Solent Road, Havant

Client – Portsmouth Water

Energy & Sustainability Statement

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1.0 Executive Summary

This report considers the energy and sustainability measures to be incorporated within the office development located on Solent Road, Havant. This document reviews the requirements at both national and local level, as set out in the National Planning Policy Framework (2021) and Havant Borough Core strategy (2011).

Energy and carbon savings are to be achieved through passive design and energy efficient design features, such as: energy efficient lighting, sub-metering of relevant areas, upgrading of 'U' values and occupancy sensing in relative areas, as well as the incorporation of renewable energy technologies. It is anticipated that a 4.31% saving in the developments predicted annual energy consumption will be achieved through the incorporation of passive measures and energy efficient design and a 28.68% further reduction will be achieved through the energy contribution by photovoltaic panels totalling a 32.99% energy reduction from the Part L 2021 Baseline. The inclusion of this energy strategy within the design of development in Solent Road, allows for an 8.28% reduction in CO_2 emissions for the development from a base Part L 2021 compliant build, in compliance with Havant's local planning requirement.

It is anticipated further measures will be adopted as a means of reducing carbon emissions associated with the development such as using construction materials that will be responsibly and legally sourced. In addition to this, it is anticipated any new insulation materials specified will be responsibly sourced.

To reduce the energy demand of the development as well as help to conserve water resources within the local area, it is anticipated that the fit-out works will provide for sanitary fittings which will be water efficient through measures such as dual flush toilets and low flow taps.

The development is located within Solent road, Havant, and is in proximity to public transport nodes, as well as a range of primary local amenities such as cash points and supermarkets. These features allow for the reduction of car-based travel and transport related pollution.

The incorporation of these sustainability measures allows for the proposed development to be deemed sustainable whilst achieving compliance with local and national policy.

2.0 Introduction

This report has been prepared by Cudd Bentley Consulting Ltd, to investigate the issues of energy and sustainability surrounding the proposed development.

The proposed development shall be located in Havant and comprises an office building containing a range of office areas, WC's and other common rooms within an office building. The proposed site plan can be seen below in Figure 2.1.

Figure 2.1: Proposed Site Plan

3.0 Drivers of Sustainability

The term *Sustainable Development*, is defined by the Department for the Environment, Food and Rural Affairs as:

'… making sure people throughout the world can satisfy their basic needs now, while making sure that future generations can also look forward to the same quality of life. It recognises that the "three pillars" – economy, society and environment – are interconnected.'

To achieve this objective of sustainable development in any industry, sector strict regulations have been put in place that have filtered down through EU Directives from the European Climate Change Programme, to National UK Acts such as the Climate Change Act 2008, to Local Policy in the form of Core Strategies. However, there are larger drivers behind the concept of sustainable development.

Kyoto Protocol

In 1997, the Kyoto Protocol was adopted as part of the United Nations Framework Convention on Climate Change, to which the UK is a signatory. The key feature of the protocol was the binding targets that were set for industrialised countries to reduce their Green House Gas emissions by 12.5% below 1990 levels by 2008-2012.

Cancun Agreements

Since the initial adoption of the Kyoto Protocol, extensive research has been put forward as to the causes and markers of climate change from the Intergovernmental Panel on Climate Change, which has led to new targets and objectives being made. In 2012, the international community met to discuss new directions for responding to climate change by adopting new agreements. The key objectives of the Cancun Agreements are:

- Establish clear objectives for reducing human-generated greenhouse gas emissions over time to keep the global average temperature rise below two degrees;
- Mobilise the development and transfer of clean technology to boost efforts to address climate change, getting it to the right place at the right time and for the best effect;
- Assist the particularly vulnerable people in the world to adapt to the inevitable impacts of climate change;
- Protect the world's forests, which are a major repository of carbon;
- Establish effective institutions and systems which will ensure these objectives are implemented successfully.

COP21: Paris Global Climate Agreement

In December 2015, a global climate deal was reached in a summit involving all the world's nations. The targets of this aimed principally to curb the dangerous levels of climate change and drive an increase low-carbon infrastructure investment. Numerous organisations and corporations also committed to helping create a greener future by making their own pledges through the course of the summit. The key elements of the agreement are:

- To keep global temperatures "well below" 2.0C above pre-industrial times and "endeavour to limit" them even more, to 1.5C
- To limit the amount of greenhouse gases emitted by human activity to the same levels that trees, soil and oceans can absorb naturally, beginning at some point between 2050 and 2100
- To review each country's contribution to cutting emissions every five years so they scale up to the challenge
- For rich countries to help poorer nations by providing "climate finance" to adapt to climate change and switch to renewable energy.

BRE's COP21 Climate Pledge (December 2015)

"We commit to continue to drive best practice and carbon reduction, as we have through the use of BREEAM for the past 25 years. By reaching over 9,000 BREEAM rated buildings we predict emissions savings will be in excess of 900,000 tonnes of CO_2, compared to regulatory minimum performance requirements, by 2020. Saving not only carbon but bringing wider benefits to both the owner and occupiers."

4.0 National Policy

National Planning Policy

An effective planning system is required to contribute to achieving sustainable development. The ***National Planning Policy Framework*** (NPPF), 2021, outlines what the government deems as sustainable development in England.

Sustainable development is defined as having the following three overarching objectives which are interdependent and need to be pursued in mutually supportive ways: an economic objective, a social objective, and an environmental objective.

1. 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;
2. 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 and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
3. Environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

The above objectives can be described as an energy trilemma, this is demonstrated in Figure 4.1 below. Each dimension is dependent on each other and sustainable development proposals should adhere to each role. This energy statement shall ensure the proposed Development is one that contributes economically, socially and environmentally in accordance with the NPPF, 2021.

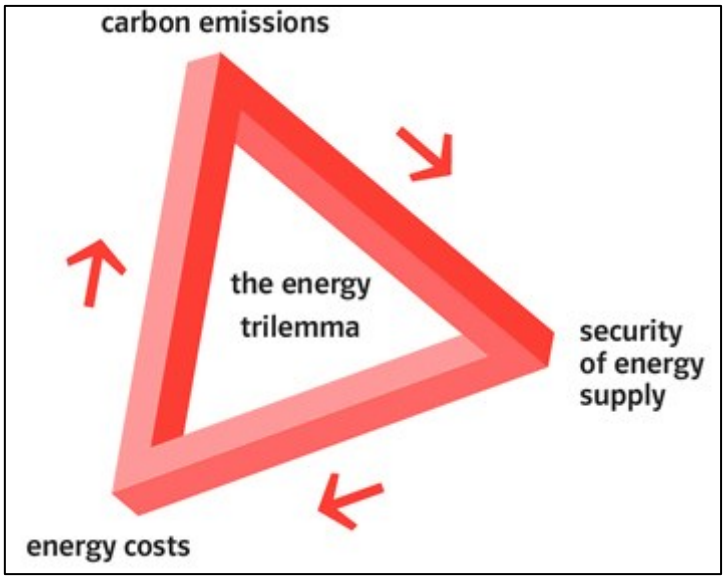


Figure 4.1 The Energy Trilemma

Guidance has been followed from the (NPPF), 2021, to provide an energy strategy which reduces energy use and carbon emissions, in line with best practice. This will provide a balanced scheme which focuses on optimal use of non-renewable resources (energy efficiency measures) whilst providing a renewable energy strategy best suited to the sites and their building uses. Below are some key extracts relevant to the development from Chapter fourteen 'Meeting the Challenge of Climate Change, Flooding & Coastal Change':

Paragraph 20

Strategic policies should set out an overall strategy for the pattern, scale and design quality of places, and make sufficient provision for:

b. infrastructure for transport, telecommunications, security, waste management, water supply, wastewater, flood risk and coastal change management, and the provision of minerals and energy (including heat);

Paragraph 153

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

Paragraph 154

New development should be planned for in ways that:

a. avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b. can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

Paragraph 155

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

a. provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b. consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

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

Paragraph 156

Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

Paragraph 157

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

a. comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b. take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

Paragraph 158

When determining planning applications for renewable and low carbon development, local planning authorities should:

a. not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and

b. approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

5.0 Local Policy

This section confirms guidance available and the minimum requirements at local level Havant Brough Council, which states the spatial strategy and policies for the future development of the area.

Havant Borough Core Strategy (2011)

Policy CS14: Efficient Use of Resources

Planning permission will be granted for development that:

1. Provides adequate land or funding for waste management infrastructure.
2. Locally contributes to the delivery of the PUSH target of 100MW of renewable energy by 2020 for the whole of the PUSH area. Major areas of development must ensure that their on-site renewable energy production is maximised and resource efficiency is maximised.
3. On completion, unless proven to be financially or technically unviable, meets the following standards:

- Residential development – Level 3 of the Code for Sustainable Homes;
- Multi occupation homes and non-residential development over 500sqm - BREEAM standard 'very good'.
- Improvements to these standards throughout the plan period will be encouraged.
- Particular attention should be paid to water efficiency measures.

4. Allowable Solutions' may be used to achieve higher levels of carbon reduction where on-site proposals are not feasible or viable.

Our climate is always changing and our use of fossil fuels creates greenhouse gas emissions that are contributing to the rate at which climate change will continue to occur. Planning has an important role to play in reducing greenhouse gases through locating development where there are opportunities to walk or cycle and by ensuring that new buildings have the highest standards of energy efficiency and design. Careful planning for future generations through sustainable development and design will have positive impacts on social inclusion and environmental benefits and in turn will have positive repercussions on economic prosperity.

The borough's location on the south coast means that the impacts of climate change will be more significant than many other parts of the country in terms of sea level rise, higher temperature and lower rainfall, resulting in significant impact on the availability of water. The Core Strategy addresses the impacts of climate change, our use of natural resources, waste management and non-renewable energy sources and the impact of our current lifestyles. The Core Strategy policies contribute to changing daily life and allow us to reconsider our consumption. Over time the changes that can be implemented now will become the norm for future generations.

The Core Strategy will cover a period up to 2026, in order to achieve the government's targets of reducing greenhouse gas emissions it is fundamental that sustainable construction methods are a priority. Policies CS14 and CS16 set out the principles that will be applied to all new development. All new development is defined as one dwelling or more and 500 square metres or more of non residential floorspace. In order to monitor Policy CS14 the Code for Sustainable Homes requires developers to submit an independently assessed code rating with their planning applications together with another on completion.

