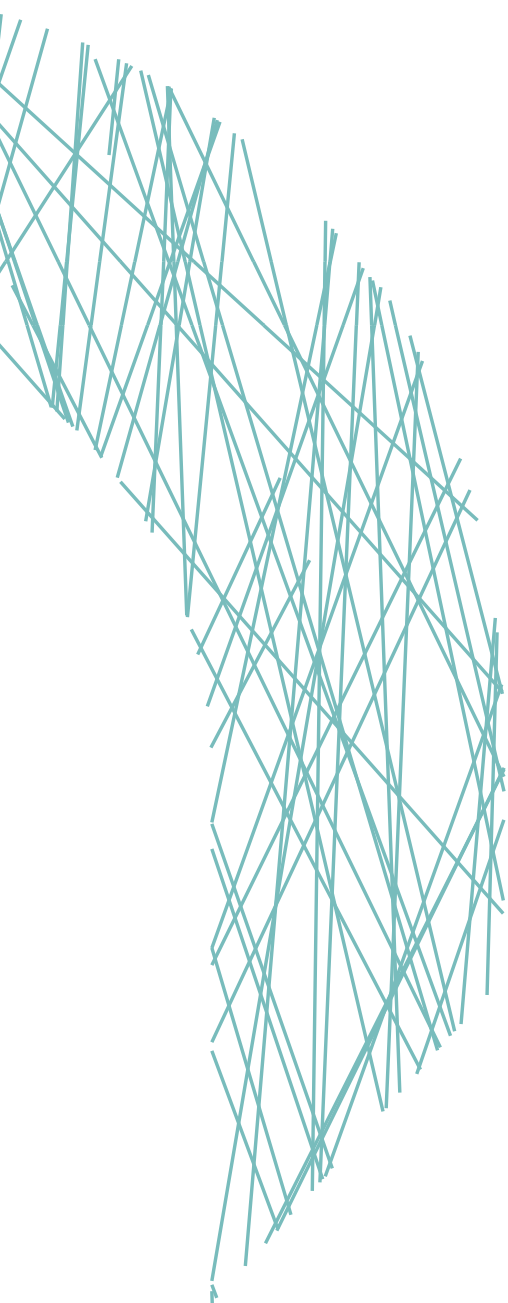


# SUSTAINABILITY & ENERGY APPRAISAL



## Proposed Development, Land at: 30–32A Queens View Netley

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Eastleigh Borough Council

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## Executive summary

The report presents the energy and sustainability strategy for the proposed development at Queens View, Netley Abbey. The application consists of the delivery of 18 dwellings and a retail space.

The Eastleigh Borough Council Local Plan policy DM2 sets out a number of requirements for environmentally sustainable development. In particular a 19% reduction in carbon emissions compared to Building Regulation standards is required.

The energy strategy for the building will incorporate a range of features, following the principle of the energy hierarchy. These will include:

- Passive demand reduction measures through improved insulation and air tightness
- Active demand reduction measures through heating controls and heat recovery techniques
- Supply of heating through high efficiency systems
- Specification of renewable energy technologies

Energy modelling has demonstrated that these elements will deliver a reduction in carbon emissions of 89% which meets and surpasses the 19% required by Planning Policy.

Additional sustainability measures are also proposed including water efficiency technologies, resource efficient design and sustainable construction methods.

# 1 Development details

The proposed development is located at Queens View, Netley Abbey. This energy statement relates a planning application consisting of the delivery of 18 new build residential dwellings, and one commercial (retail) unit.

The Energy and Sustainability Statement presents the proposed approach for the energy strategy and wider sustainability measures such as water efficiency, material efficiency and sustainable construction.

## 1.1 Schedule of accommodation - residential

The proposed development will provide the following residential accommodation:

| Type  | Location | Area  | Number |
|-------|----------|-------|--------|
| Flat  | Ground   | 1 bed | 3      |
| Flat  | Ground   | 2 bed | 3      |
| Flat  | First    | 1 bed | 3      |
| Flat  | First    | 2 bed | 4      |
| Flat  | Second   | 1 bed | 2      |
| Flat  | Second   | 2 bed | 3      |
| Total |          |       | 18     |

## 1.2 Schedule of accommodation – commercial

The proposed development will provide the following commercial space:

| Type        | Location | Area   | Number |
|-------------|----------|--------|--------|
| Retail unit | Ground   | 67.4m2 | 1      |

## 2 Policy

The following policy guidance has informed the development of the energy and sustainability strategy for the proposed development at Queens View, Netley Abbey.

### 2.1 National context

#### 2.1.1 Climate Change Act

The Climate Change Act (2008) forms the basis for the UK's approach to tackling and responding to climate change. It requires both that emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases are reduced, and that climate change risks are prepared for. The Climate Change Act was revised in October 2019 to require that *“the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline”*, effectively setting a target for ‘net zero carbon’ to be achieved by 2050.

#### 2.1.2 National Planning Policy Framework

The National Planning Policy Framework sets out the Government's planning policies for England and how these should be applied. In terms of climate change and sustainability, the NPPF provides the following guidance:

*“The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure”*

### 2.2 Local planning policy requirements

The Eastleigh Borough Council Local Plan 2016-2036 details the Local Planning Authority's requirements in respect of managing carbon emissions from the built environment.

