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**Net Zero &
Sustainability
Statement**

MM Properties (London) Limited

Broadfields Innovation and Business Park

Final v3

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Executive Summary

This Net Zero & Sustainability Statement accompanies the Outline Planning Application (all matters reserved apart from access) for the proposed development of Broadfields Innovation and Business Park in Brentwood. The central component of the sustainability strategy for the site is a commitment by the applicant to deliver a net zero carbon development, covering both embodied and operational CO₂ emissions. It is therefore a comprehensive and total net zero commitment, aligning closely with the UKGBC definition, and exceeds all local and national policy objectives pertaining to zero carbon development.

When delivered, it will represent a site at the forefront of low carbon design and operation.

The proposed development will comprise demolition of existing buildings and construction of new buildings to provide up to 32,000m² of non-residential space. This will predominantly consist of industrial units with office components.

The net zero strategy consists of the following measures and commitments:

- > A considered approach to the specification and resourcing of materials high in associated CO₂ emissions. This will focus particularly on how concrete and steel/aluminium-based materials can be used in the most sustainable way, incorporating recycled content and reducing wastage as far as possible.
- > An energy efficient design of buildings which promotes low energy usage, with all fabric elements (walls, floor, roofs, glazing) in office/administrative areas being insulated to achieve a very high standard of thermal efficiency. Where fitted out by the applicant, these spaces will also be provided with low carbon services such as ventilation with heat recovery, LED lighting, and heat pumps.
- > Adaption of building designs to maximise passive energy benefits. As lighting is expected to be one of the largest energy demands in the buildings, a design which maximises daylight penetration through the use of rooflights and 'light' cladding will be particularly beneficial. For the office areas where space heating/cooling needs are likely to be higher, orientation of glazing to maximise solar gains in cooler months and minimise summer overheating will ensure the delivery of comfortable and low energy spaces throughout the year.
- > An extensive installation of photovoltaic (PV) generating capacity across the site. In total, this could exceed 1MW of renewable power which could offset more than 3,000 tonnes of CO₂ emissions. A significant quantity of renewable power generation on site will also assist in reducing the developments burden on the local electricity supply and will reduce the energy costs for building occupants.

Wider sustainability measures include:

- > An ultra-rapid electric vehicle (EV) charging station for up to 16 vehicles. 8 x 150kW dual charging points are proposed, with the facility significantly enhancing the boroughs supply of ultra-rapid public charging points. Using these, cars could be fully charged in less than 30 minutes. Such installations are very hard to accommodate due to their large power requirements and so are often only viable when supplied as part of wider new development;
- > At least 20% of all car parking spaces on the development will be provided with EV charge points. This exceeds the requirements of the recently introduced Building Regulations Part S.
- > A BREEAM standard of ‘Excellent’ throughout the site. This represents a high standard of sustainable construction and addresses multiple environmental considerations such as water use, waste strategy, and biodiversity.

Whilst the development will represent the highest standards of sustainable development, reducing both embodied and operational CO₂ emissions well below current build standards, it is not possible to deliver a total zero carbon development on the site itself. This is predominately due to the proportionally high embodied emissions which are associated with industrial buildings.

The developer is nonetheless committed to delivering a net zero development. As such, the remaining CO₂ emissions (calculated at 9,836 tonnes in this outline assessment) are to be offset through financial contributions to a combination of global and local low carbon projects. The developer is therefore ensuring that both the global nature of the climate emergency and the local desire for low carbon investment is addressed.

The total offsetting contribution has been calculated to be £602,455, of which £467,210 is for the local borough and is to be ringfenced to allow the council to invest in chosen projects, which could include (as examples) energy efficiency retrofits in schools and hospitals, or water reduction technologies in council properties. It is proposed that 50% of this is to be paid upon commencement, with the remaining balance to be paid prior to occupations.

The table, below, shows the results of the net zero carbon assessment.

Element (Carbon)	CO₂ Emissions (Tonnes)
Embodied	11,204
Operational (25 years)	1,956
PV Benefit (25 years)	-3,324
Total (to be offset)	9,836

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1. INTRODUCTION

- 1.1 This document has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development, appointed by MM Properties (London) Limited in order to accompany the Outline Planning Application.
- 1.2 This Statement sets out the definition of net zero carbon and the sustainable design and construction measures which are to be included in the proposed development at Broadfields Innovation and Business Park, Brentwood.
- 1.3 Where CO₂ emissions are referenced within this report it refers to CO₂ equivalent, which incorporates global warming effects of related emissions such as methane and nitrous oxide.

2. DEVELOPMENT OVERVIEW

- 2.1 The proposed development site at Broadfields in Brentwood is located approximately 4 miles east of the M25, south of the A127 Southend Arterial Road at the A128 junction with Tilbury Road. The location is shown in Figure 1 below.

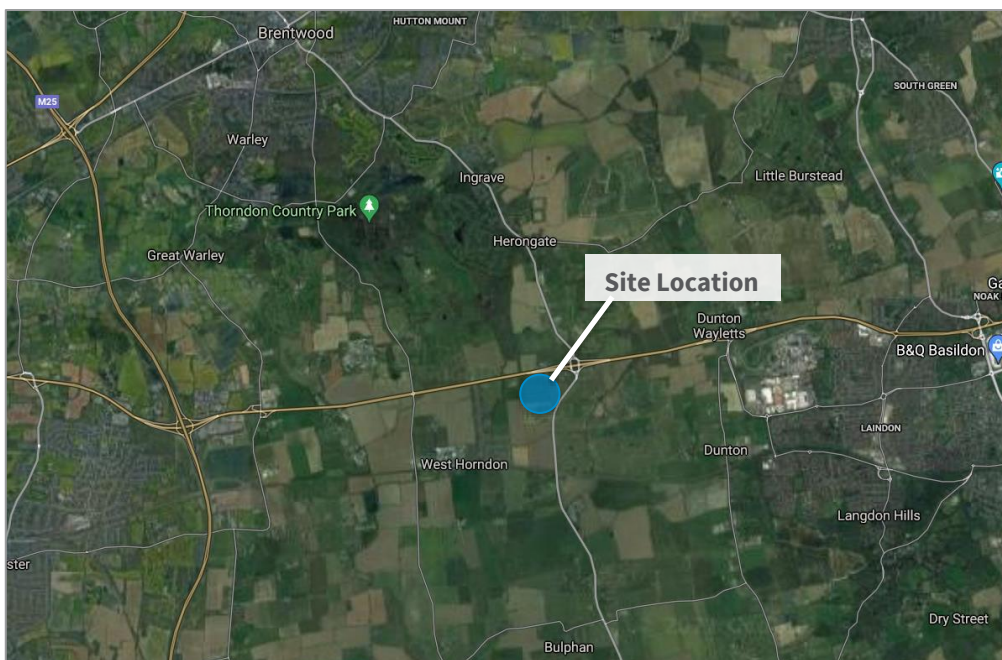


Figure 1: Site Location – Map data © 2021 Google

- 2.2 The existing site is 29.6 acres in size and currently comprises a single residential dwelling and garden, some outbuildings in commercial use and unmanaged grazing and scrubland.

