Shire Group BSC Ltd

East Grinstead Care Home
Sustainability Statement
05/12/2024

SUSTAINABILITY STATEMENT

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1.0 Executive Summary

1.1 General

1.1.1 Shire Group have been appointed to complete a Sustainability Statement for the new build site East Grinstead in support of a planning application for the scheme. The Proposed Development is a residential scheme comprising of 78 bedroom care facility as well as a detached 7 bed care unit.

1.1.2 When reviewing the energy and sustainability strategy for this development, careful consideration has been given to the context of the Application Site, local and regional planning policy and the 2021 Building Regulations. The energy efficiency, resource efficiency, water efficiency and impact of climate change of the scheme have all been considered in the development of a sustainability strategy for the building in line with the requirements of the Mid Sussex District Plan.

1.2 Key Energy Efficient Design Measures

1.2.1 The approach taken in developing the energy strategy for the scheme has followed a sequential approach, assessing in turn:

- The feasibility of the integration of passive design measures and energy efficient building services strategies;
- Determining the viability of a decentralised energy network; and
- An assessment of the feasibility of a number of Low or Zero Carbon (LZC) Technologies for application to the Site.
- Passive design and energy efficient design measures are proposed for inclusion in the development as detailed below:
- Building fabric U-values that exceed the minimum requirements of Part L;
- Air leakage rate is to be 60% lower than the maximum permissible under the Building Regulations;
- Centralised continuous mechanical ventilation with heat recovery (MVHR) to reduce heating loads;
- Reduction in hot water demand, in part due to higher insulation standards but also due to lower water consumption;

[1] Mid Sussex District Council (2018) District Plan 2014-2031

- Maximise daylighting and consequently passive solar heating (whilst not providing excessive areas of glazing that would cause overheating risk when considering future climate change);
- Specification of energy efficient light fittings and providing occupancy sensing lighting control in communal corridors;
- Provision of Air Source Heat Pumps (ASHPs) as a form of LZC for the site to meet the thermal loads of the scheme; and
- Recommendations to building users regarding energy efficient appliances and operation of systems and equipment.

1.2.2 An analysis of the feasibility of adopting a decentralised energy strategy on site has been explored. There is not an established district heating network in the vicinity of the Application Site, but due to the size and density of the residential proposals it has been proposed that a new decentralised community heating network could be a practical solution to meeting the domestic thermal loads of the care home. It is to be determined at detailed design stage if an individual application of ASHP technology/ centralised application would be the most practical and cost effective option for the Site.

1.2.3 The preliminary energy performance calculations that have been completed have demonstrated that the proposed energy strategy for the scheme will result in the site proposals meeting the requirements of Part L of the Building Regulations.

1.3 Key Resource Efficiency Design Measures

1.3.1 A strategy has been developed for the Application Site to maximise the efficient use of resources, both through the construction process and during future occupation. The waste hierarchy has been referenced throughout this assessment process to prioritise measures that would have the most significant resource saving impacts.

1.3.2 A summary of the key resource efficiency proposals are detailed below:

- The production of a Site Waste Management Plan (SWMP) to set good practice target waste benchmarks, set procedures for minimising, measuring, monitoring & reporting various waste streams and identifying potential for re-use to divert potential waste from landfill.
- Encourage the use of recycling and composting facilities. Provide guidance to future occupants via Home User Guides detailing Local Authority collection schemes, information on local recycling facilities and tips,

guidance on procedures to discard potentially hazardous waste (i.e. batteries, fridges / freezers etc.) and WRAP sustainable waste disposal principles.

1.4 Key Water Efficiency Design Measures

1.4.1 A water efficiency strategy has been developed for the Application Site to meet the water consumption targets set in the Mid Sussex District Plan - 110 litres per person per day (including external water use) for the dwellings.

1.4.2 The feasibility of a number of measures have been explored, including the installation of water conservation appliances.

1.4.3 An analysis has been undertaken of various routes to meet the targeted performance levels. A standard approach is proposed for the scheme to meet the targets - utilising water conservation appliances such as low flow taps and baths w ith a low capacity to overflow.

2.0 Introduction

2.1 Site Overview

2.1.1 The Application Site is located on West Hill, East Grinstead, RH19 4DL. The Application Site location is indicated by the red line boundary on the Site Location Map include as **Figure 2.1**, below.

Figure 2.1: Site Location Map

2.1.2 The Application Site is located near the centre of East Grinstead – in close proximity to East Grinstead railway station.

2.1.3 The Site is currently occupied by residential detached property as shown on the Site Location Map, the development site is neighboured residential properties to the north, east, south and west.

2.1.4 The proposals for the Application Site are illustrated by the site illustration included as **Figure 2.2**, below.

3.5 Plans Site Layout

2.2 Planning Context

2.2.1 There is increasing awareness and legislation regarding low carbon and sustainable design in the built environment. This Sustainability Statement supplements the planning application for the new build care home and seeks to address strategic issues raised by local, regional and national planning policies relating to climate change and sustainability.

2.2.2 Against a context of the relevant planning policies, this report focuses on minimising the environmental impact of the Proposed Development during construction, occupation and demolition.

