The Star, London Borough of Hillingdon

Energy and Sustainability Strategy

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Version 02

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JAWSustainability

Contents

1 Introduction

This report summarises the proposed sustainable strategy for development at The Star in order to meet the sustainability requirements of the London Borough of Hillingdon and the London Plan.

The site is located in the London Borough of Hillingdon. The proposed development consists of 112m2 of commercial space on the ground floor, with 10 apartments located across 3 stories above the commercial space. The site also includes 2 3 storey houses on the same site, as well as covered parking. The ground floor layout is shown in Figure 1-1.

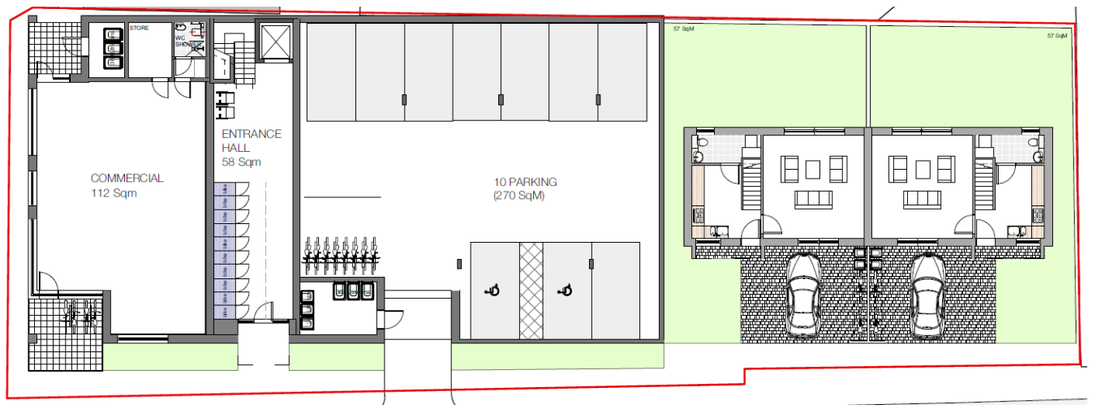


Figure 1-1 – The Star ground floor layout

2 Policy

The following policies from the London Plan and the London Borough of Hillingdon's Strategic Policies. Management plan have been identified as having requirements most relevant to the sustainability strategy of the development.

2.1 The London Plan

Policy 5.2: Minimising Carbon Dioxide Emissions

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

- Be lean: use less energy
- Be clean: supply energy efficiently
- Be green: use renewable energy

Major residential developments are required to be zero carbon, with at least a 35% reduction in carbon emissions over the Building Regulations baseline achieved on site

Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.

As a minimum, energy assessments should include the following details:

- calculation of the energy demand and carbon dioxide emissions covered by Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations at each stage of the energy hierarchy
- proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services
- proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power
- proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

Policy 5.3 Sustainable Design and Construction Strategic

Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies and sustainable design principles in this Plan.

Policy 5.6 Decentralised Energy in Development Proposals

Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.

Major development proposals should select energy systems in accordance with the following hierarchy: Connection to existing heating or cooling networks; Site wide CHP network; Communal heating and cooling.

Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

Policy 5.7 Renewable Energy

Within the framework of the energy hierarchy, major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

Policy 5.9 Overheating and Cooling

Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy: minimise internal heat generation through energy efficient design; reduce the amount of heat entering a building; manage the heat within the building; passive ventilation; mechanical ventilation; active cooling systems.

Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air conditioning systems as much as possible. Further details and guidance regarding overheating and cooling are outlined in the London Climate Change Adaptation Strategy.

Policy 5.11 Green Roofs and Development Site Environs

Major development proposals should be designed to include roof, wall and site planting, especially green roofs and walls where feasible, to deliver as many of the following objectives as possible; adaptation to climate change; sustainable urban drainage; mitigation of climate change; enhancement of biodiversity; accessible roof space; improvements to appearance and resilience of the building; growing food.

Policy 5.13 Sustainable Drainage

Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy: store rainwater for later use; use infiltration techniques, such as porous surfaces in non-clay areas; attenuate rainwater in ponds or open water features for gradual release; attenuate rainwater by storing in tanks or sealed water features for gradual release; discharge rainwater direct to a watercourse; discharge rainwater to a surface water sewer/drain; discharge rainwater to the combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

2.2 Hillingdon Strategic Policies

Policy EM1: Climate Change Adaptation and Mitigation

The Council will ensure that climate change mitigation is addressed at every stage of the development process by:

1. Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport.
2. Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3. Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4. Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6. Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.
7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation as part of their proposals.
8. Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion, hydroelectricity and a greater use of waste as a resource.
9. Promoting new development to contribute to the upgrading of existing housing stock where appropriate.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

1. Locating and designing development to minimise the probability and impacts of flooding.
2. Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.
3. Giving preference to development of previously developed land to avoid the loss of further green areas.
4. Promoting the use of living walls and roofs, alongside sustainable forms of drainage to manage surface water run-off and increase the amount of carbon sinks.
5. Promoting the inclusion of passive design measures to reduce the impacts of urban heat effects.