Policy CS13: Green Infrastructure

Development will be permitted that:

1. Maintains and manages the network of green infrastructure identified at the sub regional and local levels.
2. Incorporates, where appropriate, improvements to existing green infrastructure through the restoration, enhancement or creation of additional resources.
3. Does not undermine the functional integrity of the green infrastructure.
4. Creates, where appropriate, new green infrastructure (including access management measures) either through on site provision or financial contributions.

Development proposals that adversely affect green infrastructure will not be permitted unless superior alternative provision can be provided or where it is part of a service provider's plans to provide improved local services in equally accessible locations.

Green infrastructure sites will be allocated in the Development Delivery (Allocations) Plan.

The South East Plan requires councils and partners such as PUSH to plan, provide and manage connected and substantial networks of accessible multifunctional greenspace. Such networks of green infrastructure provide multifunctional areas that increase connectivity of open space for biodiversity and wildlife protection, creating places where people can enjoy a natural environment that will benefit their health and wellbeing.

Policy CS15: Flood and Costal Erosion Risk

Development in areas at risk of flooding now and in the future as identified on the latest Environment Agency flood risk maps and Strategic Flood Risk Assessment climate change maps will only be permitted where:

1. It meets the sequential and exception test (where required) in relation to PPS25.
2. The site is located in a low hazard area as defined in the Strategic Flood Risk Assessment.
3. A site-specific flood risk assessment demonstrates that the development will be safe, including the access, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
4. The scheme incorporates flood protection, flood resilience and resistance measures appropriate to the character and biodiversity of the area and the specific requirements of the site.
5. Appropriate flood warning and evacuation plans are in place.
6. New site drainage systems are designed taking account of events which exceed the normal design standard.

The borough has a coastline with a total length of 48km. The entire coastline is subject to international and national nature conservation designations. The impacts of climate change mean sea levels will rise and combining this with the natural forces of the sea, the borough’s coastline will change over the life of the developments that the Core Strategy promotes. The borough is faced with the challenge of planning where and when the change could occur. As well as coastal flooding there are some areas that are subject to flooding from the borough’ streams, surface water run off and rising ground water that could also be affected by climate change and these must be addressed.

Policy CS17: Concentration and Distribution of Development within the Urban Areas

Development will be permitted that makes the most effective use of land in the borough by granting planning permission that:

1. Concentrates new housing, employment, retail, leisure and other development within the five urban areas of Havant, Leigh Park, Waterlooville, Emsworth and Haylin Island, as shown on the Proposals Map.
2. Prioritises development on previously developed land, including redundant, derelict or underused land and buildings within the urban area.
3. Broadly distributes the new housing and employment development in the five areas of the borough as indicated on the Spatial Distribution Map (Key Diagram).

Development in the non-urban areas will only be permitted if it is consistent with the policies for the countryside set out in national policy.

The South East Plan defines built up and urbanised places as the urban areas. There is a national presumption that development should be concentrated in these areas. The areas beyond the urban areas (previously countryside) are now defined as non-urban areas. The boundary definition for the urban and non-urban areas is identified on the Proposals Map.

Policy CS20: Transport and Access Strategy

Development will be permitted that:

1. Is consistent with and contributes to the implementation of the 'Reduce, Manage and Invest' strategy.
2. Does not increase congestion and promotes better use of existing transport networks.
3. Improves accessibility to goods, services and employment and promotes equality in the transport system.
4. Provides transport management measures to ensure the safe and efficient operation of the strategic and local road network.
5. Ensures that highway design responds positively to the characteristics of the area and delivers a high quality public realm for all users.
6. Maintains or improves the range of transport modes accessible to the users of the development site with specific emphasis on public transport, especially high quality/frequency buses and includes walking and cycling where appropriate.
7. Improves highway, cycling and pedestrian links between the western built up area of the borough (Waterlooville) and the eastern area of the borough (centred on Havant) to create a strong east/west communication axis that passes through Dunsbury Hill Farm/Leigh Park.

Policy CS21: Developer Requirements

Development will be permitted if on-site and/or off-site infrastructure requirements are met.
Where new or improved infrastructure is essential for planning permission to be granted the council will require the on-site or off site provision and/or contributions through planning obligations, agreements or tariffs in accordance with the relevant legislation for off-site provision. The need for contributions will depend on information and advice from infrastructure providers on the expected impacts of the development on all the infrastructure types.
Where appropriate the council will seek on-site provision or financial contributions to ensure the timely off-site or on-site delivery of all types of infrastructure as detailed in
Table 9.1 under the following headings:
1. Transport
2. Housing
3. Education
4. Health
5. Social Infrastructure
6. Green Infrastructure
7. Public Services
8. Utility Services
9. Flood Defences
10. Public Realm
Where on-site provision or financial contributions are made, arrangements for the ongoing maintenance of facilities will be required.
Where the necessary contributions are not agreed by the developer, planning permission will be refused.
A Supplementary Planning Document will be prepared setting out the mechanisms that will be used for taking development contributions together with details of the types and priorities of infrastructure provision.

Policy DM8: Conservation, Protection and Enhancement of Existing Natural Features

Development will only be permitted where it protects and enhances local habitats and landscape distinctiveness and which addresses all of the relevant criteria as set out below:
1. Protects natural features of nature conservation and/or amenity importance on the site, for example trees, woodlands, hedgerows, soils, streams, stream corridors, springs, ditches or ponds from damage, destruction and a deterioration in quality.
2. Sympathetically incorporates existing features into the overall design of the scheme including measures taken to ensure their continued survival.
3. Provides new landscape works that integrate successfully with the local environment and existing natural features, using local materials and plant species and making provision for future maintenance of new landscape works associated with new developments.
4. Ensures sequences of greenspaces are maintained and protects the attractiveness and visual amenity of all green open spaces that contribute to the identity of the borough.

Policy DM10: Pollution

Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.
2. National air quality standards or objectives would not be breached.
3. The water environment would not be detrimentally affected.
4. It would not lead to an unacceptable deterioration in the quality or potential yield of coastal, surface and ground water resources.
5. External lighting is of the minimum level of illumination and duration required for security and operational purposes.
6. External lighting would not interfere with safe navigation in either Chichester or Langstone Harbours and other coastal locations.

Policy DM11: Planning for More Sustainable Travel

The council will seek to ensure that every opportunity is taken to increase integration of sustainable travel modes and availability of non-motorised modes by appropriate measures including:

1. Securing on-site and/or off-site interventions that promote integrated travel and access by non-motorised modes.

2. Requiring safe and secure vehicular and cycle parking and turning facilities to adopted standards.

3. Securing appropriate improvements to public and community transport (including infrastructure requirements) in accordance with the Hampshire Local Transport Plan and (where applicable) the relevant sub-regional transport strategy.

4. Proposals for reducing opportunities for informal parking in the area surrounding the development where this would impact on the capacity, operation and safety of the local highway network and/or the amenity of the locality.

5. Ensuring that new developments are located and designed at the outset to encourage lower vehicle speeds and safe, permeable, inclusive layouts that integrate with existing pedestrian, cycle and public transport routes. This will facilitate and encourage short distance trips by cycle and walking, including to public transport interchanges.

6.0 Energy Usage and Carbon Emissions

Government policies require significant energy reductions from buildings. Building a Greener Future sets a planned trajectory (delivered via Part L of the building regulations 2021) with an aspiration for all non-domestic new buildings to be zero carbon by 2020. The Climate Change Act (Nov 2008) sets the UK targets of; CO_2 reduction of 26% by 2020 and CO_2 reduction of 80% by 2050.

6.1 Policy Review

National Planning Policy Framework (2021)

Section 14 – Meeting the Challenge of Climate Change, Flooding and Coastal Change

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

a. provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b. consider identifying suitable areas for renewable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

c. identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for collocating potential heat customers and suppliers.

Havant Borough Core Strategy (2011)

Policy E12: Low Carbon Design

Planning permission will be granted for development that:

1. Provides adequate land or funding for waste management infrastructure.

2. Locally contributes to the delivery of the PUSH target of 100MW of renewable energy by 2020 for the whole of the PUSH area. Major areas of development must ensure that their on-site renewable energy production is maximised and resource efficiency is maximised.

3. On completion, unless proven to be financially or technically unviable, meets the following standards:

- Residential development – Level 3 of the Code for Sustainable Homes;
- Multi occupation homes and non-residential development over 500sqm - BREEAM standard 'very good'.
- Improvements to these standards throughout the plan period will be encouraged.
- Particular attention should be paid to water efficiency measures.

Allowable Solutions' may be used to achieve higher levels of carbon reduction where on-site proposals are not feasible or viable.

6.2 Development Sustainability Features

Energy modelling has been undertaken which adopts the following hierarchy for reducing carbon emissions for the development; Be Lean, Be Clean, Be Green.

The total baseline energy and carbon emissions for the development (built to Part L 2021), taking into account regulated energy demands are:

- **81,598 kWh/annum**
- **11.4 Tonnes CO_2/annum**

The primary energy demands of the development will be:

- Lighting;
- General power;
- Heating and ventilation;
- Hot water supply.

Unregulated energy use is not covered by existing regulations and includes energy consumed by the occupants through activities and appliances; in this case it would typically be small power usage (appliances, computers etc.). The following unregulated energy use for the development was calculated:

- **101,959 kWh/annum**
- **53 Tonnes CO_2/annum**

<u>Be Lean</u>

To provide energy and carbon saving further to a base Part L (2021) build; targeting compliance with local and national policies, the following passive design and energy efficiency measures are recommended.

The following 'U' values shall be incorporated within the office part of the development, in accordance with Part L2A (2021):

- External Walls - U = 0.22 W/m².K;
- Exposed Floors - U = 0.18 W/m².K;
- Exposed Roofs - U = 0.16 W/m².K;
- Glazing - U= 1.4 W/m².K;

Light Transmittance = 60%; Shading Co-efficient = 0.41

- Personnel Doors - U = 1.6 W/m².K;
- Air Permeability - 5 m^3/hr/m^2@ 50 Pa.