#### **Policy DM2, Environmentally sustainable development**

1. The Borough Council requires that:

- a. all new build residential development (C3 Use Class only) must achieve at the time a Reserved Matters or Full Planning Application is submitted:
  - i. a 19% improvement in predicted carbon emissions, compared with the building regulations standard current at the time, through increased energy efficiency of the building fabric, unless this is superseded by an updated building regulations requirement equivalent to ‘zero carbon homes’; and
  - ii. a predicted mains water consumption of no more than 110 litres/person/day.
- b. all other development that is above 500 sq.m of floorspace measured externally (including extensions and conversions to existing buildings) must achieve BREEAM ‘excellent’ (or equivalent) or BREEAM ‘very good’ plus ‘passivhaus’ certification including a 15% improvement in predicted carbon emissions, compared with the building regulations current at the time, through low or zero carbon energy generation on site or in a Borough location agreed by the Council.
- c. all other larger developments above 10,000 sq.m of floorspace should also seek to fund post occupancy evaluation (POE) in addition to the above.

2. In addition to the above, all development above 500 sq.m of floorspace measured externally (including extensions and conversions to existing buildings) and external spaces within the curtilage serving developments of this size should where practical and viable:

- a. incorporate energy-efficient passive design principles, the best use of natural daylight and natural ventilation systems wherever possible;
- b. connect to any existing near or adjacent low carbon local energy network unless this is proved unviable;
- c. use recycled, low embodied carbon, low environmental impact and locally sourced materials in construction where possible;
- d. be designed with sufficient flexibility to enable the life of the building to be extended by re-use for other purposes where feasible;
- e. aim to deliver at least 1% of all residential units within the whole scheme which achieve full 'passivhaus' certification

The Energy Statement sets out how the proposed development will respond to these national and local planning policy requirements in respect of energy performance and sustainable design and construction. Details have been provided as to how the 19% reduction in carbon emissions will be delivered for the residential dwellings.

### **2.3 The Building Regulations Part L**

The Building Regulations Approved Document Part L (AD Part L), Conservation of Fuel and Power, governs the energy performance standards that all new buildings are required to meet. At the time of preparation of this report and the supporting energy modelling, the current version of Part L applicable to new development is Part L 2021.

### **2.4 The Future Homes Standard**

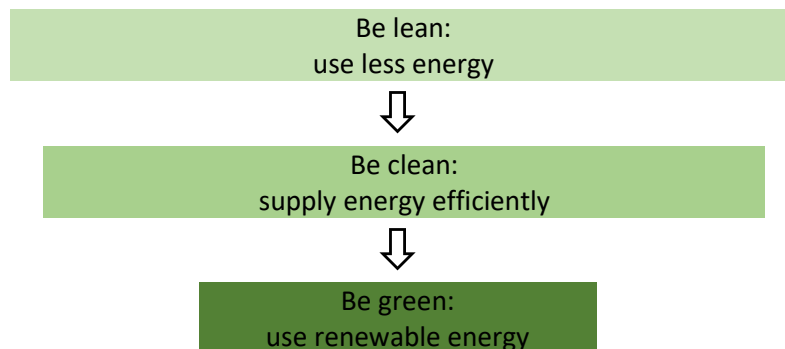
The Government have indicated that a revision to the Building Regulations is expected to be introduced in 2025, at which time new dwellings will need to meet the energy performance standards of the 'Future Homes Standard'. While still subject to full consultation, this new standard is expected to deliver new homes that achieve a 75% reduction in carbon emissions compared to previous (2013) standards. New homes will need to meet higher insulation standards and it is anticipated that the use of gas as a source of fuel for heating will be phased out. At this point all new dwellings will be required to use low carbon technologies such as air source heat pumps to meet space heating and hot water needs.

## 3 Energy Strategy

### 3.1 The energy hierarchy

The energy hierarchy sets out the key measures that should form part of an energy strategy for any new building or development, in order of their priority. Reducing energy demand is at the top of the hierarchy, followed by supplying energy efficiently, finally supplying remaining energy needs from renewable energy sources.

In line with best practice, the energy strategy for the Proposed Development has been set out in accordance with the structure of the energy hierarchy.



*Figure 1 The Energy Hierarchy*

The strategy for the proposed development aims to reduce energy demand, to use energy in an efficient way, and to use sources of renewable energy to meet demand.

### 3.2 Methodology

In order to confirm compliance with the Planning Policy requirements, energy modelling has been undertaken for the residential element of the proposed development. This has been based on a sample of representative dwelling types. Dwelling types have been selected to reflect the various factors which will affect energy performance. These include:

- Dwelling size (floor area)
- Position within the block (ratio of exposed area)
- Orientation

Energy modelling has been carried out using the Building Research Establishment's (BRE) SAP methodology by an accredited On Construction Domestic Energy Assessor. This has informed the outline specification for the various elements of the building. SAP modelling has been undertaken in SAP 10 to reflect current Building Regulations performance, and baseline emissions for the purposes of calculating the percentage emission reduction are calculated with reference to SAP 10 carbon emission factors.

Full SAP modelling of each individual dwelling will be undertaken at the relevant stage as part of the Building Regulations application for the scheme. The approaches listed in the report are based on commercially available technologies tested and approved by the BRE for use in the SAP software, and considered suitable the scale of the development.

### 3.3 Demand reduction

Using the approach of the energy hierarchy, the first stage of the approach to developing the energy strategy has consisted of identifying suitable approaches to reduce energy demand. Measures to reduce the energy demand can be classified as either 'passive' or 'active'. Passive design measures are those such as site layout, solar gain and solar shading, insulation to reduce heat loss, thermal bridging and air tightness. These measures are 'built in' to the design of new dwellings.

'Active' design measures relate to the specification of energy efficient services such as lighting and ventilation. These will be replaced during the lifetime of the home. Measures which help the building occupant to optimise the use of their space heating and hot water supply are also considered here.

#### 3.3.1 Passive design measures

Site layout and building orientation is important to achieve a balance between useful solar gain, which can reduce the energy demand of the building, whilst avoiding the potential for overheating from excessive solar gain particular as the climate changes in future years.