3 Energy Strategy

An energy strategy has been developed following the energy hierarchy ‘Be Lean, Be Clean, Be Green’. Energy calculations using Building Regulations approved and accredited software have been undertaken at each stage to calculate the savings associated with the measures incorporated.

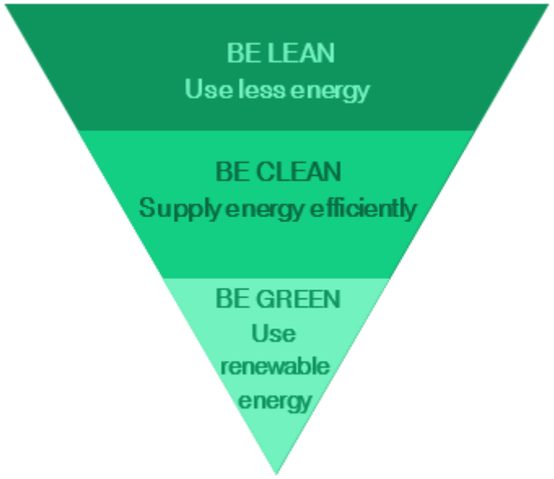


Figure 3-1 The Energy Hierarchy

The energy consumption and carbon emission figures for the dwelling within this report have been calculated using the approved Standard Assessment Procedure for the Energy Rating of Dwellings (SAP). The figures for the commercial space have been calculated using IES VE compliance module.

3.1 Energy Targets

As the development is a major residential development it is required to be zero carbon. In line with the London Plan, there is a target of a 35% reduction over Part L 2013 on site. The rest will be required to be made up via a carbon offset payment. The commercial space is a minor development so is only required to meet Part L. Table 3-1 below details the energy and carbon breakdown of the Part L target emission rate.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)						Electricity CO2 (kg/yr)	Total Energy	Total CO2
	Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	Total			
Resi	38,745	26,029	**64,775**	**13,991**	0	0	0	900	3,607	**4,507**	**2,339**	**69,282**	**16,331**
Com	0	0	**0**	**0**	584	197	1,009	347	5,747	**7,884**	**4,092**	**7,884**	**4,092**

Table 3-1 Target regulated energy demand and carbon emissions per energy source

3.2 Be Lean

As part of the Be Lean approach, passive design measures have been considered throughout the pre-planning stage to reduce initial energy demand.

Solar Gain Control and Daylight

Solar gains are a passive form of heating from the sun's radiation and are beneficial to a building during winter months as they provide an effective source of heat and reduce internal heating requirements. However, during summer months, they must be controlled in order to mitigate the risk of overheating. They can be controlled through glazing and shading design in order to allow low level winter sun to enter the building and to limit access to high level summer sun.

The glazing strategy design has carefully considered orientation and window size in order to maximise daylight while controlling excessive solar gains. Glazing will incorporate low emissivity coatings to limit overheating without compromising light transmittance.

Overheating

The London Plan overheating checklist has been used to assess the risk of overheating in the flats.

Section 1 – Site features affecting vulnerability to overheating		Yes or No
Site location	Urban – within central London[29] or in a high density conurbation	No
	Peri-urban - on the suburban fringes of London[30]	Yes
Air quality and/or Noise sensitivity - are any of the following in the vicinity of buildings?	Busy roads / A roads	Yes
	Railways / Overground / DLR	No
	Airport / Flight path	No
	Industrial uses / waste facility	No
Proposed building use	Will any buildings be occupied by vulnerable people (e.g. elderly, disabled, young children)?	No
	Are residents likely to be at home during the day (e.g. students)?	No
Dwelling aspect	Are there any single aspect units?	Yes
Glazing ratio	Is the glazing ratio (glazing: internal floor area) greater than 25%?	Yes
	If yes, is this to allow acceptable levels of daylighting?	Yes
Security - Are there any security issues that could limit opening of windows for ventilation?	Single storey ground floor units	Yes
	Vulnerable areas identified by the Police Architectural Liaison Officer	No
	Other	N/A

[29] Urban - as defined in CIBSE Guide TM49. Broadly equivalent to Central Activities Zone and Inner London areas in Map 2.2 of the London Plan

[30] Peri-urban – as defined in CIBSE Guise TM49. Broadly equivalent to Outer London areas in Map 2.2 of the London Plan