With the above passive design measures, the proposed energy strategy includes the following energy efficiency measures throughout the development:

- The provision of energy efficient lighting (PIR controls and occupancy sensing in relevant areas);
- The provision of zonal thermal and lighting controls;
- The provision of variable speed pumps and fans;
- The enhancement of pipework and ductwork, thermal insulation;

- Specific Fan Powers improved beyond Part L requirements.

Be Clean

It was investigated to establish if there were any existing decentralised energy networks near the proposed site using the Department of Energy and Climate Change CHP database. It has been concluded that there are no suitable existing nearby CHP systems to which a connection may be possible. Within Appendix B, the CHP area search identified that there is no CHP or district heating network close to the development site.

Furthermore, in order to economically justify installing a CHP unit on any site, a minimum requirement of 4,000 – 4,500 running hours per year is necessary. Based on the building type, there is a low heating and hot water demand for a continuous period over the year. Therefore, a maximum of circa 2,117 running hours per year is anticipated.

Months	Load per Day (hrs)	Load per week (hrs)	Load per month (hrs)	Load for 6 months (hrs)	
April to Sept	2	14	58.8	352.8	
October to March	10	70	294	1,764.0	
		Total approximate Load for a year		2,116.8	hours
		Minimum required hours		4,000.0	hours

Table 6.1 CHP Analysis

Be Green

Further means of reducing energy and carbon emissions for the development have been explored, through the use of renewable technologies. The following, Table 6.2, reviews the primary options for generation of on-site renewable/ Low or Zero Carbon (LZC) energy and considers their suitability for use on the development.

Renewable Technology Feasibility Assessment		Viable?
Bio Fuel Boilers	Bio-fuel boilers are specifically designed to burn solid biomass or liquid bio-fuel in order to heat water or raise steam. This can then be used for space heating or Domestic Hot Water (DHW) supply. Bio-fuel boilers could potentially provide the annual space heating and DHW demand for the Units, however they are not recommended for this development for the following reasons: 1. Biomass boilers generate increased Oxides of Nitrogen (NOx) and particulates (PM10) which would affect air quality. 2. The storage requirements for the biofuel would require a large plant space, with an auxiliary storage facility to allow for a two-week period where delivery of fuel might not be available.	No

Renewable Technology Feasibility Assessment		Viable?
Land Use Large volumes of storage are required for fuel at ground level or basement level with sufficient vehicular access for fuel delivered. Noise Noise levels are generated by the operation of the bio-fuel boiler and associated deliveries of the bio-fuel. The plant room enclosure will have to be attenuated to acceptable levels imposed by planning and Acoustician recommendations.		
Wind Turbines 	Wind turbines convert the kinetic energy in the wind into mechanical energy which is then converted into electricity. Wind turbines can provide electrical power either directly to a load or via a battery system. The use of wind turbines is not recommended for this development for the following reasons: 1. Wind turbines, of a size necessary to make a contribution to the Units' renewable energy requirements are considered inappropriate on spatial, planning, aesthetic and noise grounds. Noise pollution from commercial wind turbines can be quite significant within a few hundred metres. 2. The site is not ideal; an ideal site is a hill with a flat, clear exposure. It should be free from strong turbulence and obstructions like large trees, houses or other buildings. 3. The financial viability of a small-scale installation on the site would be compromised by the operational efficiency of the units (circa 30%). 4. Wind turbines can cause electrical interference within a 2km radius. 5. Finally, the main disadvantage is down to the wind's unreliability factor. The wind strength is often too low in many areas, where this site is located the wind speed is 5 m/s at 10m, as can be seen in the wind map presented in Appendix C, in order for the wind turbines to be feasible, wind speeds of greater than 5.5m/s are required.	No
Land Use There would be an adverse visual impact on the site which will be dependent on the height at which the wind turbines are located. Noise Noise levels are generated by the rotating blades; these noise levels will vary dependent on wind velocity and will need to be in acceptable levels imposed by planning and Acoustician recommendations.		
Ground Source Heat Pumps	Space cooling and heating can be provided by circulating water cooled or heated directly by the ground or via subterranean water. Ground water cooling and heating through the use of aquifers makes use of the relatively stable ground/ water temperature which is available at a temperature range of 10 – 14°C. The use of Ground Source Heat Pumps is not recommended for this development for the following reasons:	No

Renewable Technology Feasibility Assessment		Viable?
	1. Cost of boreholes may be prohibitive (subject to site geological conditions). 2. Favourable ground conditions may not exist. 3. Problems can arise with boreholes silting up (open-loop). 4. Changes in local ground conditions could affect water quality and the amount that can be extracted (open-loop).	
Land Use This installation would require Environment Agency approval. Ground and Hydrology analysis would be required to investigate if favourable conditions exist.		
Solar Water Heating 	Solar Water Heating systems use radiant energy from the sun to heat water. Systems comprise of a roof mounted heat collector piped to a coil located within a hot water storage cylinder. The use of Solar Panels is not recommended for this development for the following reasons: 1. 15% of the developments roof space is utilised for roof lights. 2. The roof space is better suited for the incorporation of solar PV panels.	No
Land Use Roof space is better served for the installation of Photovoltaic panels. Noise Noise levels are generated by pumps at roof level, these are insignificant so should pose no issues.		
Air Source Heat Pumps (ASHP) 	An ASHP extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15°C and typically draws approximately a quarter to a third of the electricity of a standard resistance heater for the same amount of heating, reducing utility bills. Air Source Heat Pumps (ASHP) are proposed for use within the offices in office building to provide the heating and cooling requirements. The benefits of ASHP are as follows: 1. They are ideally suited to serve the offices and communal area within the development during periods when they may require heating or cooling. The times when cooling is required may differ for different space depending on their use, occupancy period and levels, the operation of individual air source heat pumps would allow individual control and can be efficiently accommodated within the building design; 2. The heat pump units can be configured to provide internal heat reclaim from dissimilar environmental zones, reducing energy consumption and carbon emissions.	Yes
Land Use		

<table>
<tr><th colspan="2">Renewable Technology Feasibility Assessment</th><th>Viable?</th></tr>
<tr><td colspan="2">Air Source Heat Pumps can be installed on ground mounted, roof mounted or wall mounted frames. When installing Air Source Heat Pumps there are various factors to consider; Heat Pumps should be positioned to provide shelter from high winds which can reduce efficiency by causing defrost problems.
<u>Noise</u>
Noise levels are generated by fans, and compressors causing vibrations. The noise levels are dependent on manufacturer and vary accordingly, these will need to be in acceptable levels imposed by planning and Acousticians recommendations.</td><td></td></tr>
<tr><td>Photovoltaics
 </td><td>Across the development site, a PV array totalling 40 kWp (circa 108 panels, 183 sq.m) is proposed to satisfy the energy contribution targets. Photovoltaic (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases silicon.
They have the following advantages for use on this development;
1. Photovoltaic panels can be situated at roof level to provide a source of renewable energy.
2. Panels can be grid connected to sell surplus electricity produced.
3. Low maintenance issues.
4. Visual use of renewable energy can be seen by public.</td><td rowspan="2">Yes</td></tr>
<tr><td colspan="2"><u>Land Use</u>
There are no land issues or adverse visual impacts as the photovoltaic panels are roof mounted.
<u>Noise</u>
There are no noise issues generated by this technology.</td></tr>
</table>

Table 6.2 Renewable Technology Feasibility Assessment

6.3 Summary

By applying the above passive design measures and renewable energy technologies the carbon and energy savings generated are displayed in Table 6.3 – 6.4, and Figure 6.1 – 6.2. The full calculations can be seen in Appendix D.

	Predicted Energy Consumption (kWh/annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	110,743	101,959
After Energy Efficient and Passive Measures	105,966 (4.31% Saving)	-
After PVs	74,201 (28.68% Saving)	-
Total Cumulative Saving	**36,542** **(32.99% Saving)**	

Table 6.3 Regulated energy savings

	Carbon Dioxide Emissions (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	5.92	53
After Energy Efficient and Passive Measures	5.6	It is anticipated that a circa 3% saving can be achieved through the use of energy efficient fittings, for example A or A+ appliances. This would reduce the unregulated carbon emissions to: 51.41
After PVs	5.43	
Total Cumulative Saving	**11.39** **(8.28 % Saving)**	**1.59** **(3.00 % Saving)**

