> <li>• Making use of renewable energy</li> <li>• Making use of allowable solutions.</li> </ul>



## 2.3.3

**Policy ESD 3: Sustainable Construction**

All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy.

Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.

All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of the achievement of this standard should be set out in the Energy Statement.

The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- Minimising both energy demands and energy loss
- Maximising passive solar lighting and natural ventilation
- Maximising resource efficiency
- Incorporating the use of recycled and energy efficient materials
- Incorporating the use of locally sourced building materials
- Reducing waste and pollution and making adequate provision for the recycling of waste
- Making use of sustainable drainage methods
- Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and
- Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment.

Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an independent economic viability assessment can be undertaken. Where it is agreed that an economic viability assessment is required, the cost shall be met by the promoter.

2.3.4	<p><b>Policy ESD 4: Decentralised Energy Systems</b></p> <p>The use of decentralised energy systems, providing either heating (District Heating (DH)) or heating and power (Combined Heat and Power (CHP)) will be encouraged in all new developments.</p> <p>A feasibility assessment for DH/CHP, including consideration of biomass fuelled CHP, will be required for:</p> <ul style="list-style-type: none"> <li>• All residential developments for 100 dwellings or more</li> <li>• All residential developments in off-gas areas for 50 dwellings or more</li> <li>• All applications for non-domestic developments above 1000m<sup>2</sup> floorspace.</li> </ul> <p>The feasibility assessment should be informed by the renewable energy map at Appendix 5 'Maps' and the national mapping of heat demand densities undertaken by the Department for Energy and Climate Change (DECC).</p> <p>Where feasibility assessments demonstrate that decentralised energy systems are deliverable and viable, such systems will be required as part of the development unless an alternative solution would deliver the same or increased benefit.</p>
2.3.5	<p><b>Policy ESD 5: Renewable Energy</b></p> <p>The Council supports renewable and low carbon energy provision wherever any adverse impacts can be addressed satisfactorily. The potential local environmental, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications.</p> <p>Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:</p> <ul style="list-style-type: none"> <li>• Landscape and biodiversity including designations, protected habitats and species, and Conservation Target Areas</li> <li>• Visual impacts on local landscapes</li> <li>• The historic environment including designated and non designated assets and their settings</li> <li>• The Green Belt, particularly visual impacts on openness</li> <li>• Aviation activities</li> <li>• Highways and access issues, and</li> <li>• Residential amenity.</li> </ul> <p>A feasibility assessment of the potential for significant on site renewable energy provision (above any provision required to meet national building standards) will be required for:</p> <ul style="list-style-type: none"> <li>• All residential developments for 100 dwellings or more</li> <li>• All residential developments in off-gas areas for 50 dwellings or more</li> <li>• All applications for non-domestic developments above 1000m<sup>2</sup> floorspace.</li> </ul> <p>Where feasibility assessments demonstrate that on site renewable energy provision is deliverable and viable, this will be required as part of the development unless an alternative solution would deliver the same or increased benefit. This may include consideration of 'allowable solutions' as Government Policy evolves.</p>

### 3.0 SUSTAINABILITY ASSESSMENT METHOD

3.1	This Sustainability Statement describes the proposed sustainability measures which are proposed for the development to achieve high environmental standards and meet the sustainability.
3.2	Although the development will not be assessed using a specific environmental assessment method, the proposed development will still be designed to achieve high environmental standards and meet the sustainability planning policies.
3.3	The following sections of this document will broadly describe sustainability strategies and measures proposed for the development to meet the London Plan and local policy requirements.

### 4.0 SUSTAINABILITY MEASURES AND STRATEGY

<b>4.1</b>	<b>Energy</b>
4.1.1	Various technologies have been considered and appraised for the scheme arriving at the preferred and most sensible energy strategy option. The energy strategy follows the London Plan Energy Hierarchy: Be Lean, Be Clean and Be Green principles. The overarching objective is to maximise the reductions in total CO <sub>2</sub> emissions through the application of the energy hierarchy with a cost-effective and technically appropriate approach and to minimise the emission of other pollutants. This summary is attached to this report in appendix 1 and renewable technologies are also considered in appendix 2. A full energy statement will be provided at reserved matters.
4.1.2	The development will significantly reduce regulated CO <sub>2</sub> emissions by incorporating a range of passive design and energy efficiency measures, including improved building fabric standards beyond the requirements of building regulations and energy efficient mechanical and electrical plants. Further details of such measures will be progressed at the detailed design stage. These measures will enable the proposed development to exceed Part L 2013 Target Emission Rates (TER) and Target Fabric Energy Efficiency (TFEE) minimum standards through energy efficiency measures alone.
4.1.4	The Cherwell District Council North Oxfordshire adopted local plan energy policies encourages the utilisation of decentralised energy networks, where appropriate. The National Heat Map was decommissioned by BEIS in April 2018. The tool was designed to help prioritise locations for more detailed investigation, rather than for designing heat networks directly. The data, including the address level data underpinning the tool, is no longer believed to be accurate and for that reason is no longer available. Further investigation has been carried out to identify existing and planned district heating networks in the vicinity of the site. It has been identified that is no local or likely district heating network adjacent to the site.