The following elements are proposed as part of the strategy for demand reduction:

#### Building Fabric

The building fabric consists of the various elements of the envelope of the building through which heat is lost. These include the floor, walls, roof windows and doors. The design of the thermal envelope of the building can have the greatest influence on the energy demands of the building, and while services will be replaced several times over the building's lifespan, the fabric of the building envelope typically remains more constant. The building fabric is also always more difficult to retrospectively improve in terms of thermal efficiency.

Using the 'fabric first' approach, all components of the thermal envelope for the proposed dwellings have been reviewed by the design team. This process has identified opportunities to improve insulation levels to deliver a high-performance thermal envelope. Heat loss through these elements is defined by the U-value, with a lower U-value representing a better level of thermal performance. The outline specification for the thermal envelope across the various residential building types is as follows:

| Thermal element | U-value (W/m <sup>2</sup> K)                             |                                     |
|-----------------|----------------------------------------------------------|-------------------------------------|
|                 | Current typical specification for Part L 2021 Compliance | Proposed specification for building |
| Floor           | 0.13                                                     | 0.11                                |
| Walls           | 0.18                                                     | 0.15                                |
| Roof            | 0.11                                                     | 0.11                                |
| Windows         | 1.20 (double glazed)                                     | 0.80 (triple glazed)                |
| Doors           | 1.00                                                     | 1.00                                |

Figure 2 Outline fabric specification

It can be seen that the fabric specification for the building provides an enhancement on the values typically required to achieve compliance with current Building Regulations. The U-values also meet the requirements of the proposed 'Future Homes Standard'. As outlined in section 2.4 above, the 'Future Homes Standard' is expected to be the benchmark to which all new homes will be built from 2025 onwards.

In terms of thermal mass, it is anticipated that the building will be of masonry construction, this allows the building to respond to changes in temperature by absorbing, storing and releasing heat in response to changes in internal and external temperatures.

### **Thermal bridging**

As the heat loss through each of the elements in the building is reduced through the specification of lower U-values, the heat loss at the junctions of each of these elements becomes much more significant. This process is known as thermal bridging and is measured using the  $\Psi$  value. For the purposes of the energy strategy, typical average  $\Psi$  values of approximately 0.05 W/m<sup>2</sup>·K have been used. As the detailed design progresses each thermal bridge junction will be reviewed by the Design Team to determine suitable construction details that can be used to reduce heat loss. To ensure that thermal bridging details are followed effectively on site, a process of sign-off checklists for Contractors is also proposed.

### **Air tightness**

Air tightness is a measure of the air leakage from a dwelling, uncontrolled exchange of air between the internal and external environment leads to unwanted heat loss. To minimise heat loss in this way, the maximum level for air tightness has been set at 4 m<sup>3</sup>/h.m<sup>2</sup> for flats with a target of 3 m<sup>3</sup>/h.m<sup>2</sup> for compatibility with the ventilation strategy. Full testing will be carried out for each dwelling within the proposed development to confirm that this target is achieved on completion of the build.

### **Performance Gap**

Research has demonstrated that there can sometimes be a difference between the modelled energy performance of new dwellings, and their actual energy consumption in use. This is known as the 'Performance Gap'. This can be caused by various factors. To minimise the risk of this, attention will be given to ensuring a high standard of quality control on site with respect to items such as thermal bridging, air tightness and commissioning of building services.

## **3.3.2 Active measures: energy efficient services**

### **Lighting**

High efficiency lighting will be specified in order to reduce energy consumption for both internal and external lighting. Lighting will be LED fittings, providing an efficacy of 80 lumens per circuit watt as a minimum.

Externally and within the communal areas to flats, lighting will be controlled with photocell and PIR sensors to ensure it is only operational during hours of darkness and in response to demand.

### **Heating controls**

Space heating will be controlled through the provision of a programmer and thermostat for each heater.

### **Water efficiency**

The specification of water efficiency measures has the potential to not only reduce water use, but also to reduce the energy needed to provide domestic hot water. As space heating demands are decreased through higher standards of fabric efficiency, energy for hot water needs in new build homes are often higher than those for space heating. In particular, shower flow rate has the

potential to offer substantial energy savings and this has been accounted for in the supporting energy modelling.

Hot water demand will be reduced through the specification of:

- Flow restrictors to wash hand basin taps
- Smaller capacity baths
- Shower flow restrictors

Water efficiency measures are considered in more detail in section 4.0.

## Ventilation

Efficient ventilation to enable air pollutants and moisture to be removed from the building, and fresh air to be provided, is essential to ensure that occupants have a healthy internal environment, and that levels of moisture within the building do not have the potential to cause condensation. Building designs have been optimised to allow for natural ventilation through provision of openable windows, and cross ventilation where possible.

It is proposed that flats will be ventilated with mechanical ventilation with heat recovery, appropriate for their target level of air tightness. This type of ventilation provides an efficient continuous level of background ventilation, with a heat exchanger to recover heat from the exhaust air, which pre-warms incoming fresh air. Automatic summer bypass mode will be included as standard.

## Demand side response

Further measures to reduce demand will include the provision of smart meters and home user guides to aid occupants to reduce their energy use. Smart meters provide real time data on energy consumption via an energy display device, allowing residents to see their energy use, associated carbon emissions and running costs. This allows occupants to have greater control of their energy use, rather than relying on estimated meter readings for billing.

A home user guide will be provided to new occupants to ensure that they have adequate information to enable them to operate heating, hot water, ventilation and lighting systems in the most cost-effective manner.