Table 6.4 Carbon Dioxide Emissions

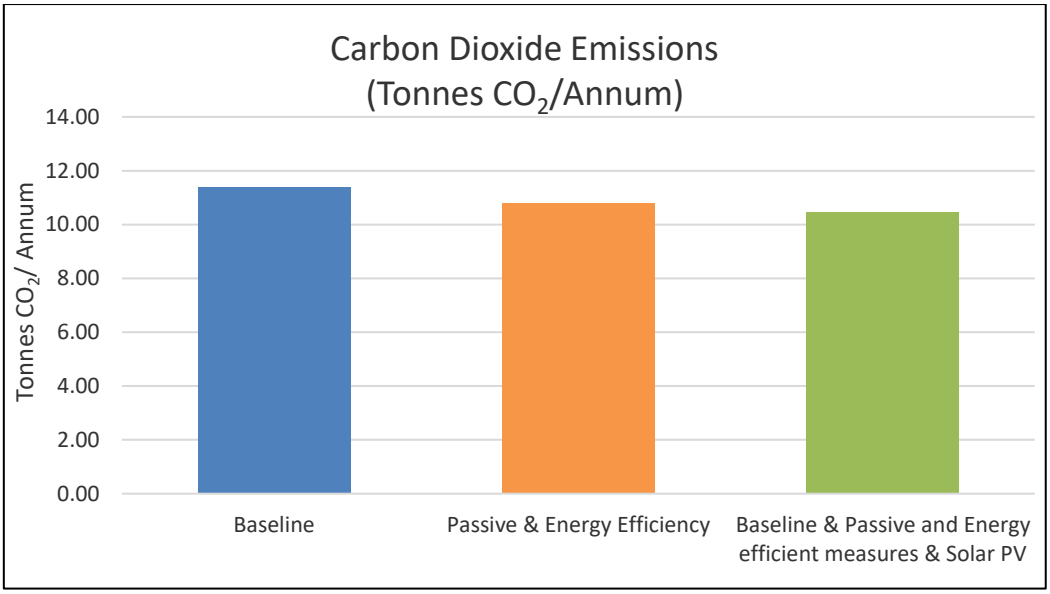


Figure 6.1 Site Carbon Savings

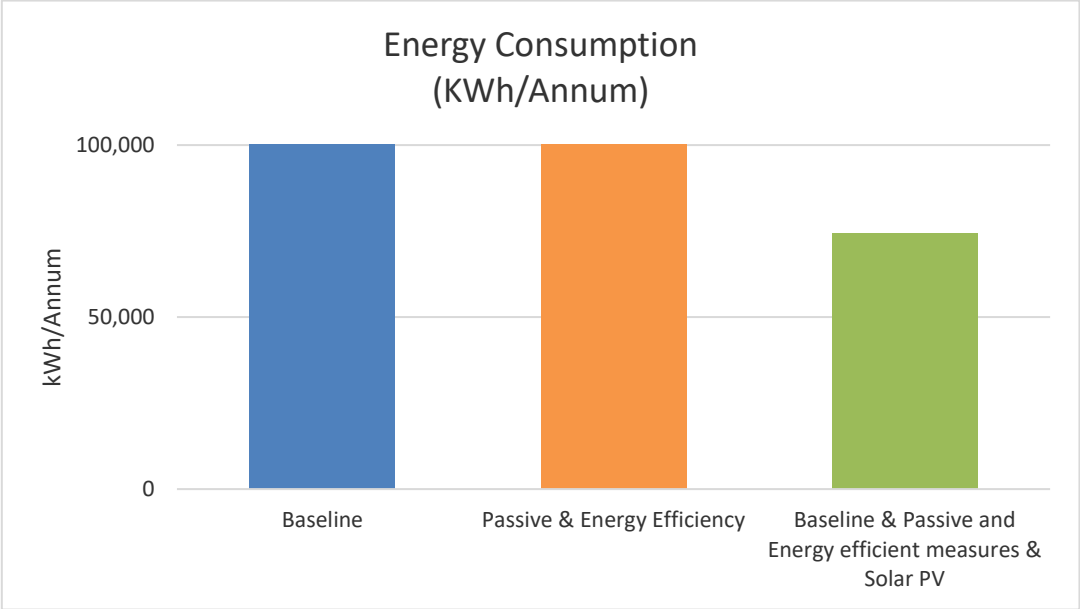


Figure 6.2 Site Energy Production

The above review has resulted in the formulation of an Energy Strategy that may be adopted for the development involving the use of passive design and energy efficiency measures aimed at achieving the recommendations set out by Havant Borough Council. The inclusion of this energy strategy within the design of Solent Road-Havant, allows for an 8.28% reduction in CO_2 emissions for the development from a base Part L 2021 compliant building regulation.

The recommended schemes take into consideration the most appropriate technologies available to the site, which provides a scheme that is commercially viable whilst keeping in compliance with National and Local Policies. The use of further/emerging technologies may be included for use within this development if their feasibility increases in the future, in accordance with best practice.

7.0 Water Consumption

The ever-increasing impacts of climate change are continuously inflating demand for water, as well as increasing a need for awareness towards water usage. The UK is already under a large amount of pressure regarding water resources. To contribute towards mitigating this issue, the proposed development will consider various means of being economical with water consumption.

7.1 Policy Review

National Planning Policy Framework (2021)
Local plans should set out strategic priorities for the area; this should include strategic policies to deliver the provision of infrastructure for waste management, water supply and wastewater.

7.2 Development Sustainability Features

In order to ensure the reduction and management of water consumption within the development, it is anticipated that various measures shall be undertaken, and specific features installed to reduce the building's potable water consumption.

It is anticipated that improvement in the consumption of potable water will be achieved, through the specification of water efficient components within sanitary areas during the fit-out works. Such features include the specification of low flow taps and dual flush toilets with reduced flush volumes.

To allow the various building users of each unit to monitor their water usage, it is also anticipated that water meters shall be specified on the mains supply to each unit. Water meters should have a pulsed output to allow connection to a Building Management System should one be installed at a later date by future building users.

In order to reduce water consumption associated with soft landscaping, it is expected that any landscaping included as part of the scheme design will either rely solely on manual watering by building users, or precipitation throughout all seasons of the year.

7.3 Summary

To ensure the sustainability of the development it is anticipated that water efficient fixtures will be incorporated into the design, such as low flow taps and dual flush toilets with reduced effective flush volumes.

To be further sustainable, it is anticipated that pulsed water meters will be installed on the mains water supply, to effectively monitor water consumption. The inclusion of the above sustainability features allows for the development to be deemed sustainable with regard to water consumption.

8.0 Transport

Transport produces a large proportion of the country's greenhouse gas emissions, something which government at both national and local level are striving to combat, especially through planning .

8.1 Policy Review

Havant Borough Core Strategy (2011)

Policy CS20: Transport and Access Strategy

Development will be permitted that:

1. Is consistent with and contributes to the implementation of the 'Reduce, Manage and Invest' strategy.

2. Does not increase congestion and promotes better use of existing transport networks.

3. Improves accessibility to goods, services and employment and promotes equality in the transport system.

4. Provides transport management measures to ensure the safe and efficient operation of the strategic and local road network.

5. Ensures that highway design responds positively to the characteristics of the area and delivers a high quality public realm for all users.

6. Maintains or improves the range of transport modes accessible to the users of the development site with specific emphasis on public transport, especially high quality/frequency buses and includes walking and cycling where appropriate.

7. Improves highway, cycling and pedestrian links between the western built up area of the borough (Waterlooville) and the eastern area of the borough (centred on Havant) to create a strong east/west communication axis that passes through Dunsbury Hill Farm/Leigh Park.

8.2 Development Sustainability Features

The proposed development is located in an urban area within Solent Road, Havant. The site has easy access to the A27, shown below in Figure 8.1. The urban location allows for a good provision of public transport with a number of bus stops in walking distance. The proposed development is within approximately 0.3 miles of a number of primary amenities including local shop and postal services which are located on Solent road; approximately an 5 minute walk.

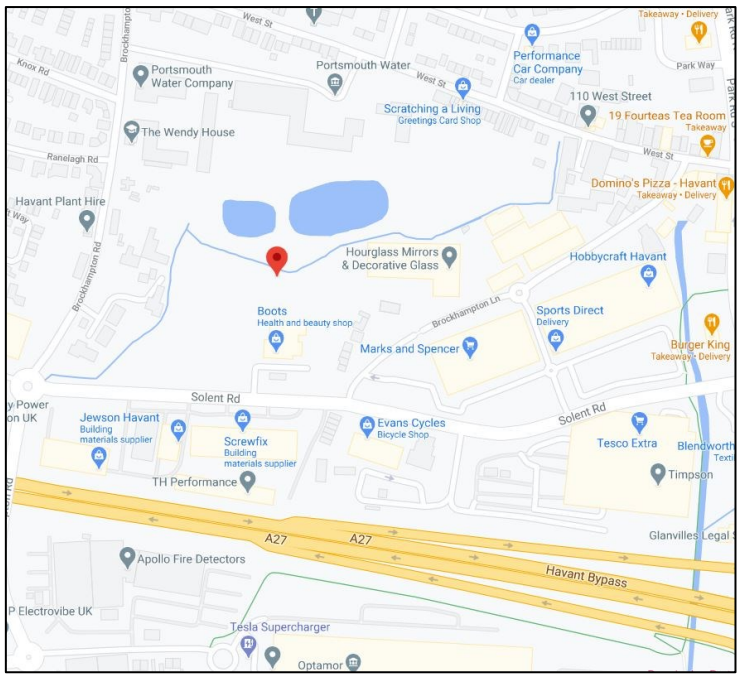


Figure 8.1 Location of the Development

8.3 Summary

The above provisions aim to make the proposed development easier to access for all building users, as well as offering a sustainable means of commuting rather than using a private vehicle.

The proposed development is located in southwest of Havant town centre. The site has easy access to the Solent road and allows for a good provision of public transport with a number of bus stops in walking distance. The proposed development is in close proximity 0.3 miles of number of Shops, including cash points and restaurants.

The inclusion of the above sustainability features allows for the proposed to be deemed sustainable with regard to transport.

9.0 Construction Site Management

A large proportion of all waste is due to construction and demolition. The requirement for new materials needs to be minimised, by re-using existing buildings and materials where possible and providing a Site Waste Management Plan for all construction sites. This responsibility lies with the contractor and needs to be clarified at an early design stage. It is becoming a greater requirement now to construct buildings that are flexible and can be re-used.

9.1 Policy Review

National Planning Policy Framework (2021)

Local plans should set out strategic priorities for the area; this should include strategic policies to deliver the provision of infrastructure for waste management, water supply and wastewater.

Havant Borough Core Strategy (2011)

Policy CS14-7.30 : Waste

Havant Borough Council is not the waste authority, although it does collect domestic and some commercial waste. The waste and minerals authority is Hampshire County Council. Waste is a major issue for our sub-region as the landfill sites are exhausted. The Waste and Resources Action Programme (WRAP) is the government sponsored organisation that supports organisations and individuals to reduce waste. It aims to halve waste to landfill. The construction industry produces 20% of all landfill. Site Waste Management Plans are now required to help developers reduce their waste. It is therefore important to deal with waste on development sites to reduce the need for landfill. Waste management infrastructure includes all physical aspects of the waste hierarchy. This ranges from adequate space within an individual dwelling curtilage for wheelie bins, recycling and composting bins, to the provision of a materials recycling centre in a major development. In order to meet the Code for Sustainable Homes and BREEAM requirements, applicants will be expected to submit a statement of how this has been achieved as part of their planning application.

9.2 Development Sustainability Features

In order to comply with national and local policy, it is anticipated that certain measures will be put into place for this development, such as a construction management scheme and a Site Waste Management Plan which monitors the site energy and water consumption and ensures that site timber is reclaimed, reused or responsibly sourced and as well as being legally sourced in accordance with the UK Government's Timber Procurement Policy.

Further to this the Site Waste Management Plan will also monitor the resource efficiency of the development construction works as well as the percentage of non-hazardous materials, excavation and construction, which have been diverted from landfill. It is expected that the main contractor will also set targets and monitor site consumption data for water consumption, energy consumption as well as fuel from deliveries and collection of waste and materials to and from site. Monitoring of such actions can encourage contractors to become more resource efficient to meet given targets. In addition to this, it is expected the main contractor will comply with best standards as set out in the

Considerate Constructors Scheme, achieving a score which is considered as exceeding compliance with the criteria of the scheme.

