Land North of The Hollies, Hill Street, Calmore
Energy Strategy Report

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JAWSustainability

Contents

Executive Summary

This energy strategy has been prepared for the Land North of The Hollies, Hill Street, Calmore, to provide 9 new residential houses.

This report demonstrates how the proposed development addresses local planning policies for New Forest District Council relating to energy and sustainability. The strategy for the development is to utilise individual Air Source Heat Pumps.

Following the energy hierarchy, passive design measures and energy efficient equipment the residential development achieved a 78.63% saving over Part L for the development, also achieving a 13.93% reduction at the Be Lean stage. The heating and cooling hierarchies have also been followed.

The design team have made all reasonable endeavours to achieve the maximum carbon savings. The fabric performs significantly better than building regulations minimum standards and highly efficient ASHP systems are specified.

1 Introduction

This energy strategy has been prepared for the development at Land North of The Hollies, Hill Street, Calmore to provide 9 new residential houses with 2-4 bedrooms. The development includes car barns, lockable bike stores, an alternative natural recreational greenspace area and a link to an existing public footpath, and the wider strategic allocation to the North.

This statement summarises the sustainable design and construction measures that have been incorporated into the project in order to meet the sustainability requirements of New Forest District Council.

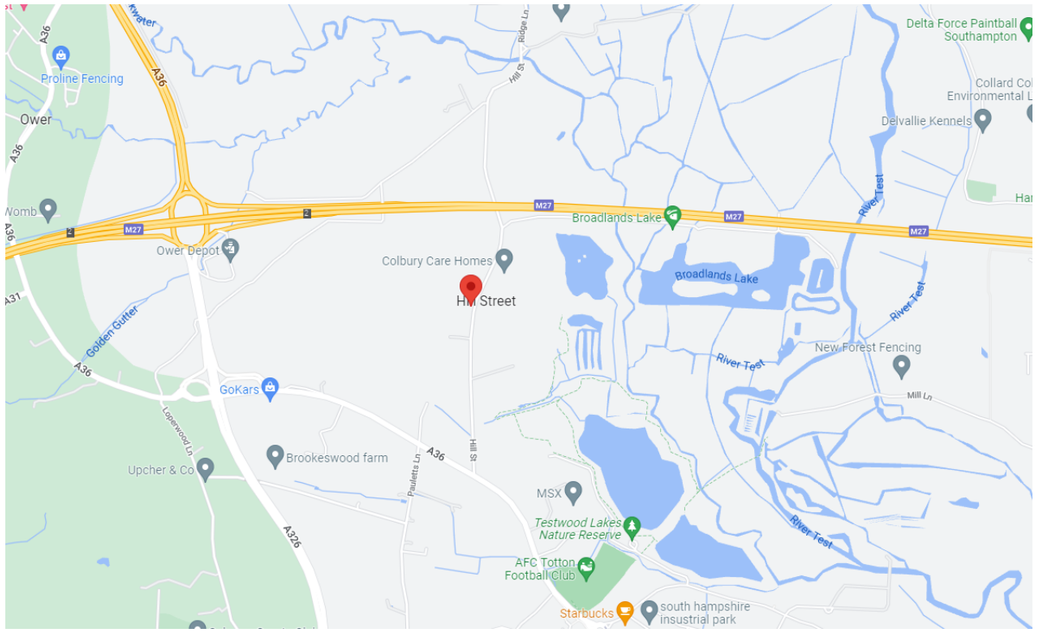


Figure 1-1 the location of the site at the land north of the Hollies, Hill Street, Calmore

1.1 Assessment approach

This report summarises the work undertaken to support the development of an energy strategy for the new development, following the energy hierarchy 'Be Lean, Be Clean, Be Green and be seen'.

Standard Assessment Procedure for the Energy Rating of Dwellings (SAP) calculations have been carried out. These are used to assess the impact on energy demand and CO_2 emissions of improvements through the hierarchy and demonstrate the most appropriate solution for the development to meet the relevant planning requirements.