## 3.4 Overheating and cooling

### 3.4.1 Introduction to overheating

Overheating is a term used to describe a situation where the temperature in a home becomes excessively warm for prolonged periods of time. Overheating occurs when internal and external thermal gains exceed the ability for excess heat to be removed. This can cause discomfort for residents, particularly if they have underlying health conditions or are vulnerable due to their age. It also means that occupants may resort to using active cooling systems such as air conditioning which will increase energy use and CO<sub>2</sub> emissions. Climate change will bring altered weather patterns which will also increase the risk of overheating in buildings in future years.

### 3.4.2 Overheating risk and mitigation

Overheating risk in buildings is caused by a number of factors and their interaction. Key factors and potential mitigation measures that will be considered through the design process are set out in the table below:

| Element              | Points to consider                                                                                                                                                     | Mitigation measures                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site context         | Local microclimate, hard and soft landscaping<br>Shading offered by adjacent buildings, structures and natural features such as trees<br>Local air and noise pollution | Maximise soft landscaping<br>Tree planting<br>Appropriate ventilation strategy dependent on local noise / air pollution                                                                                                                                                          |
| Internal heat gains  | Heat gains from occupants and their daily activities such as cooking and showering                                                                                     | Ventilation strategy to adapt to times of peak use<br>Lower flow rate showers to reduce hot water spray                                                                                                                                                                          |
|                      | Unwanted heat gains from building services, such as hot water cylinders and distribution pipework,<br><br>Lighting                                                     | Hot water cylinder insulation<br>Appropriate position of hot water cylinder to avoid excessive pipe runs<br>Pipework insulation<br>LED light fittings and controls                                                                                                               |
|                      |                                                                                                                                                                        |                                                                                                                                                                                                                                                                                  |
| Building design      | Thermal mass                                                                                                                                                           | Consideration of thermal mass appropriate to building type                                                                                                                                                                                                                       |
|                      | Insulation                                                                                                                                                             | Improved efficiency of the thermal envelope to reduce unwanted heat gains                                                                                                                                                                                                        |
|                      | Air tightness                                                                                                                                                          | Ensuring that the ventilation strategy is appropriate to target air tightness level                                                                                                                                                                                              |
| External solar gains | Reducing excessive solar gains<br>Glazed areas and orientation                                                                                                         | Glazing design including window size, orientation and G-value (thermal transmittance)<br>Depth of window reveals<br>Building design – e.g. placement of balconies to act as shading                                                                                              |
| Removing excess heat | Ventilation strategy                                                                                                                                                   | Openable windows, ideally with cross ventilation<br>Mechanical ventilation                                                                                                                                                                                                       |
| Occupant behaviour   | Ensuring that occupants understand the strategy for their home                                                                                                         | Provision of a 'Home User Guide' providing advice in non-technical language, including: <ul style="list-style-type: none"> <li>- Times of day to use different approaches</li> <li>- How to service and maintain ventilation systems</li> <li>- Locations of controls</li> </ul> |

Figure 3 Overheating risk and mitigation

### 3.4.3 Proposed approach

To ensure that the risk of overheating is adequately assessed, all dwellings have been reviewed against the requirements of the Building Regulations Approved Document Part O 2021. Part O sets out approaches to both limit unwanted solar gain, and to provide an adequate means of removing excess heat from the indoor environment. The flats and associated communal areas have been

assessed using the dynamic thermal modelling approach set out in Approved Document Part O and CIBSE TM52 and TM59.

A passive approach to mitigating overheating risk will be taken. Windows with a lower G-value (solar transmittance) will be specified in order to reduce solar gain, particularly important for glazed openings to the South East elevation. The flats will benefit from mechanical ventilation with heat recovery, and a higher air change range will be provided where needed. This will be particularly relevant for ground floor flats, where windows cannot necessarily be left open at night to provide cooling. No mechanical cooling is proposed.

### **3.5 Efficient heating infrastructure (Be Clean)**

Once demand for energy has been minimised, options for supplying energy efficiency and cleanly can be explored. This will reduce not only carbon dioxide (CO<sub>2</sub>) emissions, but also oxides of nitrogen (NO<sub>x</sub>) which impact on local air quality.

#### **3.5.1 Heat networks and communal heating systems**

Space heating and domestic hot water can be provided through communal systems. This can take the form of either connection to an existing district heating network, or provision of a new network, at either a site wide or building level.

Communal systems can, depending on the heat source, provide improved efficiencies in heat generation compared to individual systems, however this has to be considered alongside the distribution losses that occur as heat is transported around the network. Further areas to consider are metering and billing and long-term maintenance of the plant and network.

There is no existing district heating network in the vicinity of the proposed development that the new development could connect to. It is considered that individual heating systems are a more appropriate way of providing space heating and hot water for the building. With the enhancements to building fabric described above, alongside active demand reduction measures, energy required for space heating will be low and can be met efficiently by individual heating systems.

#### **3.5.2 Gas fired boilers**

Although compliance with current building regulations is possible using gas fired boilers, it is anticipated that their use will be phased out from 2025 when the Future Homes Standard is implemented. It is therefore not proposed to use gas fired heating systems within the development.

#### **3.5.3 Electric heating**

Space heating and hot water demand will be met by low carbon forms of heating. Electric panel heaters are proposed as the form of space heating. As these heating systems are fuelled by electricity, they will have low associated CO<sub>2</sub> emissions due to the low carbon intensity of electricity supplied through the grid. However, due to the higher costs of electricity compared to gas, they do have the potential to be more expensive to run. They are considered suitable for the flats due to their high standard of fabric efficiency, with enhancements to the U-values as described in earlier sections. This will reduce the space heating demand.