2.2.3 The Application Site is located within Mid Sussex. The Mid Sussex District Plan sets out a number of core issues facing the district.

2.2.4 The District Council, in conjunction with four other West Sussex local authorities, commissioned the 'West Sussex Sustainable Energy Study' to inform their policies on carbon emission standards for new development. This research and the general context of the current government position on sustainable development has informed **DP39: Sustainable Design and Construction**, included in **Figure 2.3** below.

DP39: Sustainable Design and Construction

Strategic Objectives: 1) To promote development that makes the best use of resources and increases the sustainability of communities within Mid Sussex, and its ability to adapt to climate change.
Evidence Base: Gatwick Sub Region Water Cycle Study; West Sussex Sustainable Energy Study, Mid Sussex Sustainable Energy Study.

All development proposals must seek to improve the sustainability of development and should where appropriate and feasible according to the type and size of development and location, incorporate the following measures:

- **Minimise energy use through the design and layout of the scheme including through the use of natural lighting and ventilation;**
- **Explore opportunities for efficient energy supply through the use of communal heating networks where viable and feasible;**
- **Use renewable sources of energy;**
- **Maximise efficient use of resources, including minimising waste and maximising recycling/ re-use of materials through both construction and occupation;**
- **Limit water use to 110 litres/person/day in accordance with Policy DP42: Water Infrastructure and the Water Environment;**
- **Demonstrate how the risks associated with future climate change have been planned for as part of the layout of the scheme and design of its buildings to ensure its longer term resilience**

Figure 2.3: Policy DP39 – Sustainable Design and Construction (Source: Mid Sussex District Plan 2014 -2031)

2.2.5 This policy outlines sustainability measures relating to the efficiency of energy usage, water resource usage, waste minimisation and climate change risk mitigation. **Policy DP42: Water Infrastructure and the Water Environment** further details the District's approach to water conservation. This policy is included in **Figure 2.4**, below.

DP42: Water Infrastructure and the Water Environment

Strategic Objectives: 1) To promote development that makes the best use of resources and increases the sustainability of communities within Mid Sussex, and its ability to adapt to climate change; 6) To ensure that development is accompanied by the necessary infrastructure in the right place at the right time that supports development and sustainable communities. This includes the provision of efficient and sustainable transport networks.

Evidence Base: Building Regulations (Approved Document G); Gatwick Sub Region Water Cycle Study; DCLG Housing Standards Review: Technical Consultation, September 2014; South East Water - Water Resources Management Plan 2014, Strategic Flood Risk Assessment.

New development proposals must be in accordance with the objectives of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study with respect to water quality, water supply and wastewater treatment and consequently the optional requirement under Building Regulations – Part G applies to all new residential development in the district. Development must meet the following water consumption standards:

- **Residential units should meet a water consumption standard of 110 litres per person per day (including external water use);**
- **Non-residential buildings should meet the equivalent of a 'Good' standard, as a minimum, with regard to the BREEAM water consumption targets for the development type.**

Development proposals which increase the demand for off-site service infrastructure will be permitted where the applicant can demonstrate;

- **that sufficient capacity already exists off-site for foul and surface water provision. Where capacity off-site is not available, plans must set out how appropriate infrastructure improvements approved by the statutory undertaker will be completed ahead of the development's occupation; and**
- **that there is adequate water supply to serve the development.**

Planning conditions will be used to secure necessary infrastructure provision.

Development should connect to a public sewage treatment works. If this is not feasible, proposals should be supported by sufficient information to understand the potential implications for the water environment.

The development or expansion of water supply or sewerage/sewage treatment facilities will normally be permitted, either where needed to serve existing or proposed new development, or in the interests of long term water supply and waste water management, provided that the need for such facilities outweighs any adverse land use or environmental impacts and that any such adverse impact is minimised.

Figure 2.4: Policy DP42 – Water Infrastructure and the Water Environment (Source: Mid Sussex District Plan)

2.2.6 Policy DP42 confirms that residential units should meet a water consumption standard of 110 l/p/day, inclusive of external water usage.

2.3 Objectives

2.3.1 The objectives of this report are to:

- demonstrate to the Planning Authority, Mid Sussex District Council, that the Proposed Development will comply with the relevant policies in the Mid Sussex District Plan;
- provide an initial assessment of the measures required to comply with Part L of the Building Regulations; and
- contribute to the development of a low carbon and sustainable strategy for the site which will be carried through to detailed design, construction, operation and ultimate demolition.

3.0 Energy Strategy

3.1 Introduction

3.1.1 This section of the report looks at areas where the buildings' energy demand can be reduced in order to create an energy efficient design solution.

3.1.2 The implications of the Building Regulations and the local policy are explored, with reference to the technical, functional and economic feasibility of various energy efficiency measures.

3.1.3 In line with the Energy Hierarchy, a passive first approach will be considered for the scheme. The Energy Hierarchy is summarised below:

1. Be lean: Use less energy;
2. Be clean: Supply energy efficiently; and
3. Be green: Use renewable energy.

3.2 Application for Passive Design Principles

Overview

3.2.1 Passive design uses local climatic conditions to reduce the amount of applied energy required to heat, cool or light a building. For example, passive solar gain via south facing windows can reduce the heating requirements of a space, although this must be balanced against the risk of excessive solar gains in summer, especially when considering the increased overheating risks associated with climate change. Passive design centres around the building envelope and its relationship with its surroundings.