To ensure the sustainable construction of the Development, the project will consider the concept of the waste hierarchy as seen in Figure 9.1 below. The waste hierarchy recognises the need for waste to be considered for a variety of waste streams before being sent to landfill as a last resort.

The hierarchy is as follows:

- Waste minimisation;
- Reusing or upcycling;
- Recycling of all applicable materials;
- Recovery of energy from waste (anaerobic digestion plants);
- Waste is sent to landfill.

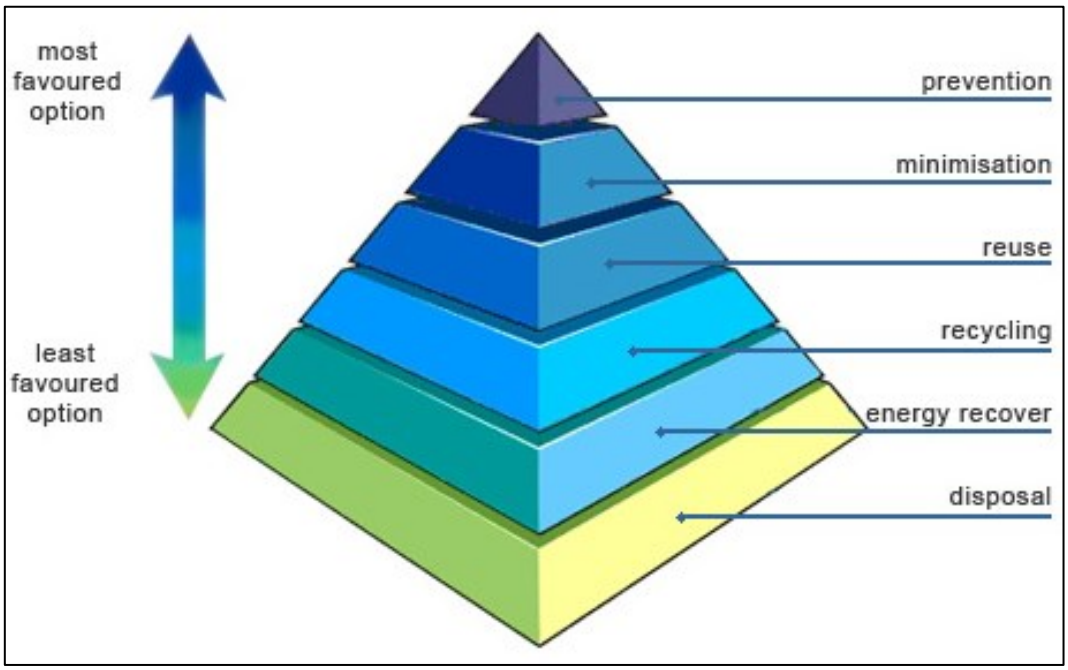


Figure 9.1 Waste Hierarchy Diagram

9.3 Summary

It is anticipated that the development will produce a Site Waste Management Plan, highlighting key materials and the correct waste streams for the recycling of any waste materials.

The development will adhere to a Considerate Constructors Scheme, achieving a targeted score which exceeds 'compliance' with the criteria of the scheme. As a result of these measures, the Development may be deemed sustainable as regards to construction site management.

10.0 Sustainable Design

Good urban design is essential in providing a varied and sustainable environment, which can facilitate opportunities for positive contributions within communities. As part of sustainable design for developments, it is essential that suitable design principles are followed to maximise opportunities for energy reduction through design as well as ensuring buildings follow or enhance the character of an area. Developments should also give further consideration to the level of security and comfort that is provided for future building users, including thermal and visual comfort, inclusivity and safe access.

10.1 Policy Review

National Planning Policy Framework (2021)
Section 12- Achieving Well-Designed Places
The creation of high-quality buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.

Havant Borough Core Strategy (2011)
Policy CS16: High Quality Design
Planning permission will be granted for development that is designed to a high standard, which helps to create places where people want to live, work and relax. All development should demonstrate that its design:

1. Responds to, draws inspiration from and respects local context and:

a) Identifies and responds positively to existing features of natural, historic or local character within or close to the proposed development site;

b) Integrates with existing local landscape features, promotes wildlife and biodiversity and/or applies characteristics of the local area into the design of a scheme wherever possible to create variety and interest;

c) Uses the characteristics of the locality to help inform the design of the new development including heights, massing, existing buildings lines, plot widths and depths, materials and proportions of windows and doors;

d) Is well connected to and integrates with the immediate local area and the wider area by linking to existing pedestrian and cycle routes and encouraging people to use public transport where possible; and

e) The development does not cause unacceptable harm to the amenity of neighbours through smell, the loss of privacy, outlook, noise and overlooking.

2. Produces a positive relationship between buildings, street and spaces both existing and proposed, where:

a) The layout of the development reduces opportunities for crime and antisocial behaviour; contributes to improving community safety; and makes provision for the management and maintenance of the development;

b) New streets are not dominated by vehicular traffic;

c) The layout of the development is legible, meaning it is easy to orientate oneself and move through.

3. Contributes to the improvement of the public realm close to the development, particularly sites close to town, district and local centres and other priority regeneration areas by using high quality hard and soft landscape material and street furniture; and where development is of a significant scale or prominence makes provision for public art.

4. Is inclusive by considering the needs of those with disabilities, ensuring safe and convenient access for all; and integrating affordable and supported housing with market housing through tenure blind design to minimise social exclusion and promote social integration.

5. Maximises opportunities for mixed use developments, particularly in town and district centres; and encourage higher densities (50+ dwellings per hectare) where appropriate.

6. Mitigates negative environmental impacts through sustainable design and construction methods, resource efficiencies, particularly water and the provision of facilities for waste recycling.

7. Adapts to the changing needs of the users and the changing climate over the lifespan of the building.

10.2 Development Sustainability Features

The development shall include a variety of features which are regarded as having a good sustainable design. To provide as much natural light as possible within the office and warehouse areas glazing has been provided to the office and circulation areas and with 15% rooflight coverage over the warehouse areas. Building modelling of each unit has confirmed that no occupied space is at risk from excessive solar gains.

To further ensure that overheating will not occur during summer months and the building is suitably insulated, as well as allowing for adaptation due to the effects of climate change, it is anticipated that the development will use building fabrics with 'U' values with an improvement beyond the threshold requirements of Part L (2021), as seen in Table 10.1 and 10.2.

Element	Part L2A Requirement	U Value Specified	% Improvement
Wall	0.26	0.22	15.38%
Roof	0.16	0.16	n/a
Floor	0.18	0.18	n/a
Glazing	1.6	1.4	12.5%

Table 10.2 U Value Improvements (Office)

Further to this the energy efficiency measures discussed within Section 6.0 will be incorporated into the design of the development. It is anticipated that such measures will lower the building's energy requirements making its operation feasible and practical for years to come. The use of suitable and functional building fabrics will also allow for the change of use of the development, should the community require it in future years.

In order to further reduce any potential overheating, lighter colour surfaces have been incorporated into the scheme where possible. It is also anticipated lighter coloured materials will be incorporated into aspects of the hard landscaping with the aim of light being reflected rather than absorbed and produce excess heat.

To provide a fully sustainable development it is also anticipated that the materials used for the following main elements of the development shall be rated under the Green Guide to Specification targeting ratings between A+ and D:

- External walls;
- Ground floor;
- Upper floors;
- Roof; and
- Windows.

To provide a development which remains sustainable during its operation phase, it is anticipated that space will be provided for the provision of waste storage facilities with additional space of recyclable waste streams. This is to enable building users to sort waste before collection and minimise the quantity of waste that may end up at landfill.

10.3 Summary

In order to comply with national and local policies, the development shall strive to provide both the building users and the local community with a building of sustainable design.

Measures should be taken to ensure the thermal comfort of future building users, through efforts such as ensuring no occupied areas will result in excessive solar gains and in turn over heating. The above design features allow for the proposed development to be of sustainable design.

11.0 Flood Risk

The Flood and Water Management Act 2010 puts emphasis on, rather than managing floods through defences, to instead make space for water storage. The extent of potential flooding for the proposed development from fluvial sources can be seen below in Figure 11.1, sourced from The Environment Agency.

11.1 Policy Review

National Planning Policy Framework (2021)

Section 14- Meeting the Challenge of Climate Change, Flooding and Coastal Change

Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

Havant Borough Core Strategy (2011)

Policy CS15: Flood and Coastal Erosion Risk

Development in areas at risk of flooding now and in the future as identified on the latest Environment Agency flood risk maps and Strategic Flood Risk Assessment climate change maps will only be permitted where:

1. It meets the sequential and exception test (where required) in relation to PPS25.

2. The site is located in a low hazard area as defined in the Strategic Flood Risk Assessment.

3. A site-specific flood risk assessment demonstrates that the development will be safe, including the access, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

4. The scheme incorporates flood protection, flood resilience and resistance measures appropriate to the character and biodiversity of the area and the specific requirements of the site.

5. Appropriate flood warning and evacuation plans are in place.

6. New site drainage systems are designed taking account of events which exceed the normal design standard.

All development will be required to ensure that there is no net increase in surface water run off. Priority should be given to incorporating Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it is proven that SuDS are not appropriate. Where SuDs are provided arrangements must be put in place for their whole life management and maintenance.

The council will work with partners to implement the Coastal Policy Zones in the North Solent Shoreline Management Plan to ensure that development avoids areas at risk from coastal erosion and coastal flooding and that areas required to offset coastal squeeze and prevent habitat fragmentation, to allow species to adapt to climate change, are identified and protected from development.

11.2 Development Sustainability Features

The flood map sourced from the Government Flood Information Warning Service seen below in Figure 11.1, demonstrates that the proposed development is not at risk from fluvial flooding. Additional flood maps from the Environment Agency further confirm that the proposal site is not at risk of flooding from reservoirs sources, as seen in Figure 11.2.