4.1.5	Electrical panels and direct hot water cylinders will be installed to supply hot water and space heating to the residents. This reflects the recent changes to the SAP10 carbon factors for electricity.
4.1.6	It is anticipated that by implementing the energy efficient design, by incorporating enhanced building fabric standards and by using energy efficient systems, the site has a potential to reduce the regulated CO <sub>2</sub> emissions below the carbon baseline by 26% without contribution from low carbon or renewable energy sources. Particularly, this may include the application of Mechanical Ventilation Heat Recovery systems to each dwelling, subject to further detailed design. This will help mitigate any external noise issues and reduce the need to have open windows on exposed elevations.
4.1.7	The Energy assessment does indicate that the proposed energy strategy can achieve regulated CO <sub>2</sub> savings which is equivalent to circa 37% reduction when compared to the regulated CO <sub>2</sub> baseline using SAP10 carbon factors and the application of solar panels – typically 2 panels per property, subject to further detailed design. This demonstrates that the proposed energy strategy can meet the local CO <sub>2</sub> reduction targets.
<b>4.2</b>	<b>Water</b>
4.2.1	In response to the Cherwell District Council North Oxfordshire Policy, all dwellings and within the proposed development will be provided with water efficient fixtures and fittings to reduce water consumption. The dwellings will be designed to reduce their water consumption to 105 litres of water per person per day. Potable water reduction measures such as flow restrictors to taps and showers, and dual flush toilets will help reduce water consumption, place less of a burden on the fresh water infrastructure and reduce water bills for the homeowners.
4.2.2	The proposed water conservation measures and technologies will be detailed and explained in the Home User Guide pack to ensure all homeowners are aware of these technologies installed, the potential benefits they bring and how to get optimal benefit out of them.
<b>4.3</b>	<b>Materials</b>
4.3.1	The energy that has been used during manufacture, processing and the transportation of the materials to site, contributes to embodied carbon emissions. These emissions shall be minimised by selection of materials for walls, floors and windows that are characterised by reduced environmental impact. Brick is made from some of the earths most abundant and natural materials, is 100% recyclable and is frequently retained on buildings when renovated. It can also be reused in other buildings. All timber and timber-based products used on the project will be legally harvested and traded timber. Any opportunities to re-use and/or recycle demolition materials will be identified and pursued, where feasible.
4.3.2	In addition, the insulation will be specified with a global warming potential (GWP) of less than 5 where feasible.

<b>4.4</b>	<b>Flood Risk</b>
4.4.1	The Cherwell District Council North Oxfordshire policy require the minimisation of flood risk and reduction of surface water flow from the site.
4.4.2	<p>The proposed development site lies in an area designated by the EA as Flood Zone 2, land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding. The wider allocated Canalside regeneration area has undergone flood alleviation measures that means the area (and Site) has the benefits of flood defence status, as such, the principle of development of the Site for the land uses proposed would be wholly appropriate</p> <p>There has been a sequential test completed, to locate the built form in the lowest flood area – as a result the proposed residential development has been placed along the eastern boundary with a green space buffer and being the furthest distance from the River Cherwell.</p>
<b>4.5</b>	<b>Waste</b>
4.5.1	<b>Waste Storage and Recycling Facilities</b>
4.5.2	To comply with the Local waste planning policy requirements, adequate communal waste and recycling spaces will be provided in line with the Council’s requirements. Sufficiency sized waste bins will be provided in each dwelling.
<b>4.6</b>	<b>Waste Minimisation</b>
4.6.1	Using good waste management practices onsite will help to reduce disposal costs, avoidance of waste transportation costs, increase recycling of materials and lower levels of material wastage.
4.6.2	Design decisions can contribute significantly to the amount of waste generated during the construction of a project. Waste will need to be minimised on site through the design and site measures. This can include cutting on site and reducing site waste.
4.6.3	The storage of materials has been identified as an area where material wastage can be reduced. The majority of waste can be due to poor housekeeping. Good housekeeping techniques will be adopted by site operatives to reduce material losses and waste.
	<b>Pollution</b>
<b>4.7</b>	<b>Constructions</b>
4.7.1	To minimise air quality impacts during construction a number of best practice mitigation measures will be implemented by the contractor. These measures include effective on-site control of construction traffic and ensuring demolition works are controlled particularly during windy or dry conditions.