2 Policy

2.1 New Forest District Local Plan

Policy STR1: Achieving Sustainable Development

All new development will be expected to make a positive social, economic and environmental contribution to community and business life in the Plan Area by:

Meeting most development needs within settlement boundaries, in a manner that is appropriate for and proportionate to the nature and size of the settlement, and where there is or will be sufficient supporting infrastructure and services;

i. Ensuring that the housing needs of local communities are addressed by locating new residential development in sustainable and accessible locations, and ensuring that new development provides a mix of types of home by size, tenure and cost to help to address the full spectrum of local housing needs at all stages of life;
ii. Taking a context and landscape-led approach to the siting and design of development to deliver high quality design that maintains local distinctiveness, creates high quality new landscapes and townscapes, safeguards the Green Belt and AONB, sustains and enhances the heritage, scenic and amenity value of the Plan Area, and has appropriate regard to and the purposes of the adjoining New Forest National Park;
iii. Achieving an environmental net gain and avoiding wherever possible or mitigating where necessary the direct and indirect impacts of development on the integrity of the New Forest, Solent, River Avon and other International Nature Conservation sites, and on other areas, species or habitats of nature conservation value;
iv. Ensuring development contributes to a diverse and thriving local economy providing an overall balance of uses, services and opportunities that are accessible by sustainable transport modes as well as by car, in order that reliance on the private car is minimised;
v. Ensuring communities and workers are safe and feel safe, and the risks to people, places and to the environment from potential hazards including pollution, flooding and climate change effects are minimised;
vi. Ensuring that new development is adaptable to the future needs of occupiers and future-proofed for climate change and innovations in transport and communications technology.

Policy STR2: Protection of the countryside, Cranborne Chase Area of Outstanding Natural Beauty and the adjoining New Forest National Park

Development should not have an unacceptable impact on the special qualities and purposes of the Cranborne Chase Area of Outstanding Natural Beauty, or on the adjoining New Forest National Park and their settings. In the determination and implementation of development proposals including planned growth, great weight will be given to ensuring that the character, quality and scenic beauty of the Cranborne Chase Area of Outstanding Natural Beauty and adjoining New Forest National Park are protected and enhanced.

Policy ENV3: Design Quality and Local Distinctiveness

All development should achieve high quality design that contributes positively to local distinctiveness, quality of life and enhances the character and identity of the locality by creating buildings, streets, places and spaces that are:

- Functional: well connected to surrounding uses, and logically laid out so that different elements work well together in a manner that is safe to access, easy to navigate, convenient to use and that makes effective use of both developed land and open spaces;
- Appropriate: sympathetic to its environment and context, respecting and enhancing local distinctiveness, character and identity; and
- Attractive: visually appealing and enjoyable to be in.

New development will be required to:

i) Create buildings, streets and spaces which are sympathetic to the environment and their context in terms of layout, landscape, scale, height, appearance and density and in relationship to adjoining buildings, spaces and landscape features;

ii) Avoid unacceptable effects by reason of visual intrusion or overbearing impact, overlooking, shading, noise and light pollution or other adverse impacts on local character or residential amenity;

iii) Create buildings, streets and spaces which are accessible to those with disabilities or of reduced mobility, that are safe and easy to navigate, and that minimise opportunities for anti-social and criminal behaviour or other public threats;

iv) Integrate sufficient car and cycle parking spaces so that realistic needs are met in a manner that is not prejudicial to the character and quality of the street, highway safety, emergency or service access or to pedestrian convenience and comfort;

v) Incorporate design measures that improve resource efficiency and climate change resilience and reduce environmental impacts wherever they are appropriate and capable of being effective, such as greywater recycling and natural heating and cooling, and the use of Sustainable Drainage Systems (SuDS);

vi) Provide appropriately designed green spaces including sufficient planting, and where applicable: provision for play, sports and natural green spaces for recreational mitigation; and

vii) Enhance the sense of place by ensuring that buildings, streets and spaces are attractive to look at through good architecture, landscape and street design.