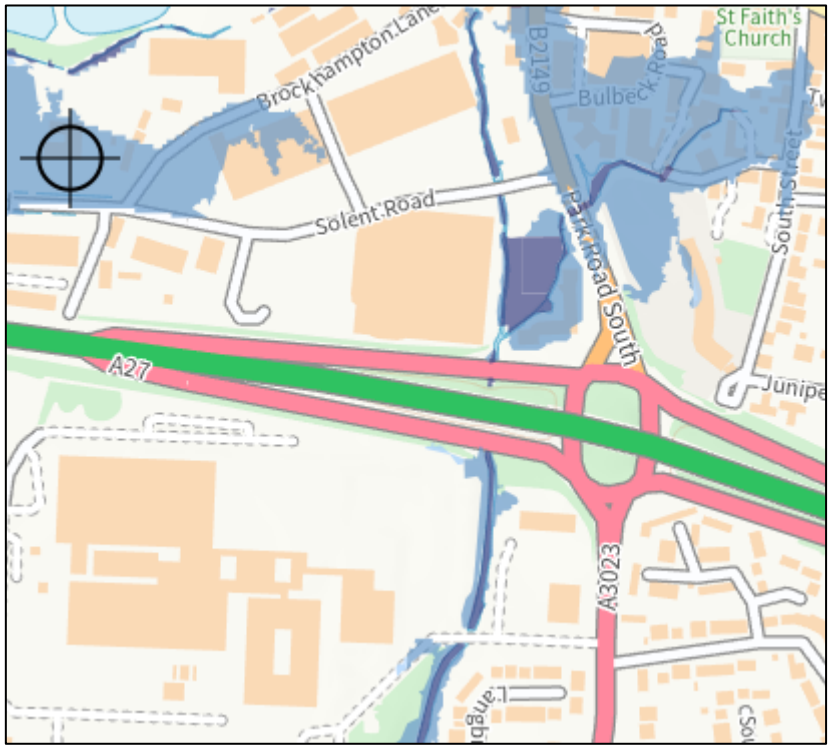


Figure 11.1 Risk of Flooding from Fluvial sources

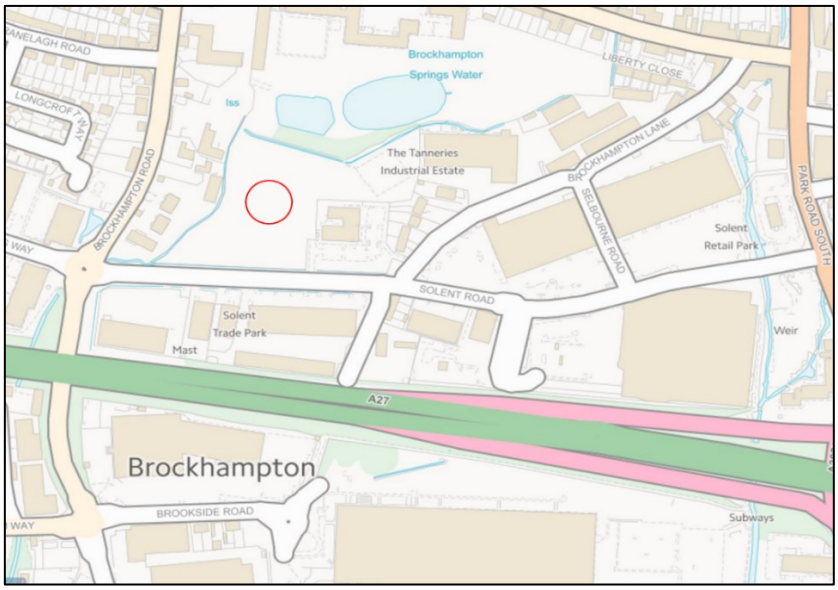


Figure 11.2 Risk of Flooding from Reservoirs

11.3 Summary

Flood maps sourced from the Government's Flood Warning Information Service highlights the development site will be located within a low risk-medium risk area and in this instance the site can be deemed secured in terms of Flood Risk. Ardent have undertaken additional flood modelling which also confirmed that the site is not at risk of flooding from River or Sea.

12.0 Noise

Noise is a subjective concept that can affect people differently, however there are set standards as to acceptable levels of noise, for different areas and times of day. In this instance, the proposed development would not be subject to potential noise pollution from rail sources, however, due to its proximity to the M62 it may be subject to noise pollution from the road.

12.1 Policy Review

Havant Borough Core Strategy (2011)

Policy DM10: Pollution

Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.

2. National air quality standards or objectives would not be breached.

3. The water environment would not be detrimentally affected.

4. It would not lead to an unacceptable deterioration in the quality or potential yield of coastal, surface and ground water resources.

5. External lighting is of the minimum level of illumination and duration required for security and operational purposes.

6. External lighting would not interfere with safe navigation in either Chichester or Langstone Harbours and other coastal locations.

12.2 Development Sustainability Features

Noise maps for the development's location, have been sourced from the Department for the Environment Fool and Rural Affairs, Figure 12.1, demonstrates that the development's south part is not far from to road noise generated in the surrounding A27. The south part of the development could also be subject to noise originated from the road nearby. The noise levels at the development would be within the range of 55.0-59.9 dB.

Figure 12.2 demonstrates that the development would not be subject to noise pollution from rail sources.

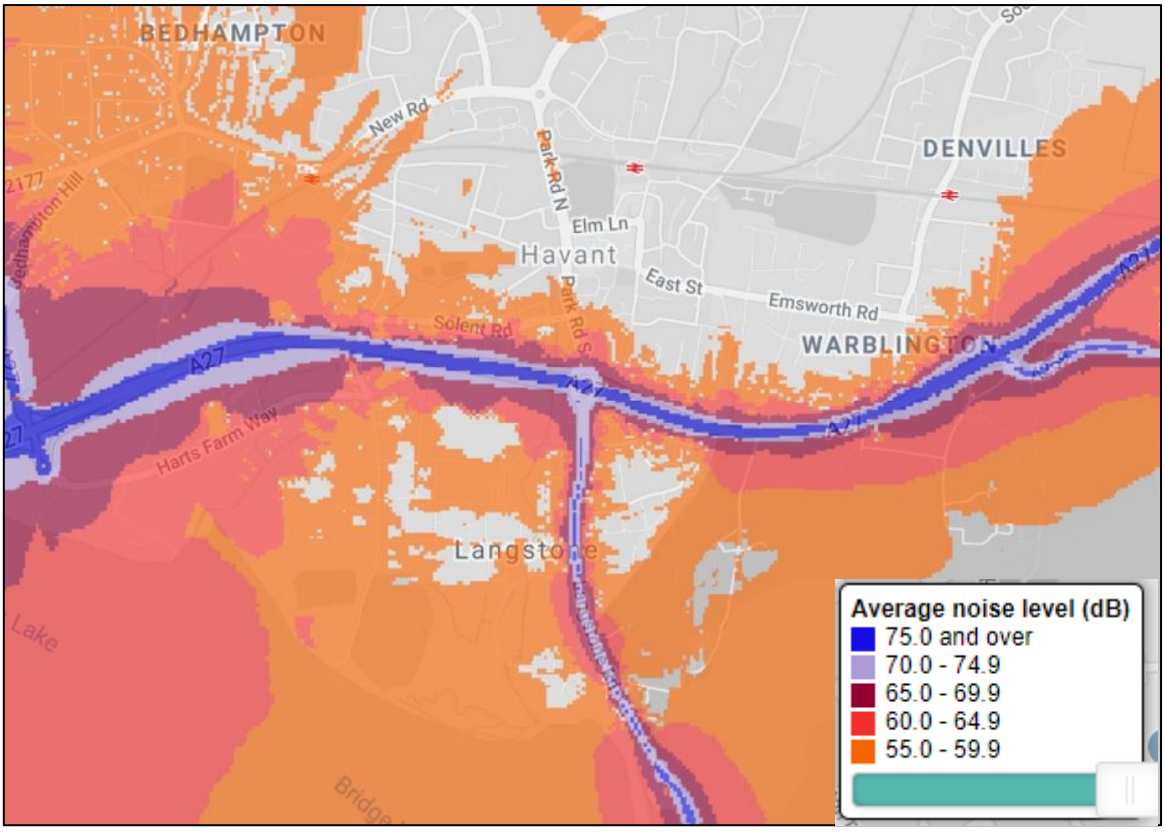


Figure 12.1 Road Noise Map for the site Development

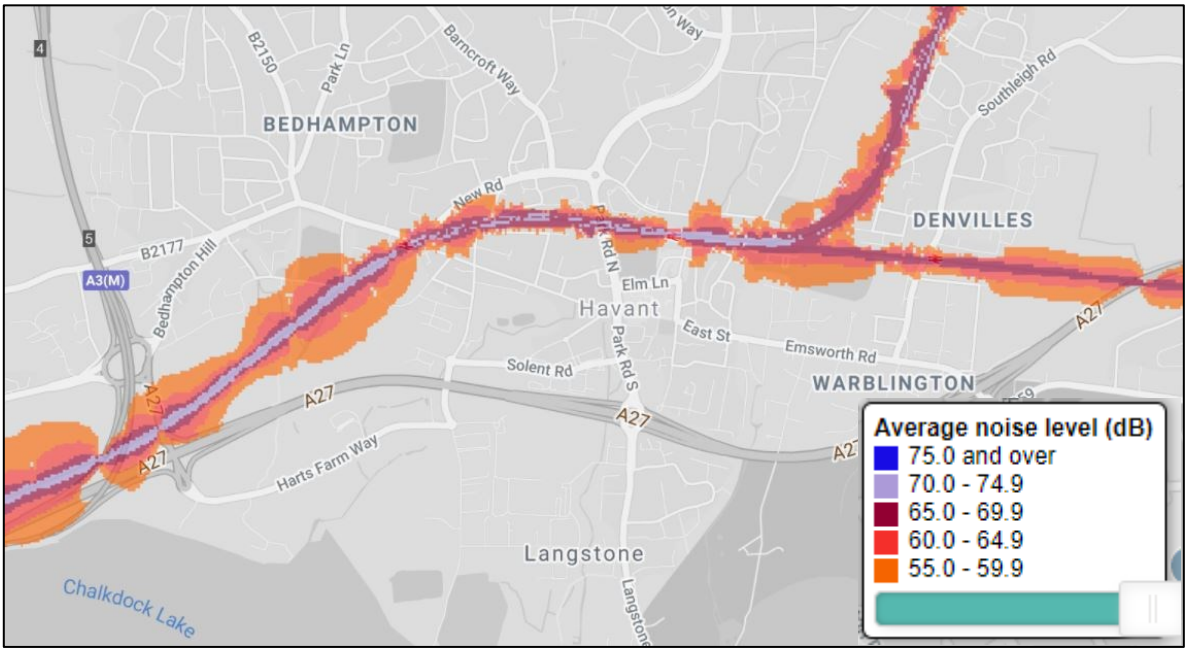


Figure 12.2 Rail Noise Map for the Site

12.2 Summary

Noise maps for the development's location, have been sourced from the Department for the Environment Food and Rural Affairs, showing the development is directly affected by road but not by rail noises.