3.2.2 One of the major design issues with the development at this stage was to ensure that compliance with Part L of the UK Building Regulations was possible. The current version of Part L - Part L 2021 - came into force on the 15th of June 2022.

3.2.3 Part L of the Building Regulations sets out elemental minimum performance standards for each building fabric element respectively, in addition to requiring the overall energy performance of the new homes to meet the performance of a comparable notional building when assessed as a whole. The holistic targets for new residential developments set by Part L 2021 are as below:

- Target Emission Rate (TER). In order to comply, the calculated Dwelling Emission Rate (DER) for a new home will need to be less than the TER.
- Target Primary Energy Rate (TPER). In order to comply, the calculated Dwelling Primary Energy Rate (DPER) for a new home will need to be less than the TPER.

- Target Fabric Energy Efficiency (TFEE). In order to comply, the calculated Dwelling Fabric Energy Efficiency (DFEE) will need to be less than the TFEE.

3.2.4 The TFEE performance metric notably only applies to domestic developments, not non-domestic developments. The TFEE requirements for a dwelling are based solely on design elements that relate to the building fabric of the dwelling – such as U values, G values, thermal mass, air tightness and thermal bridging properties.

3.2.5 Compliance with the TER, TPER and TFEE can be tested using Simplified Assessment Procedure (SAP) calculations.

3.2.6 In addition to the drivers set by Building Regulations, 'Be lean' measures have been prioritised as a means of reducing the energy demand of the scheme on occupation and minimising the environmental impact of the scheme. However, the proposals for the building envelope need to be technically feasible as well as economic.

Building Design Principles

3.2.7 The Proposed Development includes materials and a construction methodology that aims to meet the following requirements:

- minimise energy use;
- maximise daylighting to main living spaces.;
- utilise natural ventilation where feasible; and
- minimise summertime overheating risk.

Building Envelope Thermal Performance

3.2.8 At this early stage, the proposed building envelope properties outlined in **Table 3.1**, below, are proposed for the scheme.

Table 3.1: Proposed Building Fabric Properties

Element	Limiting Fabric Parameters Set out by Part L 2021	Proposed Properties	% Improvement
Walls	0.26 W/m²K	0.19 W/m²K	26.92%
Corridor Walls**	-	0.3 W/m²K	-
Exposed Floor	0.18 W/m²K	0.14 W/m²K	22.22 %
Roof	0.18 W/m²K	0.16 W/m²K	11.11 %
Windows	1.6 W/m²K	1.2 W/m²K	25 %
Doors	1.6 W/m²K	1.4 W/m²K	12.5 %
Air Permeability	8 m³/h/m²	5.0 m³/h/m²	37.5 %

*In order to qualify for the value of 0.00W/m^{2}K in the SAP calculations these walls would need to either be solid or have a fully filled cavity with effective edge sealing at all exposed edges (i.e. no U value calculation is required, but one of these definitions needs to be met).

3.2.9 It can be seen that the building fabric of the proposed care home will exceed the performance limiting standards set by Part L 2021.

3.2.10 Further to these building fabric properties, an enhanced level of thermal bridging design is proposed as part of the design strategy to meet the TFEE performance metric. It is proposed for the PSI values of the thermal bridges to meet/ exceed the properties of the Part L notional dwelling.

3.2.11 A TM59 study will also be carried out to determine whether or not certain areas of the building will overheat. The identified areas will then have measures set against them to limit solar gain into the space.

3.3 Energy Efficient Design

Overview

3.3.1 Further to the application of passive design measures to reduce the energy demand of the scheme, it is proposed to optimise the efficiency of the building services systems meeting the energy demand of the Proposed Development.

3.3.2 In the first instance, this section of the report will explore the feasibility of connecting the scheme to an existing district heating scheme / the development of an on-site community heating scheme.

3.3.3 At this stage – an initial appraisal of servicing strategies for the scheme will assume, due to the central location of the development, that there will be access to both mains gas and electricity.

3.3.4 Additionally, this section of the report will address the energy efficiency of other regulated building energy uses within the scheme and how they may be reduced.

District Heating

3.3.5 The Association for Decentralised Energy online district heating installation map has been accessed to determine if there is an established district heating network in the vicinity of the Application Site. It has been determined that the nearest established network is in. This network is over a mile away from the Application Site and there are significant obstructions that would need to be negotiated between this network and the scheme – such as roads and existing infrastructure. A connection to this network in this instance is therefore not considered feasible for the Application Site.

Dwelling Service Option 2: ASHP Community System

General

3.3.6 A community scheme is most appropriate where there is a high density of heating loads that need to be served.

3.3.7 The plant room installation for a base scheme would include ASHP units (COP average 3.6). All the major plant would be accommodated in an energy centre which would need to be easily accessible to facilitate maintenance.

3.3.8 Distribution pipework would be selected to exceed minimum standards required by Building Regulations and design temperatures optimised to minimise distribution losses.