Policy DM4: Renewable and low carbon energy generation

The benefits associated with development proposals relating to renewable energy schemes will be given significant weight, provided that they avoid unacceptable impacts on:

i) land uses, including all nature conservation designations (with particular regard to any impacts on international designations within, or near to, the Plan area) and heritage assets, including the setting of heritage assets;

ii) the immediate and wider landscape, giving particular importance to impacts on the New Forest National Park and the Cranborne Chase and West Wiltshire Downs AONB;

iii) residential amenity both during and after construction; and

iv) the road network.

2.2 New Forest Council Core Strategy

Policy CS1: Sustainable Development Principles

All new development will be expected to make a positive contribution towards the sustainability of communities and to protecting, and where possible enhancing, the environment within the Plan Area by:

a) meeting most development needs within existing communities and, where appropriate to meet Core Strategy objectives, providing for some small developments adjoining the main towns and villages;

b) ensuring a balanced mix of uses where development takes place in environmentally, socially and economically sustainable locations with a good range of services and facilities and is accessible by both car and other transport modes in order that reliance on the private car is minimised (as further developed in Policies CS10 and CS24);

c) minimising the risk of damage to areas of importance for nature conservation and/or landscape value, both directly and indirectly (as further developed in Policy CS3);

d) ensuring building construction and other forms of development adheres to high environmental standards with particular regard to energy efficiency, water efficiency, use of sustainable materials and the minimisation of waste (as further developed in Policy CS4);

e) ensuring communities are safe and feel safe, are well served by emergency services and the risks from potential hazards are minimised (as further developed in Policy CS5);

f) following a sequential approach to flood risk, in line with the requirements of Planning Policy Statement 25: Development and Flood Risk (PPS 25), avoiding the development of previously undeveloped land which is, or will be, at risk from flooding, and managing and reducing flood risk for development on previously developed land where continuing development has wider sustainability benefits to the community, or where there is no reasonable alternative site compatible with other sustainability considerations (as further developed in Policy CS6);

g) ensuring accessibility to a good range of services and facilities, and not putting an unreasonable burden on existing infrastructure and services (as further developed in Policies CS7 and CS8).

In order to enable required development to take place, in some cases mitigation measures will be needed to address the impacts of new development on existing infrastructure and on nearby sensitive areas (e.g. international nature conservation designations.)

3 Energy Strategy

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

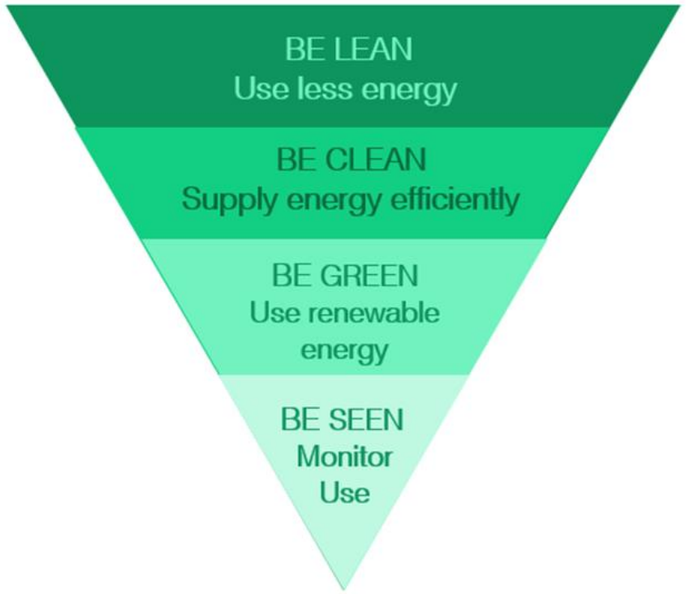


Figure 3-1 The Energy Hierarchy

The energy consumption and carbon emission figures within this report have been calculated using the approved Standard Assessment Procedure for the Energy Rating of Dwellings (SAP). SAP 10 carbon factors are used to represent the carbon intensity of mains gas and electricity.