For this type of dwelling, hot water demand is typically a much greater proportion of the overall energy demand than space heating and therefore any direct electric heating system would be utilised alongside high efficiency hot water systems such as a hot water heat pump. This technology falls under 'renewable energy' and is considered in the following section.

### 3.6 Renewable energy technologies (Be Green)

A number of renewable energy technologies have been considered for the site in order to contribute to the planning policy requirements of a 19% carbon emission reduction.

#### 3.6.1 Photovoltaic panels

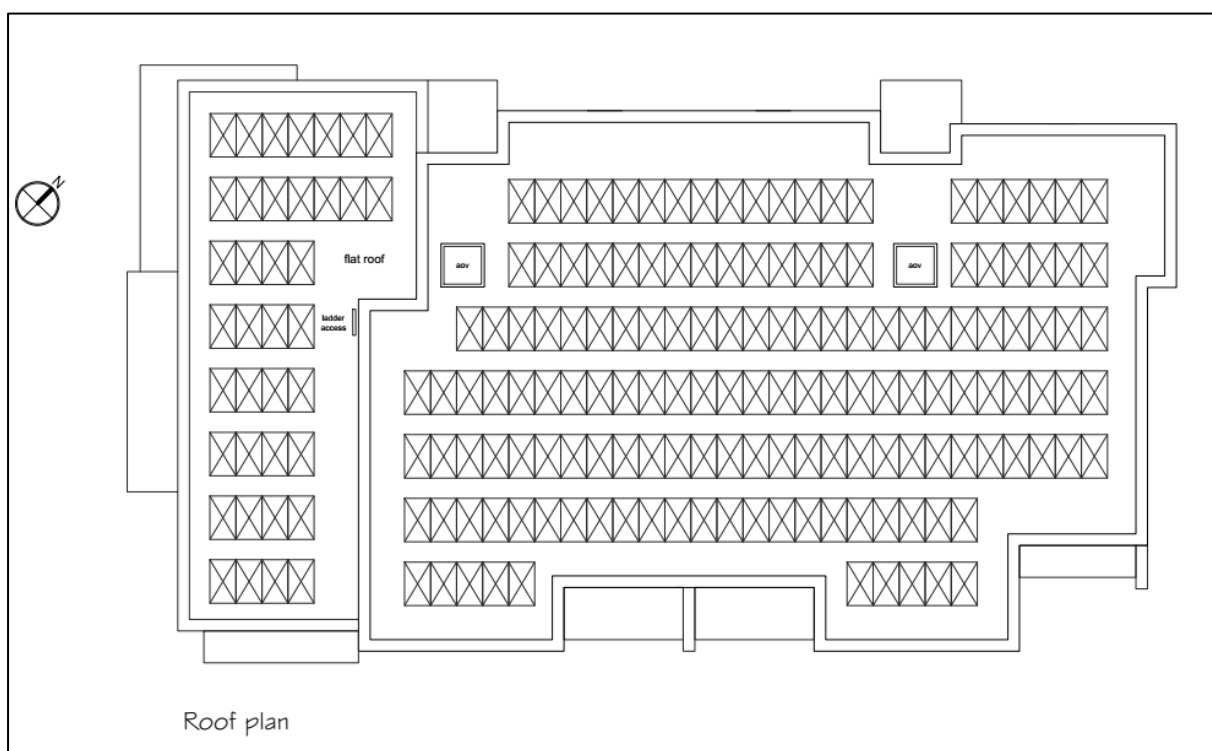
Photovoltaic (PV) panels use PV modules to convert sunlight to electrical power. The DC current generated is converted to AC current for use within the building via an inverter. While energy is being produced during daylight hours, this will be used to meet any demand that exists within the building home for electrical appliances, lighting or ventilation. Any surplus energy will flow to the national grid.

PV panels are a long established and proven technology, with a typical lifespan of around 25 years. Their maintenance is very minimal and the building occupant does not require a detailed understanding of their operation in order to benefit from their use.

It should be noted that although electricity generated locally from PV will have lower CO<sub>2</sub> emissions than that on average supplied through the national grid, this differential will not be substantial due to the rapid decarbonisation of the grid in recent years. Local provision of PV does however also have other significant benefits including

- Reducing inefficiencies through transmission losses through the grid
- Reducing demand on the grid at a local level, particularly at peak times
- Protecting occupants from higher energy costs at a time of increasing energy costs
- Contributing towards the demand for electric vehicle charging

It is proposed that a solar photovoltaic array is provided to the flat roof of the building, orientated to the south-east. The roof plan indicates that 187 solar panels could be accommodated. Based on a 250W panel, this means that a total array of 46kWp could be provided.



*Figure 4 Queens View Roof Plan*

For the purposes of the Planning stage assessment, 2kWp has been allocated to each of the 18 flats. The remaining 10kWp could be allocated to the commercial space, and to serve the communal parts of the building.

### **3.6.2 Heat pumps**

Heat pumps are devices which extract heat from a heat source such as the ground (ground source heat pumps) or the air (air source heat pumps). The heat pump then raises the temperature of the fluid which is supplied to the building for domestic heating and hot water. In order to operate most efficiently, heat pumps systems generally require an under floor heating system or oversized radiators. Consideration needs to be given to their location to avoid noise and visual impacts, and sizing to achieve a good co-efficient of performance.

Air source heat pump (ASHP) systems have the potential to achieve good reductions in terms of CO<sub>2</sub> however for flats, individual heat pump systems can be challenging in terms of finding suitable space for locating the external unit. On this occasion it is considered that electric space heating combined with how water heat pumps is a more suitable option. This also allows the roof space to be used for the photovoltaic panels.