Proposed Development

- 2.3 The proposed development is described as follows:

“Outline planning application with all matters reserved except access for development of up to 32,000 sqm of employment floorspace within Use Classes E(g), B2 and B8 including an enterprise hub of micro and small units for small businesses, an ultra rapid electric vehicle charging facility for 16 cars and a childrens play area”.

3. RELEVANT PLANNING POLICY & BUILDING REGULATIONS

Planning Policy

- 3.1 In addition to the developer’s belief that there is overwhelming need to reduce CO₂ emissions, the following planning policies and requirements have informed the sustainable design of the proposed development.

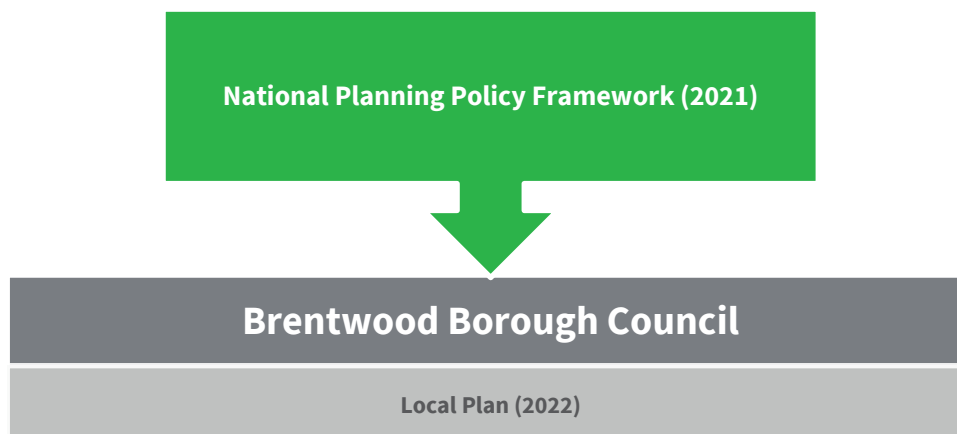


Figure 2: Relevant Planning Policy Documents

National Policy: NPPF

- 3.2** The revised National Planning Policy Framework (NPPF) was published on the 20th July 2021 and sets out the Government’s planning policies for England.
- 3.3** The NPPF provides a framework for achieving sustainable development, which has been summarised as “meeting *the needs of the present without compromising the ability of future generations to meet their own needs*” (Resolution 42/187 of the United National General Assembly). At the heart of the framework is a **presumption in favour of sustainable development**.
- 3.4** The document states that the planning system has three overarching objectives which are interdependent and need to be pursued in mutually supportive ways:
- a) An economic objective** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
 - b) A social objective** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being; and
 - c) An environmental objective** – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

Local Policy: Brentwood Borough Council

- 3.5** Brentwood Borough Council’s Local Plan was adopted in March 2022 and sets out how the area will develop from 2016 to 2033. The following policies are considered relevant to this Statement:
- 3.6 Strategic Policy BE01: Carbon Reduction and Renewable Energy** requires the following:
- > All major development will be required to achieve at least a 10% reduction in carbon dioxide emissions above the requirements of Part L Building Regulations.
 - > New non-residential development will be required to achieve a certified ‘Excellent’ rating under the BREEAM New Construction (Non-Domestic Buildings) 2018 scheme.
 - > Wherever possible, application of major development will be required to provide a minimum of 10% of the predicted energy needs of the development from renewable energy. Where on-site

provision of renewable technologies is not appropriate, or where it is clearly demonstrated that the above target cannot be fully achieved on-site, any shortfall should be provided.

- 3.7 Policy BE02: Water Efficiency and Management** requires new non-residential development to meet BREEAM 'Excellent' rating in category Wat 01. Major developments and high or intense water use developments is expected to provide more substantial water management measures such as rain/ and grey water harvesting.
- 3.8 Policy BE03: Establishing Low Carbon and Renewable Energy Infrastructure Network** states that innovative approaches to the installation and/or construction of energy generation facilities or low carbon homes which demonstrate sustainable use of resources and high energy efficiency levels will be supported.
- 3.9 Policy BE04 Managing Heat Risk** requires development proposals to minimise internal heat gain and the risks of overheating through design, layout, orientation and materials.
- 3.10 Policy BE05: Sustainable Drainage** states that all developments should incorporate appropriate Sustainable Drainage Systems (SuDS) for the disposal of surface water, in order to avoid any increase in surface water flood risk or adverse impact on water quality. Greenfield developments, major development and all development within a Critical Drainage Area must achieve a greenfield runoff rate. Where it is demonstrated that this is not possible on brownfield developments then a runoff reduction of 50% minimum should be achieved. The technical approach should be justified in the Drainage Strategy.
- 3.11 Strategic Policy BE09: Sustainable Means of Travel and Walkable Streets** states that Sustainable modes of transport should be prioritised in new developments to promote accessibility and integration with the wider community and existing networks. Priority should be given to cycle and pedestrian movements and access to public transport.
- 3.12 Policy BE10: Sustainable Passenger Transport** states that development proposals should protect and enhance existing passenger transport and their capacity.
- 3.13 Policy BE11: Electric and Low Emission Vehicle** requires all development proposals should wherever possible maximise the opportunity of occupiers and visitors to use electric and low emission vehicles and maximise the provision of electric vehicle charging/plug-in points and/or the space and infrastructure required to provide them in the future.
- 3.14 Strategic Policy NE02: Green and Blue Infrastructure (GBI)** states that new development is expected, where possible and appropriate, to maximise opportunities to enhance or restore existing GBI provision and/or create new provision on site that connects to the wider GBI network. Its design and management should also respect and enhance the character and distinctiveness of the local area.