3.1 Energy Targets

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 CO_2 (kg/yr)	Total Energy (kWh/yr)	Total CO_2 (kg/yr)
	Space Heating	Hot Water	Total		Cooling	Pumps & Fans	Lighting	Total			
Resi	50,021	22,841	72,861	15,301	0	675	3,779	4,454	1,038	77,316	16,339

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, in 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 impact of solar gains has been analysed as part of the SAP calculations, taking into account the ventilation strategies and the risk of solar overheating has been concluded to be not significant, when measured against the Part L1A criteria.

Following the results of the SAP assessment, the risk over solar overheating is minimised. There is a natural ventilation strategy and all houses have dual aspect to allow for cross ventilation.

Windows are specified to incorporate low emissivity coatings to limit overheating while ensuring adequate daylight. Internal shading has been designed into the houses to reduce the risk of overheating.

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
External Walls	0.14 W/m^{2}K
Roofs / Terraces	0.12 W/m^{2}K
Ground/ Exposed Floor	0.12 W/m^{2}K
Windows & glazed external doors	Triple Glazed 0.8 W/m^{2}K G-value 0.60 Frame Factor 0.80
External Doors	1.2 W/m^{2}K
Air Tightness	3m^3/m^2/h
Thermal Bridging	Y=0.08, requires calculation at detailed design

Table 3-2 Proposed Be Lean passive design measures

Thermal bridging

Non-repeating thermal bridges at junctions will be designed carefully in order to ensure that they perform better than typical constructions. It is proposed that an average Y-value of 0.08 is achieved across the project. At this stage of design further information is not available but all designs will ensure the 0.08 value is achieved on construction.

Building Services

Services 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	Specification – Houses
Space Heating & hot water	Individual gas boiler, 91% efficient *(assumed at be lean stage)* Charging linked to use off heat, programmer & TRVs Underfloor Heating
Hot Water Cylinder	210L with the measured loss of 1.8kWh/day
Heating Controls	Time and Temperature Zone control
Ventilation	Natural Ventilation
Lighting & Controls	100% low energy lighting

Table 3-3 Proposed energy efficient design measures

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 stage are incorporated.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)				Electricity CO_2 (kg/yr)	Total Energy (kWh/yr)	Total CO_2 (kg/yr)
	Space Heating	Hot Water	Total		Cooling	Pumps & Fans	Lighting	Total			
Resi	40,563	21,487	62,050	13,030	0	675	3,758	4,433	1,033	66,482	14,063

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

Carbon Savings

Table 3-5 and figure 3-2 demonstrate the percentage improvement over the notional baseline levels for the be lean stage.

Energy Hierarchy stage	Residential		
	CO_2 Emissions (T/yr)	CO_2 Savings (T/yr)	% Saving
Baseline	16.34		
Be Lean	14.06	2.28	14%

Table 3-5 improvements over Part L

The development has incorporated thermally efficient fabric and passive design measures to generate savings at the Be Lean stage. The houses achieve an 11% improvement over Part L. To achieve this best practice U-values have been utilised for non-repeating thermal bridges, it is concluded that the design team have attained the greatest energy and carbon savings through passive design measures that is both technically and financially viable.