### **3.6.3 Hot water heat pumps**

Hot water heat pumps offer a highly efficient way of providing domestic hot water. They incorporate a small air to water heat pump unit alongside a hot water cylinder. They are ideal for smaller dwellings with low space heating demand, or where there is not a suitable location for an external heat pump unit. Hot water heat pumps are located inside the building envelope, with air supply to the heat pump being provided through ductwork. They can be use alongside another system providing space heating such as electric heaters.

For the proposed development, it is considered that this would be a suitable way to provide the hot water needs.

### **3.6.4 Solar thermal systems**

Solar thermal systems use roof mounted collectors to absorb the heat energy from the sun. This energy is then used to heat the domestic hot water for the dwelling within the hot water cylinder. Solar thermal systems are typically more suitable for houses than for flats due to the length of pipe runs needed from the roof of the building to the flats on lower floors.

Hot water demands have been reduced as far as possible through active demand reduction measures and demand will be met through hot water heat pumps. As these are highly efficient and use electricity which is a low carbon fuel source, solar thermal systems would only deliver a very minimal additional carbon emission reduction.

It is considered that specification of solar photovoltaics would make better use of the available roof space, and would contribute to reducing CO<sub>2</sub> emissions from electrical demands within the building.

Solar thermal is therefore not currently proposed to form part of the energy strategy for the site.

## **3.7 Commercial space**

This section of the energy statement considers the strategy for the non-residential part of the development. A 67m<sup>2</sup> retail unit is proposed to the ground floor of the building.

The principle of the energy hierarchy will be followed and the first stage will always be to take a 'fabric first' approach to reducing energy demand through enhancing insulation and air tightness levels. This is particularly important for the commercial space, as typically services may be fitted out by the building user rather than the developer.

An initial appraisal has been undertaken for the retail unit to determine the elements that might feature in the energy strategy for this part of the proposed development.

| Building type | Points to consider and potential technologies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Retail        | <p>Ensure highly efficient thermal envelope so that heating plant is not oversized. Fabric U-values will be to the same specification as the residential parts, again offering an enhancement over the requirements of the Building Regulations.</p> <p>Building services are likely to provide both heating and cooling. Peak energy use is typically in daytime hours making solar PV an ideal technology, particularly to offset the use of cooling in summer months.</p> <p>Building services should be provided with suitable controls / Building Management System (BMS) to ensure effective operation.</p> <p>High efficiency LED fittings both internally and externally in entrance / access areas. Lighting controls should be linked to occupancy / movement (e.g. PIR) controls and daylight sensors.</p> <p>Process loads (e.g. refrigeration) could potentially be greater than heating or hot water demands, solar PV offers an effective way to reduce CO<sub>2</sub> emissions associated with this demand.</p> <p>Equipment should be specified to a high standard of energy efficiency to help minimise the build-up of heat within the building.</p> |

*Figure 5 Non-residential buildings – energy options appraisal*

As the detailed design is developed, energy modelling would be undertaken to appraise the most suitable energy strategy in more detail. It is likely that a combination of the elements described in the table above would be adopted.

### 3.8 Summary of energy modelling

In order to confirm that the proposed energy strategy will meet the requirements of Building Regulations and Eastleigh Borough Council's Planning Policy, energy modelling has been undertaken.

A range of measures will be implemented, following the principle of the energy hierarchy. These include:

- Passive demand reduction measures through improved insulation and air tightness
- Active demand reduction measures through heating controls and heat recovery techniques
- Supply of space heating and hot water through high efficiency systems
- Specification of renewable energy technologies

SAP modelling has demonstrated the percentage reduction in CO<sub>2</sub> emissions that these elements will deliver for the residential units. The results are summarised below. The TER 'Target Emission Rate' sets the maximum allowable carbon emissions for each dwelling, while the DER 'Dwelling Emission Rate' shows the carbon emissions as a result of the proposed energy strategy. Results show that, on a block wide basis, an 89% reduction in carbon emissions compared to the Building Regulations standards has been achieved. This confirms that the 19% carbon emission reduction target set by Planning Policy will be met and surpassed.

| SAP type          | Plot modelled | No. of type | Floor area     | CO <sub>2</sub> emissions (per dwelling) | Emission Rate (carbon)               |                                      |               | Primary Energy Rate    |                        |               | Fabric Energy Efficiency |                        |               |
|-------------------|---------------|-------------|----------------|------------------------------------------|--------------------------------------|--------------------------------------|---------------|------------------------|------------------------|---------------|--------------------------|------------------------|---------------|
|                   |               |             |                |                                          | TER                                  | DER                                  | Improv.       | TPER                   | DPER                   | Improv.       | TFEE                     | DFEE                   | Improv.       |
|                   |               |             | m <sup>2</sup> | Tonnes / yr                              | kgCO <sub>2</sub> /yr/m <sup>2</sup> | kgCO <sub>2</sub> /yr/m <sup>2</sup> | %             | kWh/m <sup>2</sup> /yr | kWh/m <sup>2</sup> /yr | %             | kWh/m <sup>2</sup> /yr   | kWh/m <sup>2</sup> /yr | %             |
| Ground floor flat | 2             | 3           | 50             | 0.14                                     | 14.07                                | 2.78                                 | 80.24%        | 74.21                  | 36.34                  | 51.03%        | 41.74                    | 36.91                  | 11.57%        |
| Ground floor flat | 6             | 3           | 71.5           | 0.11                                     | 13.41                                | 1.49                                 | 88.89%        | 70.79                  | 25.28                  | 64.29%        | 35.07                    | 30.14                  | 14.06%        |
| Mid floor flat    | 9             | 3           | 50             | -0.01                                    | 12.57                                | -0.15                                | 101.19%       | 66.55                  | 11.75                  | 82.34%        | 25.42                    | 22.39                  | 11.92%        |
| Mid floor flat    | 10            | 4           | 76             | 0.05                                     | 10.53                                | 0.61                                 | 94.21%        | 55.14                  | 14.88                  | 73.01%        | 25.15                    | 21.36                  | 15.07%        |
| Top floor flat    | 14            | 2           | 50             | 0.11                                     | 17.99                                | 2.17                                 | 87.94%        | 95.69                  | 34.84                  | 63.59%        | 50.48                    | 38.27                  | 24.19%        |
| Top floor flat    | 15            | 3           | 76             | 0.16                                     | 13.90                                | 2.14                                 | 84.60%        | 73.29                  | 30.23                  | 58.75%        | 40.47                    | 31.85                  | 21.30%        |
| <b>Block</b>      |               | <b>18</b>   | <b>Average</b> | <b>0.09</b>                              | <b>13.12</b>                         | <b>1.40</b>                          | <b>89.33%</b> | <b>69.20</b>           | <b>24.02</b>           | <b>65.29%</b> | <b>34.47</b>             | <b>28.73</b>           | <b>16.64%</b> |