3.3.9 A small building energy management system (BEMS) would control the centralised plant, commissioned to maximise efficiency to best utilise the energy sources available and to closely match the building load. The BEMS would also collect the data from the various sub-meters installed throughout the buildings, allowing billing (see sections below), and targeting and monitoring.

3.3.10 The BEMS would also alert the appointed management company of any system faults and generate reminders that maintenance is due.

Heating of Dwellings

3.3.11 Individual rooms would be served by the following:

1. Underfloor wet heating system with local control thermostat,
2. Distribution Pipework.
3. Automatic and Thermostatic Controls - including a 24-hour / 7-day programmer for the heating.

Billing

3.3.14 In a similar manner to ordinary utilities accounts, all relevant sub-metering information would be contained on the BEMS and the occupier would have access to their usage and be able to identify areas of high energy usage. Any other standard utility meters would include latest and previous readings, the number of pulses (method of measurement), conversion to volume or units of energy, plant efficiency factors and unit costs.

Additional Considerations

3.3.15 At detailed design stage, distribution routes from the centralised plant to the bedrooms should be rationalised to ensure the lengths of pipework are minimised to reduce system heat losses and enhance heating system efficiencies.

3.3.16 Standing charges – incorporating management charges, cost of maintenance and funding of plant replacement, will also need to be taken into consideration should this strategy be adopted at detailed design stage.

Reduction of Mechanical Cooling and Ventilation Loads

3.3.23 Appropriate analysis will be undertaken at design stage to ensure that the dwellings are adequately provided for by natural ventilation in summer, so that the introduction of comfort cooling at a future date is avoided.

3.3.24 For an airtight building with an air permeability equal to or less than $5.0m^3/m^2.hr$ it would be appropriate for a whole house mechanical ventilation system. However if a TM59 study determines that natural ventilation by opening windows will achieve ventilation targets in summer months then a MVHR whole house system may not be required (subject to other factors).

An MVHR system type supplies and extracts air – routing both air streams through a high efficiency heat exchanger where the heat can be transferred from the exhausted air to the incoming fresh air – as illustrated in **Figure 3.2**, below.

Figure 3.2: MVHR Diagram (Source: www.nfan.co.uk)

3.3.25 SAP Appendix Q listed mechanical ventilation systems have been tested and certified as being more energy efficient and the best performing units will be considered in the SAP calculations, i.e. those with the lowest specific fan power (electrical energy consumption).

Reduction of Domestic Hot Water Loads

3.3.26 The dwellings will be designed to meet a maximum domestic water consumption of 110 l/p/day; this compares with the UK average of 150 l/p/day. The route to achieving these performance levels is detailed further within Section 5 of this report. Therefore, the hot water (DHWS) for dwellings will be reduced and a saving in DHWS energy requirements will therefore be achievable.

3.3.27 The strategy to achieve a daily water consumption of 110l/p/day will include the provision of showers with a flow rate <8l/min.

3.3.28 Domestic hot water heat losses will be minimised throughout via factory applied thermal insulation to cylinders or thermal stores.

Energy Consumption Monitoring

3.3.29 It is anticipated that all major plant equipment will be provided with smart sub-meters incorporating separate data collection and displays.

3.3.30 The device will provide both a simple means for real time observation of energy consumed and cost consumption together with the facility to view / print out historic records for energy consumption for the associated plant.

Artificial Lighting

3.3.31 LED lighting is proposed throughout the development. The efficacy of all main internal lighting systems will incorporate energy efficient lamps (≥80lm/W).

3.3.32 In communal areas within the building, it is proposed that occupancy sensing lighting controls are provided – in order to reduce the usage of electricity by these systems when unoccupied.

3.3.33 Should balcony lighting be opted for – the following criteria shall be met for these external light fittings:

a. Automatic controls which switch luminaires off in response to daylight; and

b. If luminous efficacy is 75 light source lumens or less, automatic controls which switch luminaires off after the area lit becomes unoccupied. If luminous efficacy is greater than 75 light source lumens, manual control will be acceptable.

Home User Guides

3.3.34 It is anticipated that a Home User Guide will be supplied by the Developer to each dwelling. The guide will include recommendations on energy efficient operation of the dwelling, including buying A-rated appliances (if not fitted) and instructions on operation of systems.

Services Strategy: Summary

3.3.35 As outlined earlier in this section it is recommended that a community heating and hot water strategy is adopted via the use of ASHP and other renewable means (solar).

3.3.37 Domestic hot water loads are to be reduced by opting for sanitaryware and fixtures to reduce the dwelling's overall water usage to 110l/p/day. Heat losses will also be minimised via factory applied thermal insulation to cylinders/ thermal stores.

3.3.39 All internal and external lighting systems will be designed to be energy efficient – incorporating LED fittings throughout and occupancy sensing controls in communal circulation areas.

3.4 Assessment of Low and Zero Carbon Technologies

Overview

3.4.1 There are a number of renewable and low carbon energy technologies which may be suitable for multi-residential developments of the scale of the design proposals for East Grinstead. The Low or Zero Carbon (LZC) technologies listed below have been assessed for their applicability to this development:

- Solar Thermal for hot water;
- Photovoltaic arrays (PV);
- Wind Energy;
- Biomass;
- Combined Heat and Power;
- Ground source heat pumps (GSHP); and
- Air source heat pumps (ASHP).