4. DEFINITION OF NET ZERO CARBON

- 4.1** Policy BE 03 of the Adopted Local Plan requires new non-residential development to achieve a 10% reduction over Part L 2013 up to 2020, and 2020 onwards is to be in line with ‘national nearly zero carbon policy’. Despite there currently being no such national zero carbon policy for buildings, MM Properties (London) will deliver a net zero carbon development in this location.
- 4.2** Net zero carbon will be defined as per the UK Green Building Council’s (UKGBC) definition:
- > **Net Zero Construction:** When the amount of embodied CO₂ emissions associated with a building’s product and construction stages up to practical completion is zero, using offsets or the net export of on-site renewable energy.
 - > **Net Zero Operational Energy:** When the amount of CO₂ emissions associated with the building’s regulated operational energy on an annual basis is zero. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset.

Outline Assessment

- 4.3** The assessment for this outline application will account for emissions which will or at least are likely to be a direct result of the buildings delivered by the applicant. As the applicant will be delivering buildings predominantly as shells with only a basic level of fit-out in specific areas, the scope of a net zero assessment needs to reflect this.
- 4.4** The following table depicts the scope which is considered to best address this.

Table 1: Net Zero Scope

Embodied CO ₂		Operational CO ₂	
Scope	Period	Scope	Period
Materials (A1-A3)	60 years (following RICS guidance)	Offices – base fit-out	25 years (as per equipment lifecycles)
Transportation (A4)		Enterprise Hub - base fit-out	
Construction Site Impacts (A5)		Warehouse Space – fixed lighting	

- 4.5** A 60-year period is to be accounted for in the embodied assessment. This reflects principles established in BS EN 15978:2011 and RICS guidance. However, it should be noted that in terms of embodied emissions, the timespan accounted for has little impact on calculated emissions. This is because emissions associated with materials and construction activities have already been released to atmosphere prior to the buildings being occupied.

- 4.6 A 25-year period is to be accounted for in the operational assessment. As operational emissions are related to energy-use, with CO₂ emissions a function of the equipment used to deliver that energy, it is not considered appropriate to account for emissions which would occur beyond the maximum expected lifespans of installed equipment. It should be noted that this also applies to any renewable generating installations, so does not necessarily signpost a means of reducing the net zero obligations to the applicant.
- 4.7 For reassurance, should a full 60-year lifecycle assessment for operational emissions (as per RICs methodology) be conducted, the overall net site CO₂ is not expected to be greater than when the proposed methodology is followed. However, as explained, this is not considered to represent the most appropriate approach for this development.
- 4.8 Further information on the scope of the embodied and operational assessment is provided in the following two chapters.

Updated Assessments Post-Planning

- 4.9 The applicant is content to be conditioned to undertake more detailed net zero carbon assessments as part of reserved matters applications. This will enable more information bespoke to the project to be accounted for which is currently unavailable due to the outline nature of the proposals.
- 4.10 The site may seek to be officially certified under an approved net zero carbon assessment.
- 4.11 Any further reassessments should align with the methodology put forward in this section, in order to ensure consistency between both outline and reserved matters applications. This includes a recalculation of any offsetting obligation (this is explained in more detail in chapter 6).

5. EMBODIED CARBON

- 5.1 The applicant is committed to accounting for and reducing embodied carbon to the lowest level which is practically attainable. It should be noted that there are no specific local or national policy requirements that look to reduce embodied carbon, so the development is going above and beyond normal build standards.
- 5.2 Considering this, the applicant will look to reduce their embodied CO₂ emissions through an array of design measures.
- 5.3 Embodied carbon is the carbon footprint of a material. This includes the embodied emissions from the raw extraction of the material, processing, transport to site and the construction on site. These

processes are described by RICs as Modules A1 – A5, also know as cradle to practical completion (i.e. handover).

- 5.4** An embodied carbon assessment of one proposed industrial unit has been undertaken. This is based on a typical industrial building which is composed of 10% office space and 90% warehouse space. The operational elements are accounted for and considered in chapter 6. Modules C1-C4 and Module D have not been accounted for in this assessment as the developer will not be acting as the estate manager.
- 5.5** The results for modules A1 – A5 are as follows, with the results proportioned to reflect the full site in the righthand column.

Table 2: Embodied Carbon Assessment Results

Life Cycle Module	Total kgCO₂ – Single Unit	Total kgCO₂/m² GIA– Single Unit	Total Tonnes CO₂ – Full Site of 32,000m²
A1 – A3 Materials	2,114,834	325.36	10,412
A4 - Transport	39,163	6.03	193
A5 – Site Operations	121,888	18.75	600
Total	2,275,885	350.14	11,204

- 5.6** As can be expected, materials (A1 – A3) make up 93% of the total whilst A4 and A5 make up the remaining 7%. The total predicted embodied emissions for the development have been calculated to be 11,204 tonnes.
- 5.7** Whilst operational carbon is very important to the applicant, and energy efficiency initiatives are being factored in during design, most of the carbon within an industrial building is ‘locked’ in at the beginning and it is not something that can be corrected later. Therefore, a series of initiatives for the proposed development were modelled and the carbon savings reviewed through the embodied carbon assessment. These measures are outlined below:
- > Ground Granulated Blast-furnace Slag (GGBS) 50% replacement within the foundations.
 - > Structural steel roof with 60% recycled content.
 - > Steel beams with 30% recycled content.
 - > Paint with recycled content.

- > Carpet (within offices) to have 100% recycled content.
- > GGBS 70% replacement for external materials.
- > All materials to be sourced within 100km of the site.

5.8 With these measures incorporated, the main sources of embodied carbon are still likely to originate from the use of concrete and steel in the structures. Breaking down the contents of table 2, further, the assessment shows the following contributions (in % terms) from certain build elements:

- > Concrete (for foundations and floor slabs) – 23%;
- > Steel & aluminium (for reinforcement and cladding) – 33%;
- > Photovoltaic (PV) panels – 28%.

5.9 The sizeable contribution towards the embodied carbon content of the buildings from PV panels should be considered against the significant operational carbon reduction benefit that it brings. It will be shown in chapter 6 that over the course of a typical 25 year lifespan for a PV system that it will be a net carbon benefit for the site (i.e. that the carbon offset from renewable generation will exceed the embodied content).

5.10 Further design measures will be reviewed and explored throughout the design to further reduce these embodied emissions where possible, these are outlined below.