13.0 Ecology

Ecology is essential within many communities, with the mix of flora and fauna facilitating benefits such as flood alleviation and pollution amelioration. In addition to this, areas with a wealth of green spaces and an abundance of biodiversity are seen to provide a positive contribution to a community.

13.1 Policy Review

National Planning Policy Framework (2021)
Section 15- Conserving and Enhancing the Natural Environment
The planning system should protect and enhance valued landscapes, minimise impacts on biodiversity.

Havant Borough Core Strategy (2011)

Policy CS12: **Chichester Harbour Area of Outstanding Natural Beauty (AONB)**

Development will be permitted where it:

1. Carefully assesses the impact of individual proposals, and their cumulative effect, on the Chichester Harbour AONB, and its setting.

2. Is appropriate to the economic, social, and environmental wellbeing of the area or is desirable for the understanding and enjoyment of the area.

3. Conserves and enhances the special qualities of the Chichester Harbour AONB (as defined in the Chichester Harbour AONB Management Plan).

4. Meets the policy aims of the Chichester Harbour AONB Management Plan and 70

5. Provides mitigation of any detrimental effects including where appropriate the improvement of existing damaged landscapes relating to the proposal.

13.2 Development Sustainability Features

Ecology conservation map (sourced from MAGIC) highlights there are no Sites of Special Scientific Interest (SSSI) in the vicinity of the site development, the closest one is Langstone Harbour which is a few miles away from the development. Figure 13.1 below show the existing site is made up predominantly of hard standings and manmade impermeable surfaces, with a small portion of green areas and a number of trees at the site.

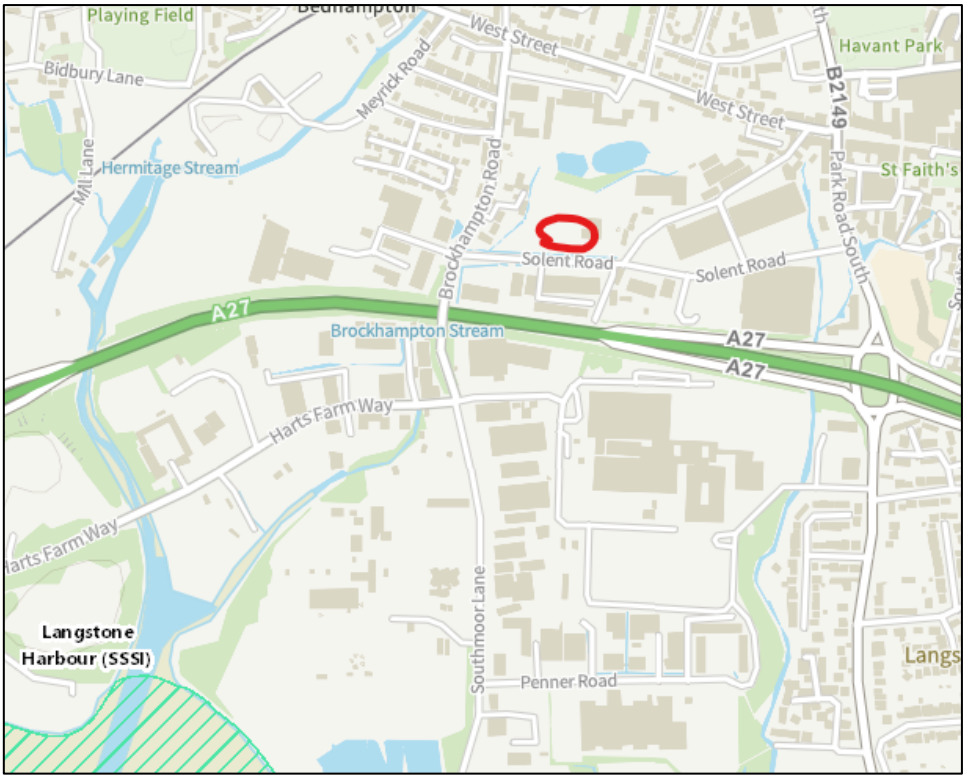


Figure 13.1 Ecological Sensitivity (Sourced from MAGIC)

Enhancing Site Ecology

A Phase 1 Ecological Assessment is advised to be undertaken which will provide recommendation for enhancing the site ecology. Such measures may include planting and landscaping or the inclusion of bat and bird boxes.

13.3 Summary

A phase 1 Ecology assessment is advised to be undertaken to determine the current ecological value of the proposed site. In order to enhance the ecological value of the site, recommendations made by the ecologist shall be included within the scheme design, thus making the site sustainable with regard to Ecology.

Appendix A – Flood Risk MAP

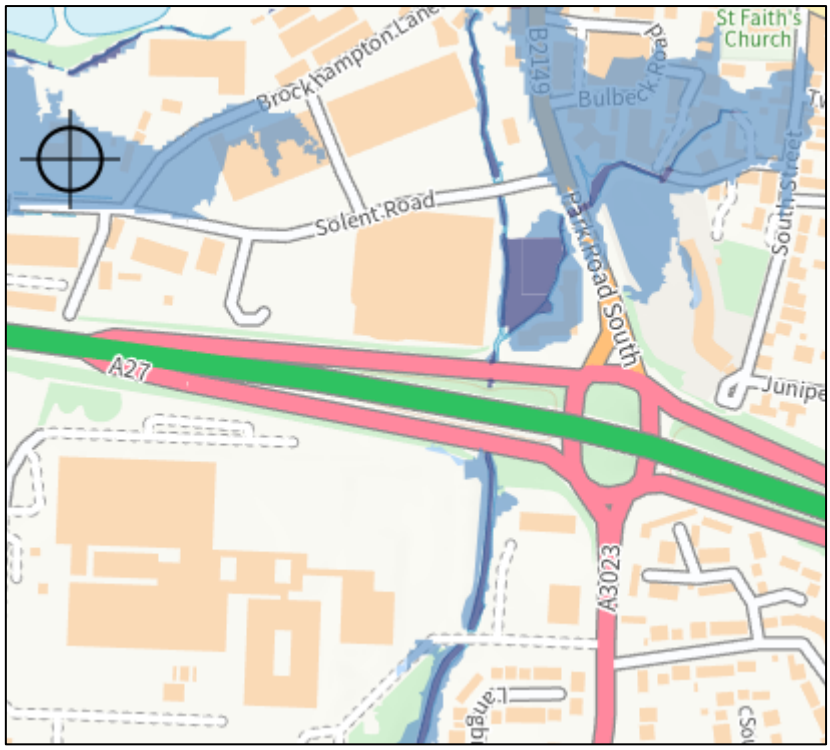
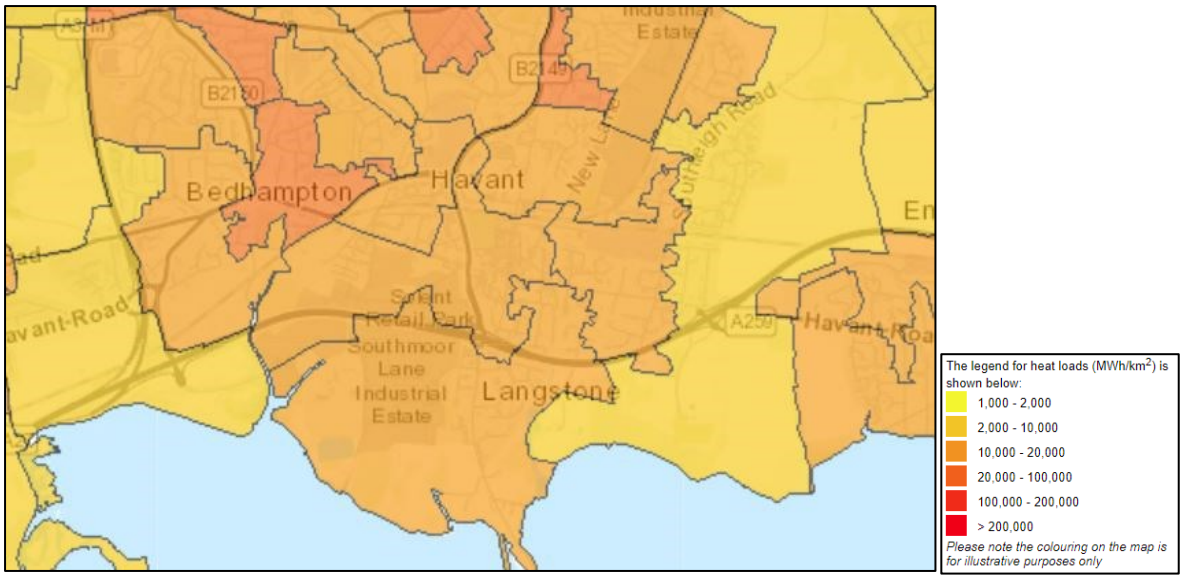


Figure A Risk of Flooding from Fluvial sources

Appendix B – CHP Search



CHP availability Search Area

Sector Name	Share	Total MWh
Communications and Transport	0.34%	1,230 MWh
Commercial Offices	1.12%	4,015 MWh
Domestic	62.42%	222,920 MWh
Education	2.91%	10,406 MWh
Government Buildings	1.21%	4,316 MWh
Hotels	0.89%	3,188 MWh
Large Industrial	24.1%	86,064 MWh
Health	0.48%	1,703 MWh
Other	0.24%	842 MWh
Small Industrial	2.74%	9,774 MWh
Prisons	0%	0 MWh
Retail	1.92%	6,840 MWh
Sport and Leisure	0.42%	1,507 MWh
Warehouses	1.21%	4,339 MWh
District Heating	0%	0 MWh
Total heat load in Area		**357,143 MWh**