Section 2 – Design features implemented to mitigate overheating risk		Please Respond
Landscaping	Will deciduous trees be provided for summer shading (to windows and pedestrian routes)?	No
	Will green roofs be provided?	-
	Will other green or blue infrastructure be provided around buildings for evaporative cooling?	No
Materials	Have high albedo (light colour) materials been specified?	Yes
Dwelling aspect	% of total units that are single aspect	33.3%
	% single aspect with NE orientation	0%
	% single aspect with SE orientation	16.7%
	% single aspect with SW orientation	16.7%
	% single aspect with NW orientation	0%
Glazing ratio - What is the glazing ratio (glazing; internal floor area) on each facade?	NE	-
	SE	-
	SW	-
	NW	-
Daylighting	What is the average daylight factor range?	-
Window opening	Are windows openable?	Yes
Window opening	What is the average percentage of openable area for the windows?	50%

Window opening - What is the extent of the opening?	Fully openable	Yes
	Limited (e.g. for security, safety, wind loading reasons)	Yes
Security	Where there are security issues (e.g. ground floor flats) has an alternative night time natural ventilation method been provided (e.g. ventilation grates)?	Yes
Shading	Is there any external shading?	Overhanging balconies
	Is there any internal shading?	TBC
Glazing specification	Is there any solar control glazing?	low emissivity glazing
Ventilation - What is the ventilation strategy?	Natural – background	Yes
	Natural – purge	Yes
	Mechanical – background (e.g. MVHR)	Yes
	Mechanical – purge	No
	What is the average design air change rate	-
Heating system	Is communal heating present?	No
	What is the flow/return temperature?	
	Have horizontal pipe runs been minimised?	
	Do the specifications include insulation levels in line with the London Heat Network Manual[31]	

[31] http://www.londonheatmap.org.uk/Content/uploaded/documents/LHNM_Manual2014Low.pdf

The impact of solar gains has been analysed as part of the SAP calculations, taking into account the ventilation strategies and the residential development has a medium risk of overheating, when measured against the Part L1A criteria.

Following the overheating checklist and results of the SAP assessment, the risk of solar overheating is minimised. Whilst Mechanical Ventilation with Heat Recovery is provided to allow for ventilation during times when windows need to remain closed due to external elements such as noise or air quality, there is also a natural ventilation strategy possible and the majority of units have dual aspect to allow for cross ventilation. Windows are specified to incorporate low emissivity coatings to limit overheating while ensuring adequate daylight, while blinds have been specified on all South, South East and South West Window

Building Fabric

Designing an efficient thermal envelope will greatly reduce the need for space heating and cooling as heat transmittance through the thermal elements is reduced.

Low air permeability rates will also reduce heating and cooling energy demand by reducing the volume of air that can penetrate the building.

As part of a 'fabric first' approach, the building fabric has been carefully considered and specified to meet or exceed current Building Regulations minimum requirements, as detailed in Table 3-2 below.

Fabric Component	Residential Specification	Commercial Specification
External Walls	0.12 W/m²K	0.15 W/m²K
Internal Boundary Walls*	0.16 W/m²K	0.16 W/m²K
Flat Roof	0.12 W/m²K	-
Sloped Roof	0.15 W/m²K	-
Ground Floor	0.12 W/m²K	0.15 W/m²K
Ceiling/Floor*	0.12 W/m²K	0.12 W/m²K
Residential Party Walls	Fully filled cavity with edge sealing	-
Windows	1.2 W/m²K, G=0.63	1.6, g=0.4
External Doors	1 W/m²K	See Windows
Air Tightness	4m³/m²/h	3m³/m²/h
Thermal Bridging	Default	Default
*Between retail, unheated and residential spaces		

Table 3-2 Proposed Be Lean passive design measures

With regards to party walls, to reach the required standards, these must be fully filed. Partially filled cavities will not comply.

Building Services

Individual systems have been identified as being the most appropriate for the site. These have been specified to maximise efficiency therefore reducing energy used to deliver services.

Table 3-3 shows the proposed services strategy and energy efficiency measures for the development.