- > Early engagement with the contractor and partnering within the supply chain will be required to ensure complete transparency and visibility throughout the supply chain.
- > Consideration of sustainable fuel use and even more energy saving measures during construction. This could include the use of biodiesel in construction machinery and vehicles.
- > The future demolition and deconstruction of the development will be considered at the design stage. Consideration to be given to ways to facilitate dismantling, such as keeping the use of welding to a minimum (although it is acknowledged this may not always be possible). This is key for the efficient recovery of the materials at the end of their life and makes it easier to preserve the value of the material for future use.
- > Similarly, a maintenance and repair schedule will be produced during the design life of the development to ensure that specific materials and pieces of equipment are able to remain in situ during their expected lifespan.

5.11 The developer may develop an embodied carbon strategy as part of the initial design to ensure principles are embedded throughout the project. This could be reviewed and updated as the project develops.

- 5.12** When assessments are undertaken in more detail at the detailed design/reserved matters stages these considerations will be taken forward and developed further. The developer is content with third-party assessment of the embodied carbon assessment at a later date, if sought by the council.

6. OPERATIONAL CARBON

Methodology

Regulated vs Unregulated Emissions

- 6.1** A building's operational emissions result from a number of different energy uses, which can be broadly split into two areas.

Regulated

- 6.2** The first, known as regulated emissions, covers activities which are strongly influenced by the design of a building, and can be affected significantly from decisions made at a relatively early stage of a building's conception. Achieving a minimum standard of regulated emissions for buildings is covered within Part L of the Building Regulations and Brentwood planning policies.
- 6.3** Regulated emissions result from regulated energy uses, which include a building's space heating, hot water, cooling, internal fixed lighting, and ventilation demands.

Unregulated

- 6.4** The second, known as unregulated emissions, considers all building energy uses not covered by the regulated definition. Unregulated energy uses include plug-in loads (such as IT equipment and kitchen appliances) and bespoke systems utilised in commercial premises (such as stationary machinery). Unregulated emissions are very difficult to forecast, especially in commercial buildings where fit-out works to adapt the space to incoming tenants can be very bespoke.
- 6.5** It is worth noting that although there is a strong link between a building's energy usage and the operational CO₂ emissions it generates, the two are not directly linked in all instances. Two identical buildings may have the same heating demands, for instance, but if one were to provide this energy from a gas boiler and the other from a heat pump, the operational CO₂ emissions would differ significantly.
- 6.6** This outline energy strategy will predominantly focus on regulated emissions (and thus regulated energy uses), as this reflects where decisions made by the applicant during the design process will have tangible consequences on the building's operational emissions. A commitment to be net zero

carbon will therefore consider regulated operational emissions, in addition to embodied emissions (discussed in the previous chapter). This is especially pertinent as it is expected that large portions of the buildings will be delivered as shells, which is likely to mean that even some decisions associated with regulated emissions (such as the choice of heating system) may not be made by the applicant. Nonetheless, strong endeavours to ensure systems which do not detract from the net zero commitment will be set out, such as the decision not to supply gas for the purpose of heating to any of the buildings.

- 6.7** It is worth stating that pursuing a net zero strategy should enable the requirements of Policy BE03 to be achieved for the site.

Energy Calculations

- 6.8** The estimated energy demands have been calculated using Simplified Building Energy Model (SBEM) software, using the National Calculation Method (NCM 2021 Edition). SBEM calculates the regulated energy demands associated with hot water, space heating and fixed electrical items, as well as unregulated energy demands.

- 6.9** Sample SBEM calculations have been carried out on the following spaces:

- > Office (standard occupancy);
- > Warehouse – only fixed lighting demands have been accounted for.

- 6.10** Energy demands from these calculations have been undertaken on the basis of an ambitious but deliverable on-site energy strategy, which shall be set out below.

- 6.11** It should be noted that as this is in support of an outline application, it is expected that opportunities will arise to refine assumptions and calculations when more information about the specific development proposals is available.

CO₂ Emissions

- 6.12** As stated in point 6.5, CO₂ emissions from energy use will be dependent on both equipment (i.e. efficiency) and fuel source (i.e. gas or electricity) used. However, in terms of the electricity grid, CO₂ emissions are also time dependent. This is because since the early 2010s the electricity grid has been undergoing a continual trajectory of decarbonisation. The onboarding of significant renewable generating capacity – particularly wind power – in combination with the phasing-out of coal-fired power stations has reduced the carbon intensity of the electricity grid considerably over the past decade.

- 6.13** Importantly, all projections point to this trajectory continuing throughout the 2020s and into the 2030s. As such, the emissions associated with using grid electricity to meet energy demand are

expected to decrease over time. The CO₂ emissions factors for the electricity grid for three fixed points in time are shown in the table, below.

Table 2: Grid CO₂ Factors

Year/Period	Grid Projection (kg/CO₂/kWh)
2013 – 2015 (SAP 2012 emission factors, as used in Part L 2013)	0.519
2020 – 2025 (SAP 10.2 emission factors, as used in Part L 2021)	0.136
2030 (Treasury Green Brook Projection)	0.053

6.14 Emissions based on an average carbon intensity of grid electricity for the period 2020-2025 have been used to calculate operational CO₂ emissions in this assessment as this best represents the present-day emissions. However, as operational emissions for a period of 25-years are being accounted for in the net zero scope it may be beneficial for the operational part of the net zero assessment to be updated every few years.

Designing in Energy Efficiency

6.15 It is envisaged that a significant proportion of the space provided by the applicant is likely to be for flexible industrial uses, such as a high-tech manufacturing warehouse, logistics depot, or specific factory use. It has been advised that up to 10% of these buildings could be self-contained offices. In addition to this, up to 3,200m² has been reserved to act as an innovation and enterprise hub. Due to the smaller size of the individual units 30% of this area has been assumed to be office space.

Office Areas

Fabric Provisions

6.16 These aspects of the development are likely to be subject to the requirements of Part L2A due to the provision of active heating and cooling. This is to facilitate a comfortable working environment.

6.17 These areas are likely to be treated as separate buildings from the larger industrial spaces, even when both are housed within the same structure. This is to ensure heating and cooling within these areas does not leak into the surrounding structure where it is not sought, therefore increasing the demands (and thus emissions) of the heating and cooling systems. All fabric

elements (glazing, walls, floors, and roofs) between these areas and either the wider structure or the outside will therefore be insulated to achieve U-values at least as good as the Part L2A standards in place at the time of the build.