Solar Thermal

3.4.2 Solar thermal is a system for generating hot water from the sun. Typical systems consist of a circulation loop filled with glycol that runs from a solar collector into a hot water storage tank. Within the solar collector, the sun heats the glycol coil – which is then circulated to the hot water tank to effectively act as an immersion heater, heating the water held within the tank. This type of system can act alone as a water heater or as a pre-heat, bringing the mains water up in temperature before it is heated to LTHW temperatures (for heating) or domestic hot water temperatures.

3.4.3 Flat panel collectors can be integrated into the roof and are complementary to photovoltaic systems. The more efficient evacuated tube system has more versatility and orientation is less of an issue, although these arrays are more expensive than flat panel.

3.4.4 Solar thermal technology is well suited to schemes where there is a consistent thermal load – this can make it applicable to domestic developments where there is a domestic hot water base load. Solar thermal systems can be applied to community heating systems – with the circulation loop serving a calorifier in the centralised energy centre.

3.4.5 The available roof area, pitch and orientation are critical. There is available flat roof area on the care home which could be used to site an array – pitch and orientation could therefore be optimised.

3.4.6 Increasing the area of solar thermal panels so that they contribute to the space heating incurs considerable cost with little energy benefit as the panels operate far below maximum efficiency during winter when they would be most required.

3.4.7 Additionally, there are significant issues in summer if an installation is over capacity; this may result in system stagnation, where there is insufficient demand for the energy produced, with separation of the glycol anti-freeze from the circulation medium, with major maintenance implications.

3.4.8 It should be noted that solar thermal's contribution to Building Regulations compliance and reduction of CO_2 emissions is typically quite small, especially when accounting for all energy requirements in modern, well insulated dwellings, which comprise less of thermal loads and more of appliance and other electrical demands. Due to this, this form of technology is not considered to be the most applicable form of renewable technology for the site.

Photovoltaic Arrays

3.4.9 Photovoltaics are semiconductor devices that convert sunlight into direct current (DC) electricity. Groups of panels can be electrically configured into arrays which can be used to power a building's electrical load. A photovoltaic (PV) installation generally consists of panels, inverters, controls and wiring for integration into a building's main electrical distribution system.

3.4.10 A number of PV systems including monocrystalline, polycrystalline and thin film are available, generally made up into arrays using multiple panels or roof slate "substitutes", PV panels can also replace vertical cladding systems.

3.4.11 One of the obvious benefits of a PV installation is that it is purely an electrical system, without the need for pipework distribution systems and storage vessels. The array can be sized to suit sustainability and renewables targets and could conceivably be increased in size at a later date. Additionally, PV systems are very low maintenance and are supplied with guarantees of between 20-25 years, although they should normally produce a high percentage of their original rating for some time afterwards.

3.4.12 PV systems have a relatively low efficiency, and therefore require a large area in order to generate sufficient electricity to have an impact on a building's CO_2 emissions and contribute towards meeting energy performance targets.

3.4.13 Overshadowing may significantly reduce the output of a solar photovoltaic system. In this instance, overshadowing is not deemed to pose a significant issue given the locality of the Application Site and height of the neighbouring buildings.

3.4.14 The orientation and mounting angles of the panels are critical in order to maximise their output. There is available flat roof area on the care home block which could be used to site an array that could be installed at an optimal pitch and orientation. The application of PV may therefore be explored further as the detailed design proposals for the scheme develop, as there may be competing requirements for the roof space.

Wind

3.4.15 Wind turbines have the capability of harnessing the power of the wind in order to produce electricity through the circular motion of the turbine's blades. The electricity produced has zero associated carbon dioxide emissions. This technology therefore qualifies for the FiT initiative.

3.4.16 Wind turbines are normally mounted on columns remote from the main structures on site. However, they could also be building mounted and spaced at intervals to avoid interference with each other. However, the method of support and mounting height would need to be carefully considered to avoid vibration transmission and to maximise output, respectively. Small turbines usually need to be mounted at least twice as high as any local obstructions to work effectively.

3.4.17 Wind turbines may be considered to be an eye-sore. This could potentially cause a planning issue as the inclusion of wind turbines in the development may be viewed to be changing the landscape character. There would also be the risk that the future inhabitants of the Application Site, and the owners of the neighbouring properties, may complain about the visual impact the inclusion of wind turbines on the development would make.

3.4.18 Wind turbines, whether roof or pole mounted, can also be noisy. Their inclusion may cause disturbance to the future residents/ occupants of the site, in addition to potential vibration issues if the turbines are to be roof mounted.

3.4.19 There is also a high capital cost associated with the installation of wind turbines, whether column or roof mounted, so this is unlikely to be the most financially viable solution.

3.4.20 The viability of wind turbines is largely determined by the site location, including average wind speed and the presence of obstructions (which produce undesired turbulence). The NOABL Wind Map has been accessed to obtain data for average wind speed in the area.