Services Component	Residential Specification	Commercial Specification
Space Heating	Gas Combi Boilers, 91% efficient, Underfloor heating	Split System, A++, SCOP 4.6
Hot Water	Gas Combi Boilers, 91% efficient	Instantaneous hot water
Cooling	-	Split System, A++ SEER 6.1
Heating Controls	Time and temperature zone control	Time and temperature zone control
Ventilation	MVHR 90% efficient, SFP 0.5 w/l/s Rigid Duct/ Insulated, Approved Installation	MVHR, 80% efficient, SFP 0.5 W/l/s
Lighting & Controls	100% low energy lighting	75 lm/W, LOR 0.9, daylighting dimming
Metering	-	

Table 3-3 Proposed energy efficient design measures

Energy Savings

The breakdown of carbon and energy use has been identified for the site. Table 3-4 shows the breakdown of carbon and energy use once the strategies proposed at the be lean are incorporated.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)						Electricity CO2 (kg/yr)	Total Energy	Total CO2
	Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	Total			
Resi	29,230	24,060	**53,290**	**11,511**	0	0	0	2,268	3,604	**5,872**	**3,048**	**59,162**	**14,558**
Com	0	0	**0**	**0**	257	189	904	262	5,361	**6,973**	**3,619**	**6,973**	**3,619**

Table 3-4 Estimated regulated energy demand and carbon emissions per energy source

Carbon Savings

Table 3-5, Figure 3-2 and Figure 3-3 demonstrates the percentage improvement over the notional baseline levels for the be lean stage.

	Residential			Commercial		
	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving
Building Regulations 2013 Baseline	16.33			4.09		
Be Lean (after demand reduction)	14.56	1.77	11%	3.62	0.47	12%

Table 3-5 improvements over Part L

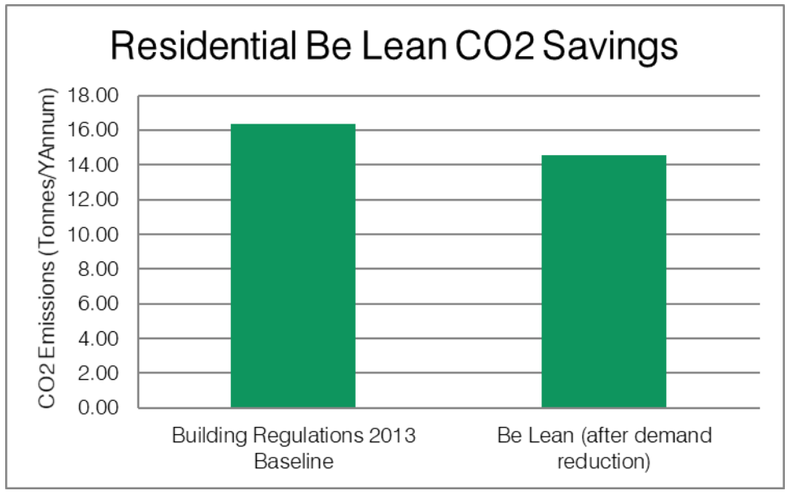


Figure 3-2 Residential Be Lean Improvement over Building Regulations Part L 2013

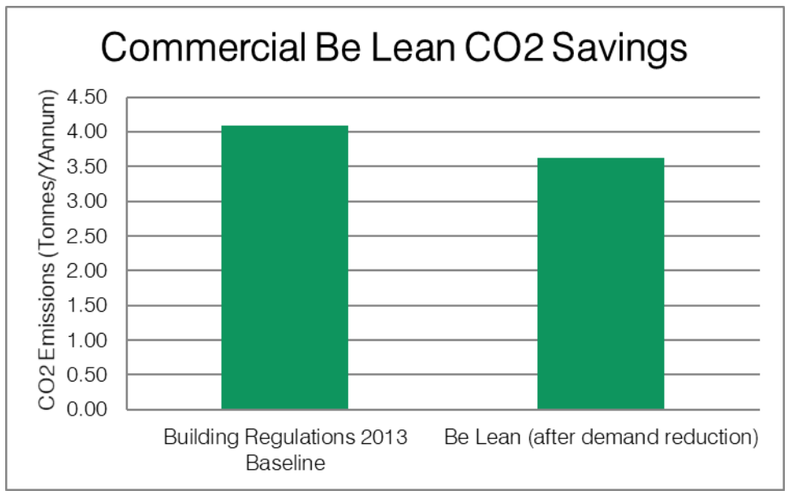


Figure 3-3 Commercial Be Lean Improvement over Building Regulations Part L 2013

3.3 Be Clean

As part of the Be Clean approach, the use of energy efficient equipment, heat networks and community heating have been considered.

District Energy Systems

With reference to the London Heat Map, there are no potential heat networks running in the vicinity of the site. Due to the lower energy requirements in the area, it is unlikely there will be a heat network here in the future.