<b>4.8</b>	<b>Sustainable Transport Measures</b>
4.8.1	<p>The development is well served in terms of availability and accessibility. All the measures outlined in the Transport Assessment and Transport Plan reduce reliance on the private motor car and encourage walking, public transport, cycling and other measures to further reduce air quality impacts.</p> <p>To promote local amenities, public transport facilities including maps and timetables (where required), details of cycle storage etc., residential occupants will be provided with a Home User Guide to try and make the best use of these facilities.</p>
4.8.2	<p>Sustainable transport measures have been encouraged across the site and can be demonstrate with the following elements:</p> <ul style="list-style-type: none"> <li>• The National Cycle Route (NCR) 5 can be accessed form the site via a link route which runs from the station along Tramway Road.</li> <li>• A new footway/ cycleway along the site’s eastern boundary.</li> <li>• Both the bus interchange and Banbury Railway Station are within walking distance at 600m and 250m from the site access, respectively.</li> <li>• number of local facilities within walking distance, allowing future residents of the scheme to walk and cycle to their destinations.</li> <li>• A managed carpool club, car sharing scheme, reduced car parking standards and cycle hire should also be introduced to reduce car dependency.</li> <li>•</li> </ul>
<b>4.9</b>	<b>Noise</b>
4.9.1	<p>A detailed environmental noise survey has been undertaken by ACCON UK in order to establish the currently prevailing environmental noise climate around the site.</p> <p>The environmental noise impact upon the proposed dwellings has been assessed in the context of national and local planning policies.</p> <p>The assessment has identified that:</p> <ul style="list-style-type: none"> <li>• The assessment of external noise levels identifies that the private amenity areas will experience noise levels within or below the target noise level range of 50 dB to 55 dB LAeq, 16hr. Therefore, no specific noise mitigation measures are expected to be required for external amenity areas.</li> <li>• It is recommended that single aspect flats which overlook the railway line are avoided and, where possible, the number of bedrooms which overlook the railway line are kept to a minimum. Based on the Illustrative Masterplan, windows for habitable rooms overlooking the railway lines are likely to require a minimum sound reduction of 29 dB(A). For these worst-affected facades, windows should not be left open for extended periods of time. The level of sound reduction required reduces with increasing distance from the railway line. Habitable rooms which do not have a line of sight to the railway line are likely to achieve the target internal noise levels with open windows for ventilation and therefore are unlikely to require any specific acoustic mitigation measures.</li> </ul>

<b>4.10</b>	<b>Vibration</b>
4.10.1	An assessment of the measured vibration levels identifies that vibration levels within a building in the area closest to the railway line are likely to fall within or below the BS 6472-1 “low probably of adverse comment” range. It is concluded that vibration mitigation measures are not required for this development.
<b>4.11</b>	<b>Lighting</b>
4.11.1	Efficient internal and external lighting will be used throughout the development, ensuring 100% LED installation. All external lighting will include for areas of security, PIR sensors and dusk till dawn activation.
	<b>Health and Wellbeing</b>
<b>4.12</b>	<b>Daylight</b>
4.12.1	The Daylight and Sunlight Study has not been carried out at this stage.
<b>4.13</b>	<b>Private Open Space</b>
4.13.1	Cherwell District Council North Oxfordshire council requires the provision of appropriate open space should be provided as part of the development.  The provision of open space for residents will in part be provided, opening up of the riverside, with walking, jogging and cycle routes through the site and two new potential river crossing, as illustrated on the submitted plans and public consultation boards.
<b>4.14</b>	<b>Sound Insulation</b>
4.14.1	Sound insulation will be provided on all separating walls and floors between habitable spaces to meet Building Regulations Part E requirements. A testing regime will be provided by the appointed acoustic consultants at detailed design stage which will then be approved by Building Control.
	<b>Management</b>
<b>4.15</b>	<b>Construction Site Impacts</b>
4.15.1	Construction has the potential for major pollution, mostly through pollution to air (through dust emission) and to water via water courses and ground water. To minimise construction site impacts the contractor will adopt best practice policies in respect of air (dust) pollution and water (ground and surface) pollution occurring, as set out in the Air Quality report.  Also, in order to minimise the potential impact of construction on local residents and businesses surrounding the application site, a number of mitigating measures would be implemented and enforced throughout the duration of the construction period. This includes following the Dust Management Plan (DMP) that will be incorporated within an overall Construction Management Plan that will be secured by condition