3.4.21 The following wind speeds were reported:

- at 10 metres: 4.8m/s;
- at 25 metres: 5.6m/s; and
- at 45 metres: 6.2m/s.

3.4.22 Normally, a wind speed threshold of 5.0m/s is used to determine whether a site may be suitable for wind turbines. Another rule of thumb is that the rotor is located at twice the height of the nearest building. The height from the roof level of the care home block to the ground is over 30m – as the site slopes down to the rear of the site. Therefore, a rotor would need to be mounted at a very high level in order to be exposed to higher wind speeds and minimise the impacts of turbulence.

3.4.23 Due to the potential environmental impact of wind turbines on the Application Site, the turbulence associated with neighbouring buildings and the financial viability of this technology, wind turbines have not been considered in any greater detail.

Biomass

3.4.24 Wood fuelled heating systems burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. Fully automated and user-friendly systems operated and controlled in a similar manner to a gas boiler are available minimising additional maintenance due to the use of a solid fuel. The CO_2 released to the atmosphere during the burning of the material is offset against the CO_2 absorbed during the growth of the fuel, so biomass is considered to be carbon neutral.

3.4.25 One of the major drawbacks of the utilisation of biomass boiler technology is the space requirements for the biomass boilers and the fuel stores. A space allocation for back up boilers would also be necessary. There is limited space available in the proximity of the proposed buildings for the siting of all of these spatial requirements. The total plant area would need to be (approximately) treble that of a standard boiler room containing equivalent gas fired boilers only.

3.4.26 There may also be issues with the reliability of the biomass fuel supply, and delivery vehicles may have access issues.

3.4.27 There are also air quality concerns associated with the burning of biomass fuels. They produce much higher levels of particulate matter than gas or oil fired boiler systems.

3.4.28 The application of biomass heating is likely to contribute to achieving Part L compliance and the reduction of site CO_2 emissions. However, considering space limitations on site, air quality concerns and the unreliability of fuel supply, the use of biomass would be quite unpractical in this instance.

Combined Heat and Power

3.4.29 Combined Heat and Power (CHP) is the simultaneous generation of both electrical power and heat from the same source. Design and sizing of CHP installations is usually driven by the presence of a heating base load; selection based on an electrical base load is likely to result in large quantities of heat being dumped due to there being no use for it.

3.4.30 The adoption of CHP requires significant investment, so it is essential that CHP plant are not sat idle – providing no benefits. CHP units are often selected so that they are operating for 17 hours per day, 11 months a year and therefore it is critical that the plant is operating at maximum efficiency, utilising all the heat available. This can be aided by the presence of a reliable and continuous heating and/ or hot water demand.

3.4.31 In a typical installation, a packaged CHP unit will replace one of the proposed or existing heating boilers. In such a configuration, it is important that the CHP unit is run as the lead boiler to maximise its running hours. Balancing of water flows through the boilers and CHP unit must be carefully addressed, as the latter has a considerably higher hydraulic resistance.

3.4.32 Notably, the carbon savings from CHP are declining as a result of the national grid electricity decarbonising, and there is increasing evidence of adverse air quality impacts. CHP installations are also more economically viable for large scale residential developments versus small-medium scale developments. Due to these reasons, CHP is not proposed for this scheme.

Ground Source Heat Pump

3.4.33 Ground source heat pumps (GSHPs) extract heat from the ground and upgrade it to a more useful temperature. The heat pump consists of a closed loop ground heat exchanger, a heat pump and a distribution system. The ground heat exchanger is a sealed loop of pipe buried either vertically or horizontally in the ground.

3.4.34 Horizontal arrays tend not to feasible on restricted sites, as the length of the loops can include multiples of pipework up to 50m in length. There is not adequate available area for a horizontal array on the Application Site.

3.4.35 Vertical arrays require a series of boreholes which accommodate the pipework and are infilled with a heat conducting grout. Environment Agency licences are not required, because it is a sealed, closed loop system. However, a ground investigation would be required as part of a detailed feasibility study.

3.4.36 Heat pumps use electrical energy, usually grid supplied, to upgrade the energy collected by the ground loop; typically one unit of electricity will be produce 3 to 4 units of useful heat. However, the output temperature is normally limited to between 40 and 45oC, or the unit efficiency will drop considerably. Performance monitoring of GSHP has indicated that the claimed efficiency of GSHP installations are not being achieved in practice, resulting in higher energy consumption and running costs.

3.4.37 GSHP is best suited to applications where the building heat load is small and the heat delivery system is either underfloor heating or air heating with coils sized to suit.

3.4.38 Factors to be considered on this project would be coordination with other buried services (drainage, tanks etc), available free ground area (horizontal loop arrays) and the geology in the area (borehole drilling).

3.4.39 The capital cost of a GSHP installation is also notably higher than an alternative ASHP installation.

3.4.40 Overall, we believe that GSHP is not the most appropriate solution for this type of development, due to the number of boreholes that would be required and the associated capital and running costs.

Air Source Heat Pumps

3.4.41 Air source heat pumps have, in general, been developed using existing air conditioning technology. However, instead of cooling, the refrigerant cycle is reversed to that heating is supplied to the building.