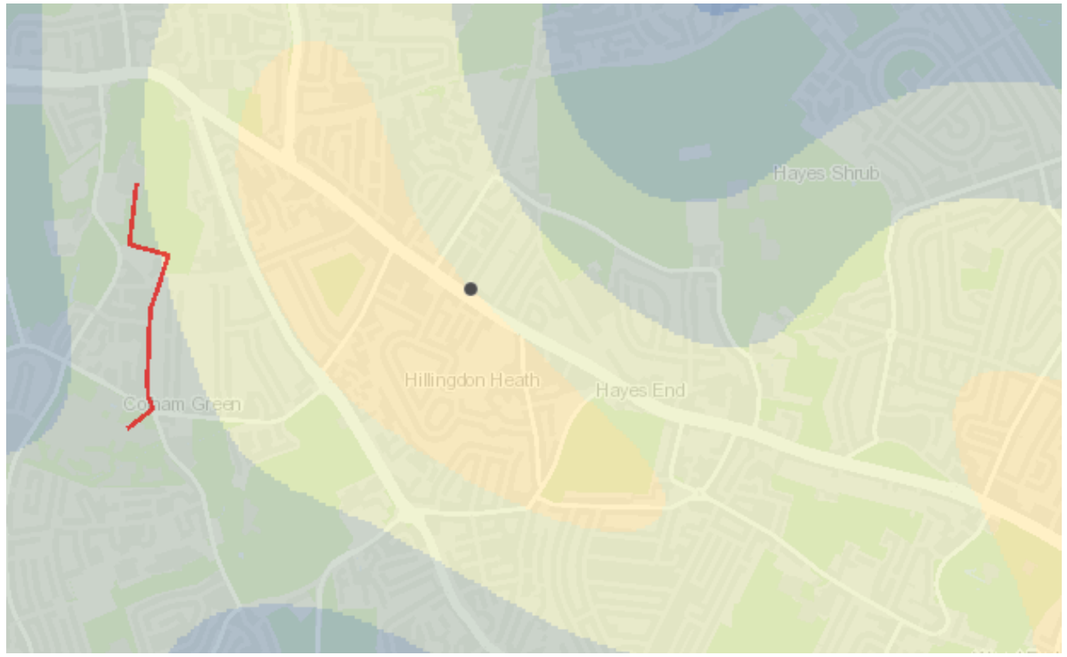


Figure 3-4 London Heat Map – Black dot demonstrates the development

Community Heating & CHP

Efficient systems for energy delivery have also been investigated. At the scale of this development, Community Heat and Power (CHP) systems are not viable. CHP requires a high base energy demand load in order to operate efficiently. It is usually more suited to hotel or hospital schemes which have a high hot water demand, or very large residential schemes incorporating hundreds of units.

The provision of a site wide energy distribution system has also been investigated. As this development is relatively small, the installation of a community energy system would not be cost effective, or technically feasible due to issues of locating plant and other systems. It is therefore proposed that highly efficient individual gas boilers are utilised for the scheme.

Carbon Savings

As the district heating and CHP are not viable options for a project of this scale, there are no further savings to be made at the be clean stage.

3.4 Be Green

At the Be Green stage, renewable technologies are investigated. Table 3-6 considers the feasibility of renewable energy technologies for the scheme.

LZC Technologies	Description	Noise	Visual impact	Internal Space	External Space	Capital Cost	Maintenance	Feasibility	
Solar Thermal Collectors 	Solar thermal collectors can be used to provide hot water using the irradiation from the sun. They can generally provide approx. 50% of the hot water demand	🟢	🟡	🟢	🟡	🔴	🟡	There are areas of flat roof that can incorporate solar technologies. However, carbon savings are quite low and it is quite a high cost technology.	✗
Solar Photovoltaic Panels 	Solar PV panels generate electricity from the sun's energy. They should be installed within 90° of due south ideally at a 30° angle. The electricity can be used to supply the landlords load.	🟢	🟡	🟢	🟡	🟡	🟡	There are areas of flat roof that can incorporate solar technologies. Solar PV is ideal for making carbon savings while being a simple technology.	✓
Biomass Heating 	Solid, liquid or gaseous fuels derived from plant material can provide boiler heat for space and water heating A biomass boiler would supplement a standard gas heating system so some of the cost may be offset through money saved on using smaller traditional boilers reliability of fuel access/supply can be a problem	🟡	🟢	🔴	🟡	🔴	🔴	Biomass is not considered feasible for this development due to issues with fuel storage, access for delivery vehicles and local NO_x emissions.	✗