- 6.18** Glazed areas will also ensure an optimum balance is found between facilitating radiative gains in winter months (which reduce space heating needs) and reducing the same gains in summer months (therefore reducing the cooling demands). Shading from overhangs and other external features will assist the provision of solar controlled glazing and will be considered as part of this optimisation as the design evolves. Emphasis will also be placed on enabling good levels of daylight to penetrate throughout these spaces, thereby reducing lighting demands.

Services

- 6.19** The applicant is unlikely to be providing all the heating and cooling infrastructure to the office/enterprise hub areas. However, it is becoming increasingly common for such spaces to be both heated and cooled through highly efficient Air Source Heat Pumps (ASHPs). These use electricity (to assist in the extraction of heat from environmental 'sinks' - in this case, the air) and upgrade it for use in a building's heating circuit. A reverse approach enables cooling to also be provided for the summer months. As they are both highly efficient (3-4 times more than a standard gas boiler) and use increasingly clean grid electricity to run, very low CO₂ emissions are associated with their operation. The developer will utilise a form of heat pump to provide all space heating and cooling needs to these spaces where they are undertaking fit-out works. It is assumed that where fit-out is conducted by occupiers the same will occur.
- 6.20** Hot water demands in such spaces are generally low, with small kitchens and bathrooms the main usages. It may therefore prove more appropriate to deliver hot water from localised direct electric systems, rather than from a hot water cylinder linked to a heat pump. The relatively low hot water demands would still be met using clean grid electricity, therefore keeping CO₂ emissions low.
- 6.21** Ventilation systems which include heat recovery functions (MVHR) could also be provided to the office/administrative areas. When combined with a high standard of air tightness this can provide a significant reduction on the space heating demands from the heating equipment.
- 6.22** One of the largest regulated energy uses in these spaces is likely to be the lighting. Should some lighting be provided, the intention would be to ensure any fittings are highly efficient LEDs, with controls which react to occupancy/movement and change as a result of daylight levels (where the building design permits sufficient daylight entry).

Outline Specification

- 6.23** In line with the design principles set out above, the following specification for the office has been assumed for the outline net zero assessment. It should be noted that this specification comfortably complies with Part L 2021 requirements.

Table 3: Indicative Specification A

Element	Target
Walls (to outside or unheated spaces)	0.20 W/m ² .K
Floor	0.10 W/m ² .K
Roof (if applicable)	0.11 W/m ² .K
Glazing	1.3 W/m ² .K with solar control glazing (g-value)
Air Permeability	3.5 m ³ /h.m ²
Ventilation	MVHR (mechanical ventilation with heat recovery) – heat recovery 85%+
Lighting	130 lm/W (LEDs)
Heating/Cooling	ASHPs (air source heat pumps) – COP of 4.6 for heating & 6.7 for cooling
Hot Water	Direct electric, or via ASHPs with hot water cylinder

Industrial Areas

- 6.24** Most of the space on this site to be provided by the applicant will be for industrial uses. It is not possible at this stage to know what the specific uses for these spaces will be, with the individual tenants for these units not known for potentially years to come. They are also likely to bring bespoke fit-out requirements when they are known, specific to the needs of their organisation.
- 6.25** It is therefore more difficult to demonstrate a standard of net zero carbon with these unknowns. The scope for this assessment has only considered fixed lighting demands for these spaces, on the basis that this is the only element that may be provided at the point the buildings are delivered.
- 6.26** Nonetheless, key principles will be outlined to enable a trajectory toward net zero carbon buildings once the occupations have taken place.

- 6.27** As all building energy use is expected to originate from a mix of grid electricity and site renewables, CO₂ emissions associated with the buildings are strongly linked to a decarbonising energy source into the future.

Services

- 6.28** Industrial buildings of the type proposed at Broadfields are often only heated to temperatures sufficient to avoid condensation or frost problems. It is likely that these areas would then qualify for the low energy exemptions within Part L2A, meaning that the compliance metrics that the office/enterprise hub spaces must achieve do not apply. The cleanest form of heating is the heat that is never generated in the first place, so the likely low heating needs of these buildings demonstrates an important low carbon principle.
- 6.29** Where heating to a higher temperature is required for comfort reasons, it is more likely to be in localised areas such as a workstation or a sorting area. This would effectively qualify as an unregulated energy use, but even so the applicant will endeavour to promote clean and efficient means of doing so with prospective tenants. As gas connections for the purpose of heating will not be provided, it should provide confidence that low carbon solutions will be reached.
- 6.30** If a specific unit requires heating to the whole space, it is likely to be through a treated air system. Under such a scenario, appropriate zoning of systems and the use of an electric-based system will ensure an efficient and low carbon solution is reached.
- 6.31** As per the offices, lighting is likely to represent one of the largest regulated energy uses. Whilst it is unclear as to the level of services that the applicant may provide for these shell spaces, it is possible to design in a significant contribution of rooflights to assist in the delivery of natural light, therefore keeping lighting energy demands down. Consideration of other uses of the roof (such as PV panels and other plant) will need to be made, but this presents an effective way for the applicant to facilitate a reduction in operational emissions.
- 6.32** Where lighting is provided and is accounted for in this net zero assessment, it has been assumed that this will all be LEDs and be capable of operating at ~143 lm/W. Consideration will also be made for translucent cladding to reduce lighting needs.

Operational Emissions – Summary

- 6.33** The energy demands and associated CO₂ emissions from the aforementioned measures are shown in the table, below, for the total 32,000m² of proposed building space. A total of 1,956 tonnes of CO₂ have been projected for a 25-year period, based on emission factors for the 2020-2025 period.