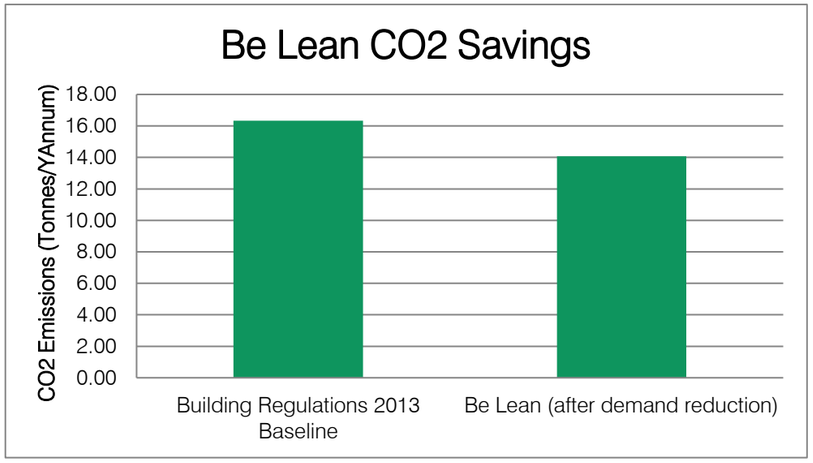


Figure 3-2 Be lean improvements over part L

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.

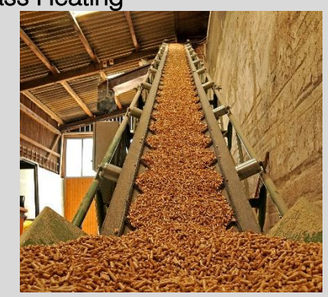
District Energy Systems

The development is not located within 500m of any existing or proposed heat network and it is not in a Heat Network Priority Area.

As there are no additional savings to be made at the be clean stage no data is given in this section.

3.4 Be Green

At the Be Green stage, renewable technologies are investigated. Table 3-10 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 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 landlord's load.	🟢	🟡	🟢	🟡	🟡	🟡	While solar PV is ideal for making carbon savings while being a simple technology, south facing roofs are deemed too small to efficiently incorporate PV, in addition to a majority of roofs not being south facing and therefore, PV would not be an efficient 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 boiler's 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	×

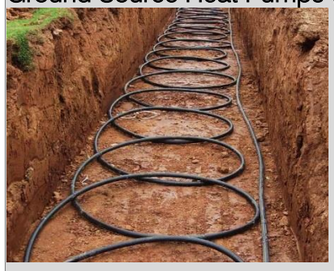
Wind Turbines 	Vertical and horizontal axis wind turbines enable electricity to be generated using the power within the wind Not suitable for urban environments due to low wind conditions and obstructions	🔴	🔴	🟢	🔴	🔴	🟡	This development is in an urban environment and so a wind turbine will not generate much 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	🟡	🟡	🟡	🟡	🟡	🟡	ASHP will be incorporated into the development utilising exterior or roof space.	✓

Table 3-6 Feasibility of LZC technologies for the development

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Renewable systems

The feasibility study has identified Air Source Heat Pumps as the most appropriate technology for the development.

Services Component	Residential Specification
Space Heating & hot water	ASHP, Space heating efficiency of 340.8% in winter and 187.5% in summer U/F heating Time and temperature zone control

Figure 3-4 Renewable and LZC technologies on site

ASHP will be incorporated into the housing developments, for the purposes of calculation a 5kW Mitsubishi ECODAN unit with a space heating efficiency of 340.8% in summer and 187.5% in winter has been used. This is an estimate of the required capacity and unit required based on the floor area of the assessed units and should not be taken as a specification. However, pending professional assessment a comparable unit, in terms of features and efficiency will be specified within the development.

3.5 Energy and Carbon Savings

Energy Use

The breakdown of carbon and energy use has been identified for the site. Table 3-5 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 CO_2 (kg/yr)	Total Energy (kWh/yr)	Total CO_2 (kg/yr)
	Space Heating	Hot Water	Total		Space Heating	Hot Water	Cooling	Pumps & Fans	Lighting	PV	Total			
Resi	0	0	0	0	5,413	5,817	0	0	3,758	0	14,988	3,492	14,988	3,492

Table 3-5 Estimated regulated energy demand and carbon emissions per energy source

Carbon Savings

Table 3-6 and Figure 3-5 demonstrate the percentage improvement over the notional baseline levels for the development.