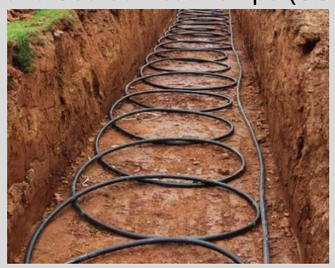
Wind Turbines 	Vertical and horizontal axis wind turbines enable electricity to be generated using the power within the wind Not suitable for urban environments due to low wind conditions and obstructions	🔴	🔴	🟢	🔴	🔴	🟡	This development is in an urban environment and so a wind turbine will not generate a significant amount of energy.	×
Ground Source Heat Pumps (GSHP) 	Utilising horizontal loops or vertical boreholes, GSHP make use of the grounds almost constant temperature to provide heating and/or cooling using a heat exchanger connected to a space/water heating delivery system Optimum efficiency with underfloor heating systems	🟡	🟢	🟡	🟡	🔴	🟡	GSHP are not a feasible technology for the site since there is a limited external space available for installation of boreholes.	×
Air Source Heat Pumps (ASHP) 	Air Source Heat Pumps extract latent energy from the external air in a manner similar to ground source heat pumps Optimum efficiency with underfloor heating systems	🟡	🟡	🟡	🟡	🟡	🟡	A communal system would not be feasible for the development due to its size. The use of individual ASHP is technically feasible, however there is limited roof space that will already be taken up by Solar PV and amenity areas, and units located on the balcony would be noisy. Split system heating cooling has been proposed for the retail space, but not for the residential development.	×

Table 3-6 Feasibility of LZC technologies for the development

PV System

The feasibility study has identified solar PV as the most appropriate technology for the site. The following system is proposed to serve the landlord loads for the communal areas.

- Peak Power – 9.3 kWp
- Orientation / Angle of elevation – SE/SW / 30°
- Panel specification – Min 20% efficiency
- Approx. number of panels / Area required – 29 panels / 108 m2 (assuming a panel spacing of 1.65m x 2.25m)

Energy Savings

The breakdown of carbon and energy use has been identified for the site. Table 3-7 shows the breakdown of carbon and energy use once the strategies proposed at the be green are incorporated.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)							Electricity CO2 (kg/yr)	Total Energy	Total CO2
	Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	PV	Total			
Resi	29,230	24,060	53,290	11,511	0	0	0	2,268	3,604	-7,641	**-1,768**	**-918**	**51,521**	**10,593**

Table 3-7 Estimated regulated energy demand and carbon emissions per energy source

Carbon Savings

Table 3-8 and Figure 3-5 demonstrates the percentage improvement over the notional baseline levels for the be green stage.

	Residential		
	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving
Building Regulations 2013 Baseline	16.33		
Be Lean (after demand reduction)	14.56	1.77	11%
Be Clean (after efficiency measures)	14.56	0	0%
Be Green (after renewable energy)	10.59	3.97	24%

Table 3-8 improvements over Part L

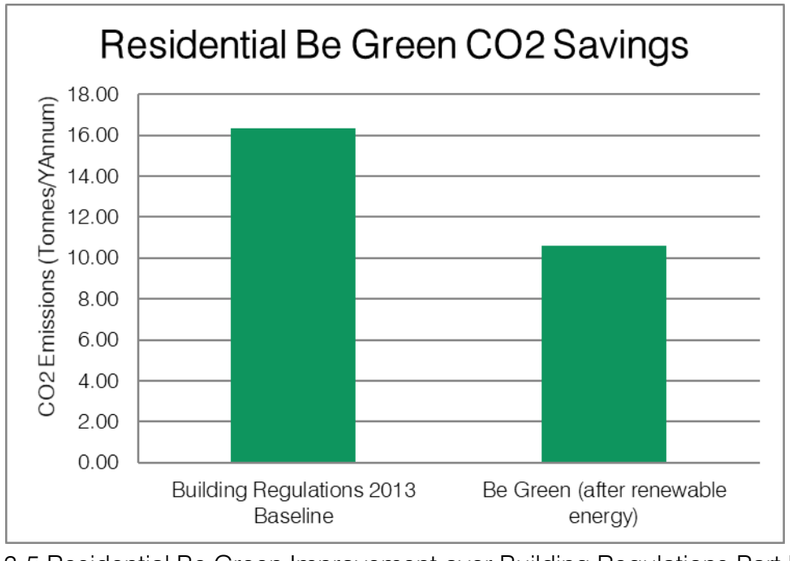


Figure 3-5 Residential Be Green Improvement over Building Regulations Part L 2013

3.5 Energy and Carbon Savings

Energy Use

The breakdown of carbon and energy use has been identified for the site. Table 3-9 shows the breakdown of carbon and energy use once the strategies proposed in this report are incorporated.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)							Electricity CO2 (kg/yr)	Total Energy	Total CO2
	Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	PV	Total			
Resi	29,230	24,060	53,290	11,511	0	0	0	2,268	3,604	-7,641	**-1,768**	**-918**	**51,521**	**10,593**
Com	0	0	**0**	**0**	257	189	904	262	5,361	0	**6,973**	**3,619**	**6,973**	**3,619**

Table 3-9 Estimated regulated energy demand and carbon emissions per energy source

Carbon Saving

Table 3-10 and Figure 3-6 demonstrate the percentage improvement over the notional baseline levels for the development. A 35% reduction has been achieved within the residential development, and an 11% reduction has been achieved within the retail development. Overall the development has achieved a 30% reduction in site wide CO2 emissions.