	<p><b>Security</b></p>
<b>4.16</b>	<p><b>Security Features</b></p>
4.16.1	<p>Significant importance has been given to the security of the prospective occupants of the building. The scheme will therefore provide a secure development with a new residential population that provides natural surveillance to surrounding streets. It is proposed to design the scheme to achieve Secured by Design requirements.</p> <p>The scheme will provide good quality lighting at all entrances to provide convenient, secure access to the development.</p> <p>The refuse stores and cycle storage area will be provided with a good level of internal and external lighting to encourage responsible use and provide safe access for residents.</p>
<b>4.17</b>	<p><b>Part Q Building Regulations</b></p>
4.17.1	<p>The proposed development will comply with Part Q Building Regulations whereby all doors, ground floor and easily accessible windows will be compliant with PAS 24:2012. All entrance doors will be fitted with controlled access for residents.</p>
<b>4.18</b>	<p><b>Ecology and Biodiversity</b></p>
4.18.1	<p>Cherwell District Council North Oxfordshire Council requires new developments to consider ecology and biodiversity aspects of the development site.</p> <p>The Site is dominantly made up of low ecological value habitats, buildings, hard standing, amenity grassland and scattered scrub. The dense/continuous scrub running along the western boundary between the site and River Cherwell has some ecological value, but it is not a Habitat of Principal Importance (HPI). Additionally, all buildings on the site were assessed to have negligible potential to support roosting bats.</p>
4.18.2	<p>Ecological impacts will be easily mitigated and indeed enhanced in the form of elements such as green roofs and the opening up of the River Cherwell to allow light for emergent/marginal plants to colonise, benefiting a range of protected and notable species:</p> <ul style="list-style-type: none"> <li>• Installation of Bat boxes within suitable retained trees,</li> <li>• Provision of bird boxes on retained mature trees within the site and within the fabric of the buildings itself, if practical.</li> <li>• Pre-work check for otter holts and water vole burrows so not impacted before construction works.</li> <li>• Areas of hedge and scrub should be searched prior to removal to check for the presence of hedgehogs etc.</li> <li>• Enhancing the river corridor to benefit biodiversity</li> <li>• Enhancing the site for invertebrates with insect hotels and wildflower/ grassland planting.</li> <li>• Landscape planting to benefit biodiversity with pollinator friendly species.</li> </ul>



<b>4.19</b>	<b>Transport</b>
4.19.1	Cherwell District Council North Oxfordshire Council has a long term transport strategy outlining their commitment to improving transport options and reducing overall air pollution.
4.19.2	A review of the local highway network and collision data in the vicinity of the site indicates that there are no apparent problems in relation to the current operation or safety of the local highways;
4.19.3	The site is well located for convenient access to a range of services and amenities in addition to public transport linkages to additional facilities further afield;
4.19.4	The site is fully compliant with local and national planning policy guidance;
4.19.5	The site access arrangements are safe and appropriate and have been designed in accordance with the prevailing national and regional design guidance;
4.19.6	Parking provision on-site will be suitable to negate any adverse impact upon the local highway network; and the proposed development will not have a severe impact on the operation of the local highway network and the surrounding off-site junctions. All spaces will incorporate Electric Vehicle (EV) charging points for residents benefit.
<b>4.20</b>	<b>Summary and Conclusions</b>
4.20.1	The sustainability approach has been developed to meet the targets and standards set by the relevant planning policies. The proposed development has incorporated a number of key sustainability measures and features which are summarised in the table below.
4.20.2	The development will increase the sustainability of Banbury by promoting the regeneration of brownfield land, providing access to nature through the opening up of the riverside, encouraging walking, jogging and cycling. This new route along the River Cherwell will bring much improved connectivity.
4.20.3	This Sustainability Statement demonstrates that the proposed development is targeting good standards of design and build-quality. Much attention has been given to reducing the environmental impact throughout the lifetime of the development and not just during occupation.  In conclusion, this report demonstrates that the proposed development can meet the sustainability planning policy requirements. The design team has carefully considered the site's potential environmental impacts, which will be managed and mitigated in line with the relevant planning policies.