Energy Hierarchy stage	Residential		
	CO_2 Emissions (T/yr)	CO_2 Savings (T/yr)	% Saving
Baseline	16.34		
Be Lean	14.06	2.28	13.93%
Be Clean	14.06	0.00	0.0%
Be Green	3.49	10.57	64.70%
Total Cumulative Savings		12.85	78.63%

Table 3-6 Improvement over part L

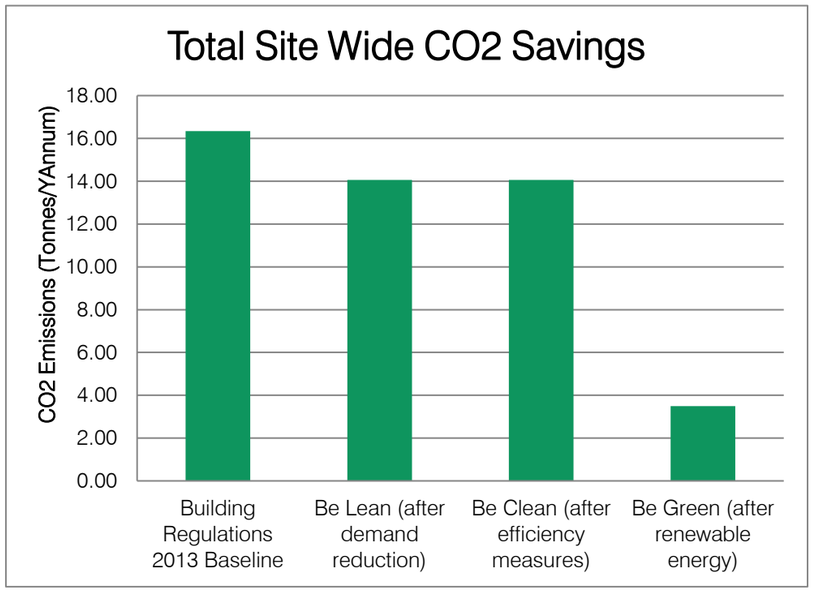

Figure 3-5 Total site wide savings over part L

The development has also been modelled in SAP 10 beta software to ensure that it passes the new fabric and energy targets within the new Part L regulations. Although it passes using the beta version of the software, this is still trial software and will need to be recalculated when the software is released.

3.6 Be Seen

All plant will be fitted with meters to allow remote monitoring of energy used by the heating systems and distribution boards. A contract will be put in place to monitor the readings so that they can be compared with the predicted energy performance, and this information will be reported.

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 for the residential aspect of the development:

- 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

Materials will be specified to reduce the embodied carbon of the development, wherever possible.

Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used, by specifying mineral wool. If possible, materials with a high recycled content will be specified.

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, taking into account whole life cycle analysis.

4.3 Climate Change Adaptation

4.3.1 Tackling Increased Temperature and Drought

Windows will incorporate low emissivity coatings to reduce solar gain, and overhangs are built to some of the windows.

As described above in water consumption, measures have been put in place to reduce potable water use internally. There is limited planting associated with the development and this will all be specified to be drought resistant rely mainly on rainwater.

4.3.2 Flooding and Surface Water Management

The development is in flood Zone 1 and is at no risk of flooding. For more information on flood risk drainage please see any supporting flood risk documents.