3.4.42 An air source heat pump has much smaller space requirements than a ground source heat pump and has lower associated installation costs. The units tend to be located externally, and therefore consideration needs to be given to their placement and appropriate screening as they may pose a noise issue when operational. Quieter units are available on the market to aid in addressing this constraint.

3.4.43 This form of technology lends itself to adoption on either a centralised or individual application basis. Given the scale of the proposed development – it is envisaged that at detailed design stage a centralised strategy would be considered more appropriate.

3.4.44 The seasonal coefficient of performance of an ASHP may achieve around 3.2 if serving a domestic hot water cylinder, noting that the storage temperature needs to be raised either by elevating the heat pump output or via an immersion heater.

3.4.45 A design challenge with ASHPs is the drop in efficiency of the units at low external ambient temperatures, especially when relatively high flow temperatures are required. One approach to optimising system performance would be to provide supplementary gas fired boiler plant that could be brought online to meet the thermal load of the development when external temperatures fall below a specified threshold. This would likely result in additional capital cost – however, may aid in reducing operational costs of the system.

4.0 Resource Efficiency

4.1 Overview

4.1.1 Resource efficiency means utilising the earth's limited natural resources in a sustainable manner and in turn mitigating negative environmental impacts. The management of waste is increasingly recognised by local authorities as an area that should be addressed in the development of design proposals. Policy DP39 dictates that efforts should be demonstrated to minimise waste and maximise recycling and reuse of materials through both the construction process and future occupation. This section of the report will outline a strategy for a resource efficient development for the East Grinstead scheme.

4.2 Waste Hierarchy

4.2.1 The Waste Hierarchy aids in identifying actions that can improve resource efficiency by prioritising waste management options in line with their relative impact.

Figure 4.1: The Waste Hierarchy (Original Source: BRE website)

4.2.2 The Building Research Establishment (BRE) outline the following steps in identifying a route to resource efficiency:

- Where is waste being produced?
- What is the cause of this and is it avoidable?
- If not avoidable, what opportunities are there for this material to be used internally, or by another business through recycling or refurbishing?
- Can improvements be made to the way waste is currently handled?

4.3 Construction Waste

4.3.1 Construction waste can be minimised during the construction process via the effective and appropriate management of construction site waste.

4.3.2 It is proposed that this is implemented on the Application Site through the production of a SWMP outlining procedures and good practice measures that can be adopted on Site.

4.3.3 It is proposed that a SWMP will be developed for the site in accordance with guidance from:

- DEFRA (Department for Environment, Food and Rural Affairs);
- BRE (Building Research Establishment);
- Envirowise;
- WRAP (Waste & Resources Action Programme); and
- Environmental performance indicators and / or key performance indicators (KPI) from Envirowise or Constructing Excellence.

4.3.4 The SWMP will outline the following:

- Target benchmarks for resource efficiency, i.e. m3 of waste per 100m2 or tonnes of waste per $100m^2$ set in accordance with best practice.
- Procedures and commitments to minimize non-hazardous construction waste at design stage. Specify waste minimisation actions relating to at least 3 waste groups and support them by appropriate monitoring of waste.
- Procedures for minimising hazardous waste.
- Monitoring, measuring and reporting of hazardous and non-hazardous site waste production according to the defined waste groups.
- Procedures to divert waste from landfill through re-use on site, re-use on other sites, reclaim for re-use, return to the supplier via a ‘take-back’ scheme, recovery and recycling using an approved waste management contractor or composting according the defined waste groups.

4.3.5 The defined waste groups referenced in the SWMP will include the following materials as defined in the European Waste Catalogue: bricks, concrete, insulation, packaging, timber, electrical and electronic equipment, canteen / office / ad hoc, asphalt & tar, tiles and ceramics, inert materials, metals, gypsum, plastics, floor coverings, soils, hazardous materials, architectural features and other / mixed materials.

4.3.6 The target benchmarks for resource efficiency will be set using best practice and will be reviewed throughout the construction process.

4.4 Built Fabric Resource Intensity

4.4.1 The resource intensity of the building fabric of the proposed building can be addressed through the specification of 'resource light' construction and consideration of the end of life of the building.

4.4.2 Resource-light construction refers to the appropriate use of construction materials and building techniques to provide the most efficient response to the particular building requirements. 'Eco' materials will be considered for their applicability to the scheme as the architectural design progresses. Eco-materials are less resource intensive than alternative materials, and have a lower level of embodied carbon as a result of their sourcing, production process, delivery requirements etc. Examples of these materials are locally sourced eco-cement, wood, straw, clay etc. The application of these materials in the Proposed Development will be within the Site, economic and thermal performance constraints of the scheme.

4.4.3 The design of the scheme will also consider the end of life of the buildings. The following options will be explored as the scheme develops to maximise the end of life potential:

- The use of prefabricated components may make them easier to dismantle on demolition and therefore more appropriate for re-use.
- Utilising simple connections and avoiding non-standard connection details will allow for efficient deconstruction and will reduce the need for multiple tools.
- Designing with reusable and adaptable materials. Materials such as bricks, steel beams / columns and wood can be easily re-used / repurposed to avoid them going to landfill on demolition.
- Resilience to climate change may extend the lifetime of the dwellings and therefore the economic life of the dwellings.