Total Heat Load Distribution

Appendix C – Wind Map

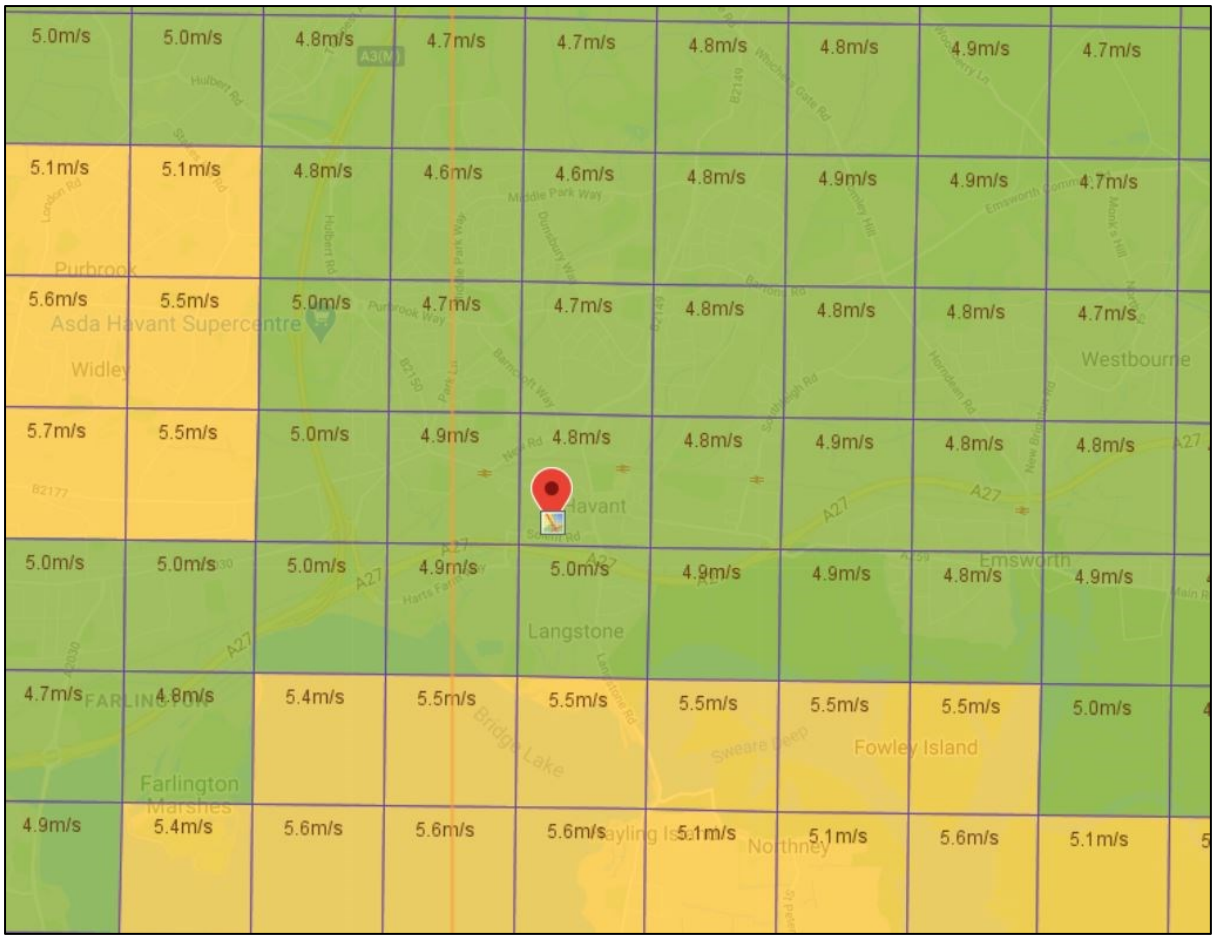


Chart C.1 Wind Velocity Chart for the Development Site

Appendix D – Energy Calculations

Regulated Energy Demand

kWh/m²/annum Baseline

Typical Unit	Area	Heating	Cooling	Auxillary	Lighting	Hotwater	Total	kWh/Annum	kgCO2/m²/Annum	Total kgCO2/Annum	Total TonsCO2/ Annum
Offices	1926.30m²	10.23	11.25	0.12	11	24.89	57.49	110742.987	5.92	11403.696	11.40
Total	1,926							110,743		11,404	11.40

kWh/m²/annum Baseline with Passive/Energy Efficiency Measures

Typical Unit	Area	Heating	Cooling	Auxillary	Lighting	Hotwater	Total	kWh/Annum	kgCO2/m²/Annum	Total kgCO2/Annum	Total TonsCO2/ Annum
Offices	1926.30m²	10.53	10.93	0.12	8.54	24.89	55.01	105965.763	5.6	10787.28	10.79
Total	1,926							105,966		10,787	10.79

kWh/m²/annum Baseline with Passive/Energy Efficiency Measures & PVs

Typical Unit	Area	Heating	Cooling	Auxillary	Lighting	Hotwater	Total	kWh/Annum	kgCO2/m²/Annum	Total kgCO2/Annum	Total TonsCO2/ Annum
Offices	1926.30m²	10.53	10.93	0.12	8.54	24.89	38.52	74201.076	5.43	10459.809	10.46
Total	1,926							74,201		10,460	10.46

Unregulated Energy Demand

Typical Unit	Total Area	Energy from Equipment kWh/m2/Annum	Total Energy kWh/annum	Gas %	Electricity %	KgCO2/m2	Total KgCO2/ annum	Total TonsCO2/ annum
Offices	1926.30m²	52.93	101959.059		100	27.47067	52916.75162	52.91675162
Total	1,926		101,959.06				52,917	53

Energy Calculations (Regulated Energy Demands) Carbon

Typical Unit	Total Area	Baseline kgCO2/annum	Improved Emissions after Passive Energy Efficiency kgCO2 /annum	Improved Emissions after PVs kgCO2 /annum	kgCO2/annum displaced by Passive	TonsCO2/annum displaced by Passive	Total % TonsCO2/annum displaced by Passive	kgCO2/annum displaced by PVs	TonsCO2/annum displaced by PVs	% TonsCO2/annum displaced by PVs	Total kgCO2/annum displaced	Total TonsCO2/ annum displaced	Total % TonsCO2/annum displaced
Offices	1926.30m²	11403.70	10787.28	10459.81	616.42	0.62	5.41	327.47	0.33	3.04	943.89	0.943887	8.277027027
Total	1,926	11,404	10,787	10,460	616.42	0.62	5.41	327.47	0.33	3.04	943.89	0.943887	8.277027

Energy Calculations (Regulated Energy Demands) Energy

Typical Unit	Total Area	BaselineTotal kWh/annum	Passive Energy Efficiency kwh /annum	PVs kWh/annum	Total kwh/annum displaced	Total % kwh/annum displaced
Offices	1926.30m²	110,742.99	105,965.76	74,201.08	36,541.91	33.00
Total	1,926	110,742.99	105,965.76	74,201.08	4777.224	4.313793703

Appendix E – BRUKL SAMPLE

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Solent Road, Havant — As designed

Date: Mon Mar 27 10:55:12 2023

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number: 01344 628821

Address: Cudd Bentley Ashurst Manor, Sunninghill, SL5 7DD

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.d.0

Interface to calculation engine: Energy Simulator

Interface to calculation engine version: 10.10.0.199

BRUKL compliance module version: v6.1.d.0

Foundation area [m²]: 954

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	5.92	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	5.43	
Target primary energy rate (TPER), $kWh/m^2.annum$	63.5	
Building primary energy rate (BPER), $kWh/m^2.annum$	57.28	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-Limit}}$	$U_{a\text{-Calc}}$	$U_{i\text{-Calc}}$	First surface with maximum value
Walls*	0.26	0.22	0.22	Wall 1
Floors	0.18	0.18	0.18	Exposed Floor 1
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.16	0.16	Exposed Roof 1
Windows** and roof windows	1.6	1.4	1.4	Window 1
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Offices, IT Room & Tea Room

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	4.5	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

2- Panel Heater Area's

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

3- Circulation Area's + Lift

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

1- Default DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
F.IT ROOM	143	-	-
F.OFFICE 1	164	-	-
F.OFFICE 4	137	-	-
F.OFFICE 5	145	-	-
F.OFFICE 6	145	-	-
F.OFFICE3	140	-	-
F.OOFICE2	147	-	-
F.TEA ROOM	172	-	-
G.OFFICE 1	150	-	-
G.OFFICE 2	164	-	-
G.OFFICE 3	155	-	-
G.OFFICE 4	144	-	-
G.OFFICE 5	143	-	-

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
G.OFFICE 6	NO (-23.8%)	NO
G.OFFICE 7	N/A	N/A
G.OFFICE 8	N/A	N/A
G.RECEP	NO (-4%)	NO
G.COR 1	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	1936.6	1936.6
External area [m²]	2159.4	2159.4
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	749.52	820.03
Average U-value [W/m²K]	0.35	0.38
Alpha value* [%]	57.03	23.9

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
93	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
3	**Storage or Distribution**
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
4	**Others: Miscellaneous 24hr Activities**
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	10.53	7.94
Cooling	10.93	7.88
Auxiliary	0.12	0.06
Lighting	8.54	7.94
Hot water	24.89	24.89
Equipment*	52.93	52.93
TOTAL**	**55.02**	**48.7**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	16.49	5.91
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*16.49*	*5.91*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	213.63	203.35
Primary energy [kWh/m²]	57.28	63.5
Total emissions [kg/m²]	5.43	5.92

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	62.7	175.8	5.3	15.3	0	3.26	3.2	3.5	4.5
	Notional	44	174.4	4.6	11	0	2.64	4.4	----	----
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	120	13.5	37.4	0	2.3	0.89	0	1	0
	Notional	110.6	41.8	22.9	0	1.1	1.34	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	71.2	26.8	24.7	0	0	0.8	0	1	0
	Notional	86.1	45.2	17.8	0	0	1.34	0	----	----
[ST] No Heating or Cooling										
	Actual	126.7	296.2	0	0	0	0	0	0	0
	Notional	50.9	291.9	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type