Table 4: Operational Energy Demands (regulated)

Use	Scheme Area (m ²)	Energy (kWh/m ² /yr)				Total - Tonnes of CO ₂ for 25 years
		Heating and Cooling	Lighting	Ventilation	Total	
Office (30% of Innovation Hub, 10% of remainder of development)	3,840m ²	8.33	6.74	2.33	17.4	227
Warehouse Space	28,160m ²	-	18.06	-	18.06	1,729
Totals					35.46	1,956

Generating Zero Carbon Energy

- 6.34** The applicant is committed to the delivery of buildings which are energy efficient and clean in operation, and where CO₂ emissions have been reduced through a considered process relating to both embodied and regulated emissions.
- 6.35** In addition to the measures presented thus far, a significant installation of renewable generating technologies will be provided by the applicant. Most notably, the delivery of large industrial units allows for the installation of significant arrays of solar photovoltaic (PV) panels. The applicant intends to reserve as much space as possible on these roofs for this purpose.
- 6.36** Maximising renewable generation on the Broadfields site itself not only more closely reduces the building's emissions but also has the advantage of assisting with the energy management of the site. Measures which can reduce the load on the local electricity network from the site and provide an element of self-sufficiency to buildings, such as large PV installations, provide a number of benefits. This includes reduced operational costs for the building users.
- 6.37** The applicant will also liaise with prospective tenants as to whether they could consider energy storage systems for the site. This could include the consideration of battery storage to enable maximum usage of PV generated electricity on site, in addition to the more bespoke Uninterruptable Power Supply (UPS) systems which specific industrial uses may look for. Any decisions of the benefit of such systems should not be taken prior to obtaining sufficient site operational data, so it should be noted these would be unlikely to be installed prior to initial occupations.

6.38 On the basis that 50% of all roof area will be set aside for PV panels, it has been calculated that the development could accommodate 1.143MW of PV generating capacity. Over the operational assessment period of 25 years and using SAP 10.2 emission factors, this could offset 3,324 tonnes of CO₂.

6.39 As shown in table 4, the calculated operational CO₂ for the 25 year assessment period is 1,956 tonnes. The additional of 1.143MW of PV generating capacity therefore offsets all of these emissions and reduces the impact of the calculated embodied emissions. This is shown in the table, below.

Table 5: Total Site Emissions

Element	CO₂ Emissions (Tonnes)
Embodied	11,204
Operational (25 years)	1,956
PV Benefit (25 years)	-3,324
Total	9,836

6.40 The applicant will revisit the application of PV panels as the design evolves to ascertain whether the PV capacity can be increased further, or to consider the possibility of other renewable technologies should they prove to be of greater benefit to the site.

Offsetting

6.41 Based on the assessment undertaken as part of this outline application, the development is to offset 9,836 tonnes of CO₂. For reassurance, the applicant reminds the reader that:

- > A high standard of construction methodology and operational design have been incorporated to develop buildings which go far beyond current policy and regulatory requirements;
- > Offsetting residual emissions is also not a requirement of either policy or regulation. Any financial contribution provided by the developer to account for residual emissions is therefore a further indication of the commitment that the developer has toward net zero development.

6.42 The applicant has considered a number of methods to offset the residual 9,836 tonnes of CO₂. A considered balance between local and international projects would ensure that both the global impact of the climate emergency and the local need to invest in low carbon schemes is proportionally addressed. It is therefore proposed to offset in line with the following methods:

- > 25% of the offset total (2,459 tonnes) to fund global renewable projects in less developed countries. It is proposed to set this at £15/tonne which comes to £36,885;
 - > 25% of the offset total (2,459 tonnes) to fund global reforestation projects. It is proposed to set this at £40/tonne which comes to £98,360;
 - > 50% of the offset total (4,918 tonnes) to fund local low carbon projects within the borough. It is proposed to set this at £95/tonne which comes to £467,210.
- 6.43** Proposed price per tonnage for international projects have been based on averages of current similar schemes shown on the Gold Standard website when accessed in September 2022 (see <https://marketplace.goldstandard.org/collections/projects>).
- 6.44** The £95/tonne proposed price for local projects aligns with the current GLA carbon offsetting price. It should be noted that building lifespan has already been accounted for in the assessment undertaken in chapters 5 and 6 of this report, so there is no need to include the 30 year multiplier applied by the GLA.
- 6.45** The precise tonnage to offset and associated contributions will be determined following detailed assessment at the reserved matters stages.

Offsetting Payment Mechanism

- 6.46** It is proposed to contribute 50% of the total offsetting sum prior to commencement of site works (following reserved matters consents), with the remaining 50% to be provided upon occupations of each specific plot. The latter payment is subject to recalculation to account for any design revisions or updated construction information which may increase or decrease the associated CO₂ emissions to be offset.

7. SUSTAINABILITY STRATEGY

Design Considerations

BREEAM Assessment

7.1 In accordance with Policy BE01, the commercial units will be assessed under the BREEAM New Construction 2018 assessment with a target of achieving the required 'Excellent' rating.



7.2 BREEAM is a sustainability assessment and certification scheme for the built environment. It assesses, encourages and rewards environmental, social and economic sustainability throughout the built environment. The BREEAM UK New Construction scheme is a performance-based assessment method which aims to mitigate the life cycle impacts of new buildings on the environment in a robust and cost-effective manner.

7.3 The principles and requirements of many of the individual credits feature throughout this report, where appropriate, however the mandatory credits for BREEAM 'Excellent' are listed as follows:

- > **Man 03: Responsible Construction Practices** – Responsible construction management processes to be implemented.
- > **Wat 02: Water Monitoring** – A water meter is to be provided on the mains water supply which should have a pulsed output connected to a Building Management System (BMS).
- > **Ene 01: Reduction in CO₂ emissions** – An Energy Performance Ratio (EPR) is to be compared against benchmark figures to minimise operational energy demand and CO₂ emissions in buildings. A minimum of four credits are to be achieved.
- > **Mat 03: Responsible Sourcing** – All timber used on the project must be sourced in accordance with the UK Government's Timber Procurement Policy.
- > **Wst 03: Operational Waste** – A dedicated space(s) for the segregation and storage of operational recyclable waste is to be provided. This is to be clearly labelled, easily accessible (to building users and for waste collection) and of an adequate size.

Water Reduction

7.4 The internal water consumption of the commercial space will be significantly reduced through the use of water efficient fixtures and fittings in line with the Wat 01 requirements of the BREEAM

assessment. In accordance with Policy BE01, a BREEAM ‘Excellent’ rating is to be achieved in category Wat 01.

- 7.5** Table 5 below provides an indication of the types of sanitaryware and appliances that could be installed to meet the required performance level.

Table 5: Commercial Sanitaryware

Installation Type	Water Capacity/Flow Rate
WC	4 litres effective flush volume
Basin tap	4.5 litres/minute flow rate
Shower	6 litres/minute flow rate
Urinals (2 or more)	1.5 litres/bowl/hour
Urinal (1 only)	2 litres/bowl/hour
Kitchen tap	5 litres/minute flow rate
Dishwasher (domestic size)	12 litres/cycle
Washing machine (domestic size)	40 litres/use
Dishwasher (commercial size)	5 litres/rack
Washing machine (commercial size)	7.5 litres/kg

- 7.6** Another method of reducing internal water consumption is to ensure that water leaks do not go undetected. A leak detection system may be installed which will be capable of detecting a major water leak on the mains water supply within the building and between the building and the utilities water meter. This will also ensure that relevant BREEAM credits are achieved.