Issue	Proposed Key Sustainability Measures
<b>Energy</b>	<ul style="list-style-type: none"> <li>• Good levels of passive design standards and energy efficiency measures for the whole development can be used to achieve CO<sub>2</sub> reduction.</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>• All dwellings within the proposed development will be provided with water efficient fixtures and fittings to reduce water consumption below 105 litres per person per day.</li> </ul>
<b>Materials</b>	<ul style="list-style-type: none"> <li>• All timber and timber-based products used on the project will be legally harvested and traded timber.</li> <li>• Any opportunities to re-use and/or recycle demolition materials will be identified and pursued, where feasible.</li> <li>• The insulation will be specified with a global warming potential (GWP) of less than 5 where feasible.</li> </ul>
<b>Flood Risk and Surface Water Management</b>	<ul style="list-style-type: none"> <li>• The development is located within Flood Zone 2 and as such is at a low risk of flooding from fluvial and tidal sources.</li> <li>• Inclusion of the wider SuDs attenuation systems of the master planning scheme.</li> </ul>
<b>Waste</b>	<ul style="list-style-type: none"> <li>• The proposed development will incorporate appropriately sized and located external waste and recycling storage facilities.</li> <li>• Dedicated internal refuse and recycling storage facilities are proposed to accommodate the waste streams associated with the use of residential units.</li> <li>• The storage of construction materials has been identified as an area where material wastage can be reduced. The majority of waste can be due to poor housekeeping. Good housekeeping techniques will be adopted by site operatives to reduce material losses and waste.</li> </ul>
<b>Pollution</b>	<ul style="list-style-type: none"> <li>• Insulating materials for the proposed development will be specified with a Global Warming Potential (GWP) of less than 5, where feasible.</li> <li>• NO<sub>x</sub> emissions arising from the operation of the boilers for space heating and hot water systems will be low as there will be no Gas fired equipment.</li> <li>• Public transport facilities including maps and timetables (where required), details of cycle storage etc., residential occupants will be provided with a Home User Guide to try and make the best use of these facilities and reduce pollution.</li> <li>• External lighting will be minimised by incorporating daylight and presence detection as appropriate.</li> <li>• High quality sound insulation is expected to be provided on all separating walls between habitable spaces to improve indoor comfort by reducing the likelihood of nuisance due to noise transmission.</li> <li>• Use of suitably specified glazing and acoustically attenuated ventilation, have been recommended to reduce to a minimum the adverse impact on health and quality life arising from environmental noise.</li> </ul>
<b>Health and Wellbeing</b>	<ul style="list-style-type: none"> <li>• It is anticipated that all key rooms in the apartments will be achieving good daylight factors.</li> <li>• Sound insulation for separating walls and floors will be improved beyond Building Regulations requirements. The proposed dwellings will be provided with gardens or balconies.</li> </ul>
<b>Management</b>	<ul style="list-style-type: none"> <li>• To minimise construction site impacts the contractor will adopt best practice policies in respect of air (dust) pollution and water (ground and surface) pollution occurring.</li> </ul>

	<ul style="list-style-type: none"> <li>• It is proposed to design the scheme to achieve Secured by Design requirements.</li> <li>• The development will comply with Part Q Building Regulations whereby all doors, ground floor and easily accessible windows will be compliant with PAS 24:2012. All entrance doors will be fitted with controlled access for residents.</li> <li>• Residential occupants will be provided with a Home User Guide to help them understand and operate their homes more efficiency and make the best use of local facilities.</li> </ul>
<b>Ecology and biodiversity</b>	<ul style="list-style-type: none"> <li>• A number of recommendations and mitigation measures have been proposed to protect the ecological features of the site to ensure that the development is compliant with legislation and policy regarding these protected and priority species.</li> <li>• Ecological enhancements to increase the ecological value of the land will be implemented which will include implementation of native tree and scrub planting scheme, retention of logs on site for hibernacula, and incorporation of bat and bird boxes into the development.</li> </ul>
<b>Transport</b>	<ul style="list-style-type: none"> <li>• The proposed development and mitigation measures have been designed to maximise the potential for sustainable travel and minimise any impacts on the local transport networks. The proposed development is therefore considered to be sustainable and appropriate.</li> </ul>