Figure 6 Carbon emission reduction – proposed strategy (Site)

## 4 Sustainability Statement

The proposed development aims to provide a new building that is not only energy efficient in operation but are also resource efficient in terms of its construction. This section of the report presents additional aspects of the building design that relate to water efficiency, resource efficient design and sustainable construction.

Elements of the Local Plan policies which relate to sustainability in terms of landscape and ecology, transport, waste management, flood risk and surface water drainage are covered by additional reports submitted as part of the Planning Application.

### 4.1 Water efficiency

Water resources nationally are under increasing pressure from climate change and population growth. Implementation of water efficiency measures to reduce the water demand from the proposed development will have several benefits including:

- Reducing demand on a natural resource, which will increase in importance with changing climate and weather patterns
- Decreasing the energy required to heat hot water for showers, baths and handwashing and therefore reducing carbon emissions
- Minimising the volume of water that needs to be treated to drinking water standards and pumped to the development
- Decreasing the volume of foul water generated, therefore reducing demand on waste water treatment (and associated energy use) and infrastructure

With these benefits in mind, water efficiency measures will be specified for both the residential and commercial parts. The measures proposed have been selected based on their relevance to the building types.

#### 4.1.1 Residential dwellings

Water consumption in residential dwellings is calculated with reference to The Building Regulations Approved Document Part G. This document sets out a methodology for calculating the water use per occupant per day, based on the flow rates and capacities of the sanitary ware fittings and water using appliances in the home.

New dwellings are currently required to achieve water demand of less than 125 litres per person per day. In accordance with the Planning Policy requirements, an enhanced level of water efficiency is proposed to meet the optional higher performance standard of Approved Document Part G, 110 litres per person per day.

The following summary table sets out typical flow rates required to achieve the 110 litre target, in comparison to those required for the 125 litre target.

| Fitting              | Typical new build specification | Proposed specification     |
|----------------------|---------------------------------|----------------------------|
| WC                   | 6 /4 litre dual flush           | 4 /2.6 litre dual flush    |
| Bath                 | 200 litre capacity              | 180 litre capacity         |
| Shower               | 9 litres/min                    | 8 litres/min               |
| Wash hand basin taps | 7 litres / min                  | 6 litres / min             |
| Kitchen taps         | 7 litres / min                  | 6 litres / min             |
| Washing machine      | 8.17 litres / kg dry load*      | 8.17 litres / kg dry load* |

|                                        |                               |                               |
|----------------------------------------|-------------------------------|-------------------------------|
| Dishwasher                             | 1.25 litres / place setting * | 1.25 litres / place setting * |
| Total water consumption (l/person/day) | 123.00                        | 108.75                        |

\* where washing machines and dishwashers are not provided the calculation still allows for their consumption based on typical performance

Figure 7 Sanitary ware specification

| Installation               | Unit of measure               | (1)<br>Capacity /<br>flow rate | (2)<br>Use factor                                                         | (3)<br>Fixed use<br>(litres / person<br>/ day) | (4)<br>Litres / person<br>/ day |
|----------------------------|-------------------------------|--------------------------------|---------------------------------------------------------------------------|------------------------------------------------|---------------------------------|
|                            |                               |                                |                                                                           |                                                | = [(1)x(2)]+(3)                 |
| WC (single flush)          | Flush volume (litres)         | 0                              | 4.42                                                                      | 0                                              | 0.00                            |
| WC (dual flush)            | Full flush volume (litres)    | 4                              | 1.46                                                                      | 0                                              | 5.84                            |
|                            | Part flush volume (litres)    | 2.6                            | 2.96                                                                      | 0                                              | 7.70                            |
| Wash hand basin taps       | Flow rate (litres / min)      | 6                              | 1.58                                                                      | 1.58                                           | 11.06                           |
| Bath (shower also present) | Capacity to overflow (litres) | 180                            | 0.11                                                                      | 0                                              | 19.80                           |
| Shower (bath also present) | Flow rate (litres / min)      | 8                              | 4.37                                                                      | 0                                              | 34.96                           |
| Bath only                  | Capacity to overflow (litres) | 0                              | 0.5                                                                       | 0                                              | 0.00                            |
| Shower only                | Flow rate (litres / min)      | 0                              | 5.6                                                                       | 0                                              | 0.00                            |
| Kitchen / utility taps     | Flow rate (litres / min)      | 6                              | 0.44                                                                      | 10.36                                          | 13.00                           |
| Washing machine            | Litres / dry load             | 8.17                           | 2.1                                                                       | 0                                              | 17.16                           |
| Dishwasher                 | Litres / place setting        | 1.25                           | 3.6                                                                       | 0                                              | 4.50                            |
| Waste disposal             | Litres / use                  | 0                              | 3.08                                                                      | 0                                              | 0.00                            |
| Water softener             | Litres / person / day         | 0                              | 1                                                                         | 0                                              | 0.00                            |
|                            |                               | (5)                            | Total calculated use                                                      |                                                | 114.01                          |
|                            |                               | (6)                            | Contribution from greywater<br>(litres / person / day)                    |                                                | 0.00                            |
|                            |                               | (7)                            | Contribution from rainwater<br>(litres / person / day)                    |                                                | 0.00                            |
|                            |                               | (8)                            | Normalisation factor                                                      |                                                | 0.91                            |
|                            |                               | (9)                            | Total water consumption =[(5)-<br>(6)-(7)]x(8)<br>(litres / person / day) |                                                | 103.75                          |
|                            |                               | (10)                           | External water use<br>(litres / person / day)                             |                                                | 5.00                            |
|                            |                               | (11)                           | Total calculated use<br>=(9)+(10)<br>(litres / person / day)              |                                                | 108.75                          |