Waste Management

- 7.7** Waste reduction and recycling is a key challenge of sustainable development. In terms of operational waste, the waste storage and segregation will meet the following BREEAM requirements:

- > Bins will be clearly labelled to assist with waste segregation, storage and collection;

- > The stores will be accessible to building occupants and facilities operators; and
- > The storage will be of a capacity that is appropriate to the building's type, size and predicted volumes of waste.

7.8 In terms of construction waste, a Site Waste Management Plan (SWMP) will be implemented in accordance with the BREEAM requirements. The SWMP will establish ways of minimising waste at source, assess the use, reuse and recycling of materials on and off-site and prevent illegal waste activities. This plan will then be disseminated to all relevant personnel on and off-site.

7.9 The following waste minimisation actions will be considered:

- > Consider opportunities for zero cut and fill to avoid waste from excavation or groundworks.
- > Design for standardisation of components and the use of fewer materials e.g., exposed soffits in place of suspended ceilings.
- > Return packaging for reuse.
- > Consider community reuse of surplus materials or offcuts.
- > Engage with supply chains and include waste minimisation initiatives and targets in tenders and contracts.

Thermal Comfort

7.10 In accordance with Policy BE04, the risk of overheating will be minimised through design, layout, orientation and materials. Glazed office spaces will be treated with external shading in order to prevent excessive solar gains and openable windows will facilitate natural ventilation.

Environmental Impacts

Biodiversity and Ecology

7.11 In order to protect existing biodiversity, a series of measures will be implemented to reduce any impact on local wildlife. These include the following:

- > All site operatives to be made aware of current legislation, including the protection of certain species;
- > Site clearance works to be timed to avoid the main bird nesting season. If this is not possible, a check should be carried out prior to the works to determine the presence of any active nests;

- > Suitable fencing should be erected to reduce the possibility of any damage to established vegetation; and
- > Native species, or species of known wildlife value, should be used for the proposed new planting.

7.12 Hardscape areas have been reduced to only functional requirements such as the required number of car parking bays and for the use of vehicles around service yards. A 12 to 15m vegetated zone around the perimeter of the site is proposed and remaining areas are allocated to vegetation. In addition, green walls and trellis like structures are proposed in building facades.

7.13 Trees planting is considered to be a form of climate change mitigation, due to their absorption of carbon dioxide. Green roofs and walls are a climate change mitigation practice due to their ability to decrease CO₂ emissions through direct and indirect measures:

- > **Direct impact** - green roof and wall layers directly capture and store air pollutants from surroundings.
- > **Indirect impact** - decreasing the building temperature and therefore reducing the building's energy consumption.

7.14 Around 40% of the site area will be undeveloped and instead will be planted with vegetation and trees.

Materials

Environmental Impact

7.15 New building materials will be selected, where possible, to ensure that they minimise environmental impact and have low embodied energy – from manufacture, transportation, and operational stages, through to eventual demolition and disposal. This will be addressed as part of the embodied carbon strategy, as discussed in chapter 5.

7.16 All insulation materials will have an Ozone Depleting Potential (ODP) of zero and a Global Warming Potential (GWP) of less than 5. In addition, all decorative paints and varnishes will meet the relevant standards in order to reduce the emission levels of volatile organic compounds (VOCs).

Local and Responsible Sourcing

7.17 Preference will be given to the use of locally sourced materials and local suppliers. This will benefit the local economy as well as having environmental benefits through reduced transportation.

7.18 Materials from suppliers who participate in responsible sourcing schemes such as the BRE BES 6001:2008 Responsible Sourcing Standard will be prioritised. In addition, products with a recognised environmental product declaration (EPD) will be specified where possible.

7.19 Timber used on site, including timber used in the construction phase, such as hoarding, fencing and scaffolding, will be sourced from sustainable forestry sources (e.g. PEFC and FSC) where possible.

Flood Risk & Surface Water Run-Off

7.20 In accordance with Policy BE05, the proposed development will incorporate Sustainable Drainage Systems (SuDS). SuDS can deliver multiple benefits which broadly fit into four categories: water quantity, water quality, amenity and biodiversity, shown in Figure 3 below. The overarching principle of SuDS design is that surface water runoff should be managed for maximum benefit.

7.21 Long term environmental and social factors must be included in decisions regarding sustainable drainage. Sustainable drainage takes account of the quantity and quality of runoff, and the amenity and aesthetic value of surface water in the urban environment.

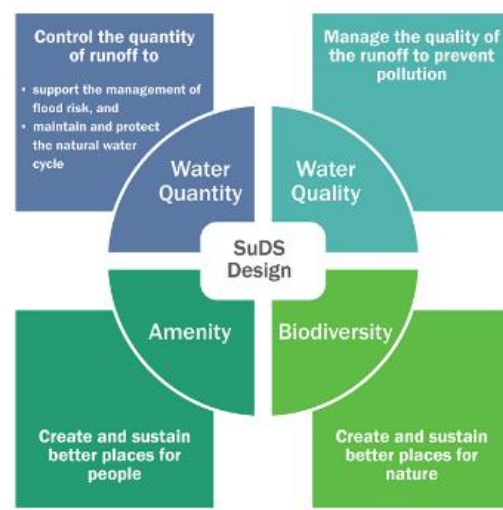


Figure 3: The four 'pillars' of SuDS – CIRIA SuDS Manual (2015)

7.22 The following listed SuDS are proposed. These will not only help to attenuate surface water but will provide the necessary water treatment.

- > **Extensive green roofs** above office areas will help to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.
- > **Detention basins** will treat the water by trapping the silt, which contain a high proportion of the pollutants.

- > **Retention ponds and wetlands** will provide both stormwater attenuation as well as treatment using bacteria and sunlight to break down pollutants before the water eventually flows into downstream watercourses.
- > **Swales** alongside the main access road will allow surface water to be stored or conveyed and will allow much of the suspended particulate loads to settle, providing effective pollutant removal.

Transport

Active Travel

- 7.23** Encouraging cycling not only makes a positive contribution to health and well-being, but also reduces pressure on existing transport systems. It is envisaged that a 3m cycle track and 2m pedestrian path will be available along Tilbury Road in order to encourage active travel.
- 7.24** Cycle parking will be provided in the form of cycle shelters located in nearby each building entrance. The quantity and layout will be in accordance with required parking standards.