APPENDIX 1: ENERGY STRATEGY STATEMENT

The Energy Strategy for the development has been formulated following the Energy Hierarchy: Be Lean, Be Clean and Be Green. The overriding objective in the formulation of the strategy is to maximise the reductions in total CO<sub>2</sub> emissions through the application of this hierarchy with a technically appropriate and cost-effective approach to minimise the emission of other pollutants. The energy strategy measures are summarised and presented in table 1.

**Table 1. Overall CO<sub>2</sub> Emission savings for whole development**

	CO <sub>2</sub> Emissions (Tonnes/Year)
	(SAP 10)
<b>Total Baseline</b>	<b>12.430</b>
<b>Be Lean total</b>	<b>9.204</b>
<b>Be Clean total</b>	<b>9.204</b>
<b>Be Green total</b>	<b>7.823</b>
<b>Overall tCO<sub>2</sub> Savings</b>	<b>4.607 (37%)</b>

**Table 2. GLA carbon reporting table, Carbon Dioxide Emissions after each stage of the Energy Hierarchy for the whole development**

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO <sub>2</sub> per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	12	9
After energy demand reduction	9	7
After heat network / CHP	9	7
After renewable energy	8	7

**Table 3. GLA carbon reporting table, regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for the whole development**

	Regulated domestic carbon dioxide savings	
	(Tonnes CO <sub>2</sub> per annum)	(%)
Savings from energy demand reduction	3	26%
Savings from heat network / CHP	0	0%
Savings from renewable energy	1	11%
<b>Cumulative on site savings</b>	<b>5</b>	<b>37%</b>
Annual savings from off-set payment	8	-

These result will be supported by further detailed energy reports, together with detailed calculations, as and when reserved matters are brought forward.

In summary, the proposed energy strategy for the development:

- Complies with Part L 2013 Building Regulations and meets TFEE requirements.
- Includes optimal building fabric standards, energy efficient design of building services and energy efficient appliances.
- Includes high efficiency designed to meet the hot water demand and supply space heating.
- Includes renewable energy technology.

Achieves the 35% regulated energy CO<sub>2</sub> emissions reduction requirement from LCZ or renewables.

APPENDIX 2: ALTERNATIVE RENEWABLE TECHNOLOGIES

	<p>This appendix presents an assessment of the renewable technology options relative to the site which are considered to be less suitable or unsuitable for this development.</p>
1.1	<p><b>Air Source Heat Pumps</b></p>
1.1.1	<p>The Air Source Heat pumps (ASHP) can be used as both a source of heating and cooling. ASHP use the same principle operation as GSHPs but uses air instead of water as a heat source. The downside is that the air temperature and therefore efficiency of the heat pump is reduced in cold weather when the heat is most needed. This means that one either needs to oversize ASHPs to take into account degradation in performance or, alternatively, provide an auxiliary electric heating system. Provision of an auxiliary heater reduces capital cost but adds to running costs and reduces carbon savings.</p>
1.1.2	<p>Outdoor air systems are widely implemented in the form of split systems, with indoor and outdoor units linked by refrigerant pipes running through the wall. Packaged air systems where outdoor air is ducted to an indoor package are also available.</p>
1.1.3	<p>Installation of the ASHPs on the roofs would require higher installation costs associated with support and access to the plant and greater need to consider noise impacts.</p>
1.2	<p><b>Ground Source Heat Pumps</b></p>
1.2.1	<p>The ground can be used as both a source of heating and a source of cooling. Ground source heating involves heat pumps, drawing heat from underground, whereas ground source cooling can either use heat pumps or make use of low temperature groundwater directly. Ground Source Heat Pumps (GSHP) are a relatively mature technology and utilise the energy in the ground through a refrigeration cycle. Where GSHP are used for both heating and cooling, depending on the season, this can be a very efficient solution. GSHP can be open loop or closed loop.</p>
1.2.2	<p>Open Loop GSHP system uses groundwater which is taken from an aquifer to supply heating or cooling. The water is then returned to the ground (sometimes via a borehole or sometimes via storm water drainage). Open loop systems require abstraction and discharge licences from the Environment Agency (EA).</p>
1.2.3	<p>Closed loop GSHP system comprises a sealed system of buried pipes, normally containing brine or water/antifreeze solution. The solution is circulated continuously around a closed system. This system requires extensive ground works to bury the coils that extract the low grade heat from the earth. They therefore require a large area for horizontal burial (40-100m long trench) or a vertical pile (50-100m) which is considerably more expensive but can be used where space is limited.</p>
1.2.4	<p>The ground conditions are currently unknown and may not be suitable to use an open-loop system. To assess ground conditions, it will be required to test bore holes.</p>