	Residential			Commercial		
	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving
Building Regulations 2013 Baseline	16.33			4.09		
Be Lean (after demand reduction)	14.56	1.77	11%	3.62	0.47	12%
Be Clean (after efficiency measures)	14.56	0	0%	3.62	0.00	0%
Be Green (after renewable energy)	10.59	3.97	24%	3.62	0.00	0%
Total Cumulative Savings		5.74	35%		0.47	12%

Table 3-10 improvements over Part L

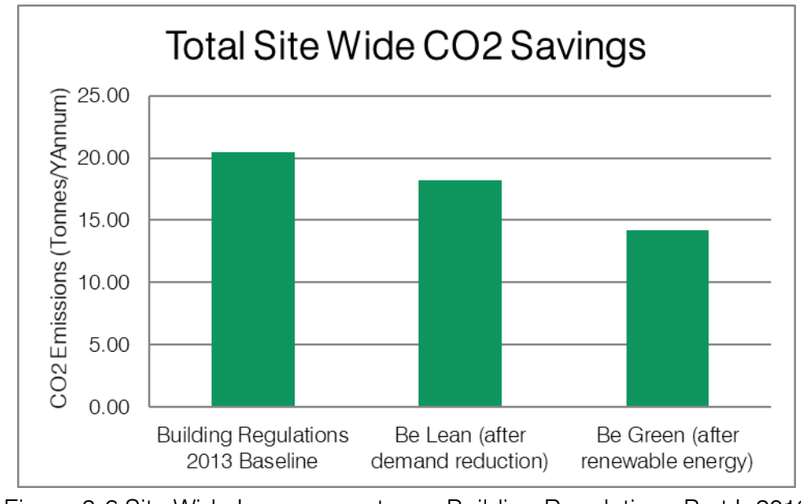


Figure 3-6 Site Wide Improvement over Building Regulations Part L 2013

Carbon Offset Payment

The measures identified above will be used to achieve a 35% reduction in Carbon Dioxide emissions. For the residential part, there is a target of "Zero Carbon", which can be achieved through an offset payment when there is a shortfall in site. This calculation is detailed in Table 3-11 below.

Shortfall on zero carbon for Residential		
Carbon emissions (tonnes / annum)	30 year carbon emissions	Offset payment (£60/tonne)
10.59	318	£ 19,067

Table 3-11 Carbon offset payment

4 Sustainability

4.1 Water efficiency

Water fittings will be specified with the following or similar flow rates to meet the target water consumption of 105 l/p/day:

- Wash basin taps – 6.5 l/min
- Showers – 7.5 l/min
- Bath – 120l to overflow
- Dishwasher - 1.2 l/place setting
- Washing machine - 9 l/kg load
- WC – 6/4 litre dual flush
- Kitchen taps – 6.5 l/min

Water meters will be installed to encourage residents to limit their consumption.

4.2 Materials

Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used. The use low embodied energy products will be further investigated.

Responsible sourcing will also be pursued. All timber used on site during the construction phase and within the building will be from legal sources. Where possible, FSC or equivalent timber will be used. Sourcing of other materials will include products where the manufacturer employs an environmental management system such as ISO 14001 or BES 6001. Where possible, materials will be sourced locally.

Non-toxic materials will be used wherever possible, including the specification of products with low VOC content in line with European testing standards.

All the building elements will achieve high ratings on the BRE Green Guide to Specification. Materials will be specified to have a low embodied energy, considering whole life cycle analysis.

4.3 Waste Management and Construction

Construction site waste will be managed in such a way to reduce the amount of waste produced as much as possible, and the waste hierarchy will be followed.

Household waste will be recycled through the local authority collection scheme. Each unit will be provided with its own separate waste and recycling bins. The development will have refuse stores integrated on the ground floor in two locations, which will provide separate bins for waste and recycling.

4.4 Nature Conservation and Biodiversity

The site was previously occupied by a building so is not considered to be of ecological value. Measures will be taken during construction to minimise impact on ecology by timing works appropriately and following best practice guidance. The garden spaces will incorporate native planting. The development will attempt to increase biodiversity through the provision of living roofs on available roof space.

4.5 Climate Change Adaptation

Tackling Increased Temperature and Drought

The impact of solar gain has been incorporated into the SAP analysis for compliance with Part L and the risk of solar overheating has been concluded to be medium for the development.

Windows will incorporate low emissivity coatings to reduce solar gain. Blinds have also been specified on all windows orientated South, South East and South West. The residential units will be provided with openable windows to provide natural ventilation and mechanical ventilation.