Electric Vehicle Charging

- 7.25** The development will provide an ultra-rapid EV charging station for up to 16 vehicles. 8 x 150kW dual charging points are proposed, with the facility significantly enhancing the boroughs supply of ultra-rapid public charging points.
- 7.26** Using these, cars could be fully charged in less than 30 minutes and larger commercial vehicles in less than an hour. These charging speeds are close to the highest rates available with today's technology and represent a significant commitment to the development of low and zero emission transport to the borough.
- 7.27** Such installations are very hard to accommodate due to their large power requirements and so are often only viable when supplied as part of wider new development. It would therefore be very difficult to accommodate such an installation elsewhere in the borough, and the proposed Broadfields development represents a rare opportunity to provide this without the unfeasible electrical supply costs which would likely arise elsewhere.
- 7.28** Across the site, at least 20% of all parking spaces will be provided with EV charge points. This exceeds the requirements of the recently introduced Building Regulations Part S for non-residential development.

Sustainable Construction

- 7.29** During the construction processes, control procedures will be put in place to minimise noise and dust pollution and roads will be kept clean. The management systems will generally comprise

procedures and working methods that are approved by the development team together with commercial arrangements to ensure compliance.

- 7.30** Further to the above, additional measures will be adopted to minimise the impact on the local area during construction. This will include the limiting of air and water pollution in accordance with best practice principles, as well as the recording, monitoring, and displaying of energy and water use from site activities during construction.
- 7.31** All relevant contractors will be required to investigate opportunities to minimise and reduce use of energy and water, such:
- > Selection and specification of energy efficient plant and equipment wherever viable;
 - > Use of alternatives to diesel/petrol powered equipment where possible (such as biodiesel);
 - > Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both on-site and within site offices; encouraging a paper-reduced office and encouraging double sided printing and photocopying when these activities are necessary;
 - > Use of recycling water systems such as wheel washes.
- 7.32** In terms of construction traffic, this will be minimised by restricting deliveries and arrival times in order to manage potential impacts on existing and future occupants. Work will be limited to appropriate hours to be agreed with the Council.
- 7.33** 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.
- 7.34** Compliance with the necessary legislation will be adhered to for all site options. Methods relating to waste can be confirmed upon the appointment of a contractor at the Site.

8. CONCLUSION

- 8.1** This Net Zero & Sustainability Statement accompanies the Outline Planning Application (all matters reserved apart from access) for the proposed development of Broadfields Innovation and Business Park in Brentwood. The central component of the sustainability strategy for the site is a commitment by the applicant to deliver a net zero carbon development, covering both embodied and operational CO₂ emissions. It is therefore a comprehensive and total net zero commitment, aligning closely with the UKGBC definition, and exceeds all local and national policy objectives pertaining to zero carbon development.
- 8.2** When delivered, it will represent a site at the forefront of low carbon design and operation.
- 8.3** The proposed development will comprise demolition of existing buildings and construction of new buildings to provide up to 32,000m² of non-residential space. This will predominantly consist of industrial units with office components.
- 8.4** The net zero strategy consists of the following measures and commitments:
- > A considered approach to the specification and resourcing of materials high in associated CO₂ emissions. This will focus particularly on how concrete and steel/aluminium-based materials can be used in the most sustainable way, incorporating recycled content and reducing wastage as far as possible.
 - > An energy efficient design of buildings which promotes low energy usage, with all fabric elements (walls, floor, roofs, glazing) in office/administrative areas being insulated to achieve a very high standard of thermal efficiency. Where fitted out by the applicant, these spaces will also be provided with low carbon services such as ventilation with heat recovery, LED lighting, and heat pumps.
 - > Adaption of building designs to maximise passive energy benefits. As lighting is expected to be one of the largest energy demands in the buildings, a design which maximises daylight penetration through the use of rooflights and 'light' cladding will be particularly beneficial. For the office areas where space heating/cooling needs are likely to be higher, orientation of glazing to maximise solar gains in cooler months and minimise summer overheating will ensure the delivery of comfortable and low energy spaces throughout the year.
 - > An extensive installation of photovoltaic (PV) generating capacity across the site. In total, this could exceed 1MW of renewable power which could offset more than 3,000 tonnes of CO₂ emissions. A significant quantity of renewable power generation on site will also assist in reducing the developments burden on the local electricity supply and will reduce the energy costs for building occupants.

8.5 Wider sustainability measures include:

- > An ultra-rapid electric vehicle (EV) charging station for up to 16 vehicles. 8 x 150kW dual charging points are proposed, with the facility significantly enhancing the boroughs supply of ultra-rapid public charging points. Using these, cars could be fully charged in less than 30 minutes. Such installations are very hard to accommodate due to their large power requirements and so are often only viable when supplied as part of wider new development;
- > At least 20% of all car parking spaces on the development will be provided with EV charge points. This exceeds the requirements of the recently introduced Building Regulations Part S.
- > A BREEAM standard of ‘Excellent’ throughout the site. This represents a high standard of sustainable construction and addresses multiple environmental considerations such as water use, waste strategy, and biodiversity.

8.6 Whilst the development will represent the highest standards of sustainable development, reducing both embodied and operational CO₂ emissions well below current build standards, it is not possible to deliver a total zero carbon development on the site itself. This is predominately due to the proportionally high embodied emissions which are associated with industrial buildings.

8.7 The developer is nonetheless committed to delivering a net zero development. As such, the remaining CO₂ emissions (calculated at 9,836 tonnes in this outline assessment) are to be offset through financial contributions to a combination of global and local low carbon projects. The developer is therefore ensuring that both the global nature of the climate emergency and the local desire for low carbon investment is addressed.

8.8 The total offsetting contribution has been calculated to be £602,455, of which £467,210 is for the local borough and is to be ringfenced to allow the council to invest in chosen projects, which could include (as examples) energy efficiency retrofits in schools and hospitals, or water reduction technologies in council properties. It is proposed that 50% of this is to be paid upon commencement, with the remaining balance to be paid prior to occupations.

8.9 The table, below, shows the results of the net zero carbon assessment.

Element (Carbon)	CO₂ Emissions (Tonnes)
Embodied	11,204
Operational (25 years)	1,956
PV Benefit (25 years)	-3,324
Total (to be offset)	9,836