<b>1.3</b>	<b>Wind Turbines</b>
1.3.1	Wind turbines can range from small domestic turbines (1kW) to large commercial turbines (140m tall, 2MW). There are also different designs and styles (horizontal or vertical axis; 1 blade to multiple blades) to suit the location. They generate renewable electricity that can be provided for use on-site, or sold directly to the local electricity network.
1.3.2	Installation of large/medium scale wind turbine(s) could meet the renewable energy and carbon reduction targets however there is no appropriate space for the installation of large/medium scale wind turbines within the site.
1.3.3	<p>Vertical axis turbines have a lower performance than horizontal axis turbines but work better in urban environments. However, effective energy generation through small scale roof mounted wind turbines is not feasible due to the following:</p> <ul style="list-style-type: none"> <li>• The average wind speed at the site is estimated to be circa 5.1 m/s at 25 m above ground which is based on NOABLE Wind Map (the wind speed was taken from the Rensmart Wind Map). The wind speed is marginal for effective operation of a wind turbine;</li> <li>• Issues such as noise, telecoms interference and visual impact are likely to restrict installation of wind turbines;</li> <li>• Installation of wind turbines on the roofs will have a significant visual impact;</li> <li>• There will be risks associated with operation and maintenance of the turbines; and</li> </ul> <p>Taking into account the above, wind power is not recommended for this development.</p>
<b>1.4</b>	<b>Biomass Boilers</b>
1.4.1	Biomass boilers are now regarded as a conventional form of technology with a wide range of sizes and types to meet renewable targets. Biomass boilers use biomass as a fuel source, which is an alternative solid fuel to the conventional fossil fuels and has carbon emissions close to zero. Various types of biomass fuel are in use, the most common being wood chips and pellets.
1.4.2	Although pellets are more expensive than chips, they have greater energy content per unit of weight and require a lower storage volume. Pellet boilers also require less maintenance and produce considerably less ash residue.
1.4.3	There are some local/regional as well as national biomass suppliers who can supply biomass for the site. Biomass would need to be delivered to site in large trucks and the arrangements for supply and storage of the biomass fuel would need careful consideration. It would also require a suitable biomass storage space, which given the space constraints on this site is likely to be restrictive.

1.4.4	<p>The potential reduction in carbon emissions from the installation of biomass boilers can be considerable and this would likely meet the GLA's target for carbon emissions reduction from renewable energy sources. However, although biomass systems have a number of advantages, in the context of this development, the following issues prevent the installation of biomass boilers:</p> <ul style="list-style-type: none"> <li>• Likely significant negative impact on local air quality;</li> <li>• No space availability for fuel delivery and storage;</li> <li>• Significantly higher capital costs in comparison with gas boiler system;</li> <li>• Requirements of additional resources for management of the operation;</li> <li>• The location of the development may not be suitable for large-scale fuel delivery; and</li> </ul> <p>Security of biomass supply.</p>
1.4.5	<p>However, like CHP engines, biomass boilers are best designed to provide the base heating and already discussed the base heat demand profile for this scheme is low and not ideal for Biomass or CHP.</p>
<b>1.5</b>	<b>Solar Thermal</b>
1.5.1	<p>Solar Thermal heating systems can contribute to the hot water demand of a dwelling or building. Water or glycol (heat transfer fluid) is circulated to roof level where it is heated using solar energy before being returned to a thermal store in the plant room where heat is exchanged with water from the conventional system. The solar water systems are usually sized to provide circa 60% of the total hot water demand.</p>
1.5.2	<p>The use of solar thermal systems is inappropriate for this development on the basis that the base hot water load is low and not sufficiently large enough to justify its selection.</p>
1.5.3	<p>In addition, the system will produce relatively small CO<sub>2</sub> savings but will have significant negative impact of the cost of the heating system and its practicability. Therefore, solar thermal systems are not recommended for this development.</p>