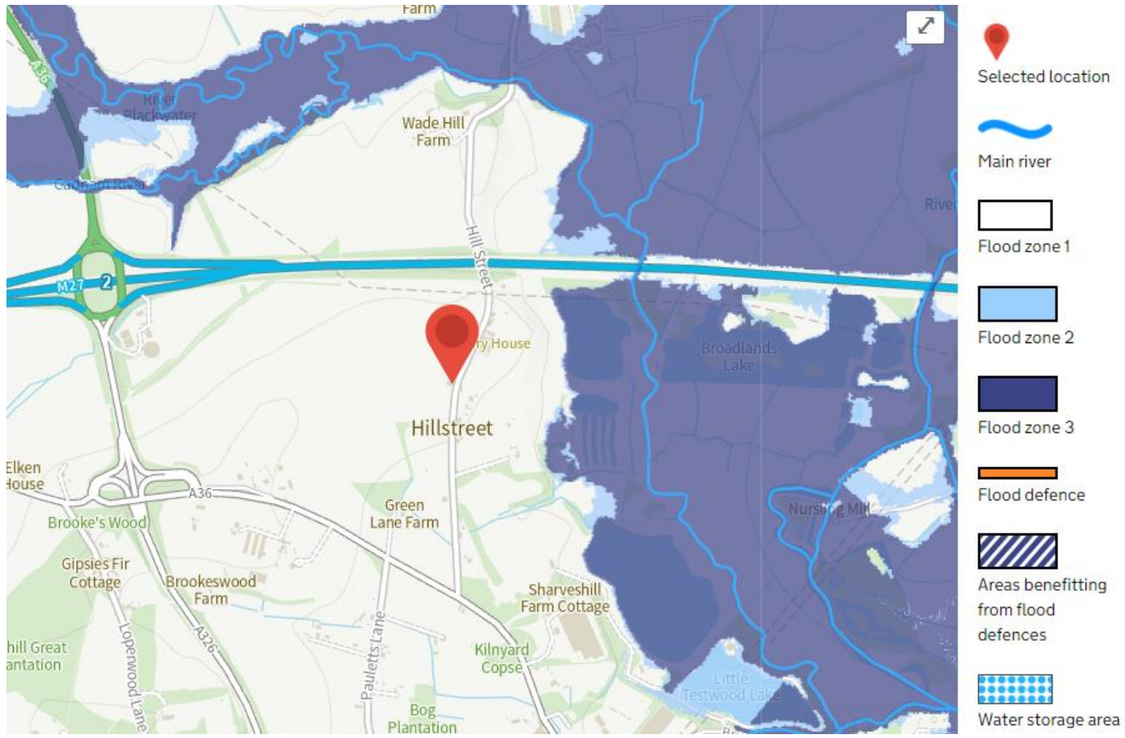

Figure 4-1 Land to the North of the Hollies, Hill Street, Calmore Flood Risk Map

4.4 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. In addition, at least 85% of waste that does arise will be recycled using an external waste contractor.

Regular waste and recycling bins will be provided for separation of waste to facilitate recycling.

The contractor will enrol in the Considerate Contractors Scheme to ensure best practice construction standards are met during the build of the development.

4.5 Nature Conservation and Biodiversity

The requirement to deliver biodiversity net gain is applied to all new build developments in New Forest District Council. Minor developments are not exempt from delivering a net gain, however use of the Defra Biodiversity Metric will not normally be required. Measures will be taken during construction in order to minimise impact on ecology by timing works appropriately, following best practice guidance, and through the soft landscape design.

5 Conclusion

The development at the land north of the Hollies, Hill Street, Calmore to provide 9 new residential units. The development follows New District Council policies and the energy hierarchy, incorporating passive design measures, energy efficient equipment and renewable energy.

The development employs an efficient building fabric, including well insulated walls and highly efficient triple glazing, efficient systems and ASHP are specified to maximise carbon savings for the site.

The residential development achieved a 78.63% saving over Part L for the development, also achieving a 13.93% reduction at the Be Lean stage. The development has also been modelled in SAP 10 beta software and passes new part L energy and fabric regulations being introduced on the 15th of June 2022.

The development follows the energy hierarchy, heating hierarchy and cooling hierarchy. The proposals therefore represent the best on site savings.

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.