Figure 8 Water efficiency calculator

This water efficiency calculation confirms that, based on the specification listed, that all dwellings within the Proposed Development will have water consumption of less than 110 litres per person per day therefore meeting the requirements of Policy DM2.

#### 4.1.2 Commercial unit

For this part of the building water use is likely to be less intensive. Measures that could be implemented here are likely to include:

- Low flush capacity WCs
- Flow restrictors to wash hand basin taps
- Flow restrictors to taps in kitchenette areas
- Measures to prevent leaks such as water supply linked to occupant sensors in WC areas

## 4.2 Electric vehicle charging

With a growing demand for lower emission forms of transport, there has been an increase in recent years in the market for electric vehicles. This growth is set to continue rapidly over the coming years, as the Government seek to phase out the sale of new petrol and diesel cars from 2030. It is therefore important that suitable provision is made for charging of electric vehicles. Dedicated charging points deliver faster charging times in a safe and reliable manner. It is key that local demand on the grid, for both heating and transport needs, is factored into the supply to the site.

The proposed development will make provision for electric vehicle charging points in line with the requirements of the Building Regulations Approved Document Part S 2021. All new homes with an associated parking space (as defined in Part S) will be provided with an electric vehicle charging point.

## 4.3 Materials & waste

Optimising the use of materials in the construction of the proposed development offers the potential to not only decrease the embodied energy / carbon impact but also to minimise the generation of waste. Each stage of the design and construction process offers opportunities to evaluate the use of resources.

### Design stage

Before considering the procurement of materials and specific supplier, opportunities will be taken to reduce the quantities of materials needed, specify durable materials, and select material types with low embodied environmental impact. The design team will:

- Identify a 'designing out waste' champion, to take responsibility for the material efficiency strategy.
- Determine whether existing site resources can be reused / recycled for use on site.
- Review building designs to ensure dimensions are standardised and aligned to standard product dimensions (for example ceiling heights to plasterboard sizes)
- Review material choices considering their life cycle impact in terms of carbon emissions
- Review the M&E specification as it is developed to ensure all elements and their controls are compatible with each other, also considering the lifespan of the various technologies.
- Appraise materials for their durability with consideration of the building type and its users.
- Identify opportunities to make buildings more adaptable to other uses during their lifespan.
- Prepare a Site Waste Management Plan identifying all potential waste materials and their estimated quantities, methods for sorting and storing on site, recycling or recovery route.
- Ensure components which require replacement to be easily accessible without disrupting / damaging other materials around them, and without damaging air tightness membranes
- Consider the use of prefabricated elements. These generally significantly reduce the amount of waste produced on site, use less raw materials and are typically quicker to install. This will be considered alongside the ability for these to be maintained / repaired without the whole element needing to be replaced.
- Design considering climate change adaptation, and the need for the buildings to be more resilient to changing temperatures and climate patterns.
- Refer to recognised industry standards in specifying material build ups such as the BRE Green Guide to Specification.

## Procurement

Following the process of designing out waste, and specifying low impact, durable and resilient materials, the procurement phase will:

- Review individual work packages to identify further opportunities for material efficiency.
- Set waste reduction targets in tender / contract documents with suppliers and sub contractors, along with a requirement to report regularly on progress.
- Request material deliveries in recyclable / compostable / reusable packaging.
- Promote the use of local suppliers and manufacturers of construction materials, retaining investment in the local economy and reducing transport related emissions.
- Procure materials from suppliers that hold nationally recognised sustainability certification such as ISO14001 or BES6001.
- Ensure paints, varnishes and floor coverings are specified with low VOC content.

## Construction phase

During the construction phase actions will be taken to:

- Implement the Site Waste Management Plan (SWMP) compiled during the design phase.
- Ensure careful storage of materials on site to avoid damage and wastage.
- Protect vulnerable items from damage, contamination, and degradation from moisture and weather.
- Work with contractors and subcontractors to forecast site waste arisings and waste management plans.
- Optimise delivery of the programme so that works take place in the correct sequence, minimising wasted materials and the need to rectify defects.
- Establish an effective materials delivery regime so that correct quantities of materials are available at the right time.
- Monitor energy and water use from construction site activities.
- Provide site accommodation and welfare facilities with a lower impact through features such as low flush volume WCs, flow restrictors to wash hand basin taps and LED Lighting with controls.
- Consider use of alternative fuels for construction site use such as biodiesel to reduce carbon emissions.