Flooding

The peak and volume of surface water run-off rates will not be increased due to the development, as the site is existing hard standing so the impermeable area will not increase. The site is in flood zone 1 so the building is not at risk of flooding.

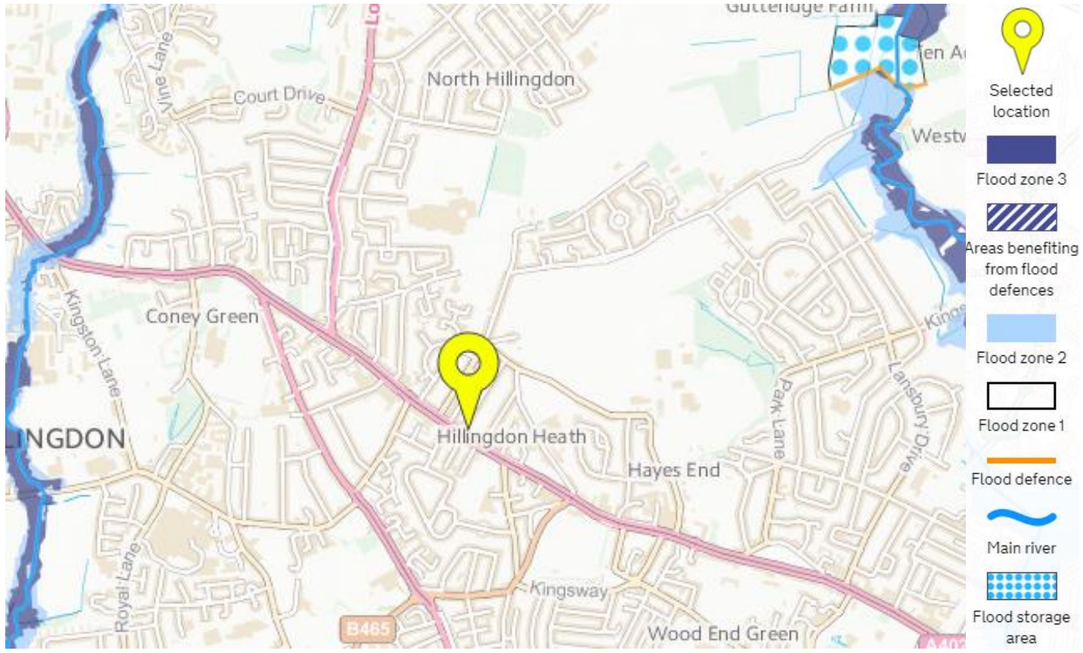


Figure 3-1 Flood Risk Map

4.6 Pollution Management

Air Quality

The construction site will be managed in such a way that the environmental impact is minimised. This includes following best practice policies for dust pollution by using dust sheets, covering skips and damping down where appropriate.

Plant and machinery

All plant and equipment installed in the development will be appropriately sized and selected for efficiency in order to reduce greenhouse gas emissions and have a low NO_x emission value. All equipment will be frequently maintained to ensure it continues to run efficiently and cleanly.

Insulating materials and heating systems will be specified to keep pollutants to a minimum. Insulation will have a low Global Warming Potential.

Noise

The dwellings will comply with Building Regulations Part E, providing a good level of sound insulation. All windows are to be specified as high efficiency double glazing to minimise the transmission of noise between the property and surrounding area.

Light Pollution

External lighting will be adequately controlled to ensure that it does not run unnecessarily. The proposed development is in a highly urbanised location, and therefore will not significantly contribute to increasing the effects of light pollution.

5 Conclusion

This report summarises the proposed sustainable strategy for development at The Star in order to meet the sustainability requirements of the London Borough of Hillingdon and the London Plan. The site is located in the London Borough of Hillingdon. The proposed development consists of 112m2 of commercial space on the ground floor, with 10 apartments located across 3 stories above the commercial space. The site also includes 2 3 storey houses on the same site, as well as covered parking.

As required by the London Plan, the development follows the energy hierarchy, incorporating passive design measures, energy efficient equipment and renewable energy.

The residential section of the development is a major residential development it is required to be zero carbon. In line with the London Plan, there is a target of a 35% reduction over Part L 2013 on site. The development employs an efficient building fabric, including well insulated walls and highly efficient glazing, efficient systems and PV Panels are specified to maximise carbon savings for the site, resulting in a 35% improvement over Part L for the residential areas. The development will further achieve ‘zero carbon’ through an offset payment in line with the London Plan guidance.

The commercial space is a minor development so is only required to meet Part L. An 11% reduction over Part L was achieved for the retail space.

Measures have been incorporated to ensure that sustainability is considered throughout the construction and design process.

The figures within this report are based on preliminary analysis only and further detailed studies will be required at the detailed design stage before specifying any of the proposed systems.