4.5 Recycling and Composting In-use

4.5.1 Encouraging the occupants of the development to recycle and compost biodegradable waste will aid in reducing the amount of waste being sent to landfill through the lifetime of the Application Site.

4.5.2 It is proposed that the Home User Guide supplied to the future occupants of the dwellings will include a section on Recycling and Waste to provide guidance on good practices.

4.5.3 It is proposed that this section of the Home User Guide will include the following:

- Information about the Local Authority collection scheme;

- Information on the Waste and Resource Action Programme (WRAP) which can offer guidance on recycling and sustainable waste disposal;
- Information on the procedure to follow with items of waste not covered by the standard weekly Local Authority collection scheme – for example fridges / freezers, computer equipment, batteries and other potentially hazardous equipment; and
- Information and location of local recycling facilities and waste tips.

5.0 Water Efficiency

5.1 Overview

5.1.1 With climate change and the consequential predicted reduction in rainfall for Southern England, water use and conservation are issues that should be considered in providing sustainable development. Methods and technologies that may be utilised include:

- Rainwater harvesting;
- Grey water re-use;
- Composting toilets; and
- Waste water treatment via reed beds.

5.1.2 Composting toilets and reed beds are not considered suitable for most large commercial developments, given site space constraints and the general availability of mains sewerage.

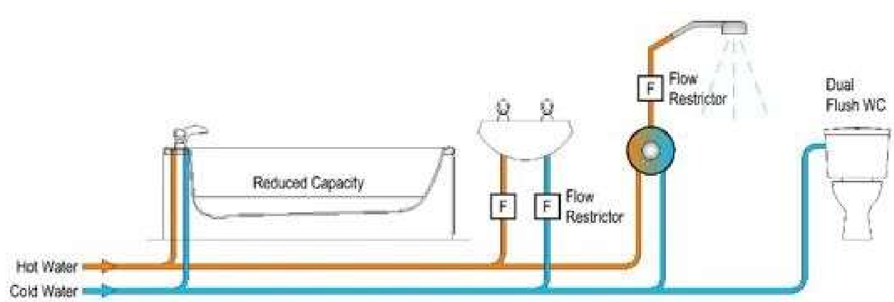
5.2 Application for Water Management Systems

5.4.1 In line with the requirements of **DP42: Water Infrastructure and the Water Environment**, it is proposed for the proposed residential development to achieve a water consumption standard of 110 l/p/day (including external water use).

5.4.2 For residential developments achieving this required reduction in the consumption of potable water can be addressed in several different ways which are recognised within the Water Efficiency Calculator for New Dwellings used for Part G of the Building Regulations. This calculation methodology takes a whole house approach; manufacturer's data for each appliance is inputted and the theoretical amount of water that the average person would use in a house fitted with those appliances is calculated.

5.4.3 One of the most straightforward approaches to reducing water consumption would be to specify water conservation appliances such as dual flush toilets, low flow taps and baths with a low capacity to overflow although this has the potential to conflict with user preferences.

Figure 5.3: Standard Approach to Reducing Water Consumption



5.4.4 An alternative approach is to consider integrating technology that reuses water onsite such as using rainwater or grey water recycling. It is important to note however that in isolation the use of rainwater or grey water recycling is unlikely to reduce water consumption sufficiently to achieve the minimum standards, although in combination with low flow appliances these levels should be achievable, as shown in the table below:

Table 5.1: Summary of Routes to 105 l/p/day Residential Water Consumption (Internal Usage Only)

	Appliance Only	Rainwater	Greywater
Toilet	Dual flush – 4.5 litres capacity full flush, 3 litres capacity half flush	Dual flush – 4.5 litres capacity full flush, 3 litres capacity half flush	Dual flush – 6 litres capacity full flush, 4 litres

6.0 Conclusions

6.1.1 A sustainability strategy for the Application Site has been developed to optimise the use of resources during design, construction and end use.

6.1.2 A sequential approach has been taken for the scheme energy strategy to minimise the potential carbon dioxide (CO_2) emissions from the site, firstly by passive measures and secondly by more active means. We believe that this has been achieved without unduly compromising the external appeal of the buildings and comfort of the occupants. The occupants will receive direct benefits in the provision of energy efficient buildings. Demand for heating and mechanical cooling will be significantly reduced, with a resultant decrease in carbon emissions. In terms of running costs, the residents and users will see the benefit through financial savings.

6.1.3 Detailed calculations regarding the predicted energy demand and carbon dioxide emissions will be undertaken at detailed design development stage. However, based on the preliminary calculation exercises carried out for this report, the Building Regulations energy targets will be met and exceeded through a combination of passive measures, energy efficient fixed services and low and zero carbon (LZC) technologies.

6.1.4 Energy savings and subsequent reduction in CO2 emissions have been targeted through implementation of the following:

- Exceeding good or best practice standards for thermal insulation of opaque and glazed elements;
- Achieving air permeability of 5.0 $m^3/h.m^2$ at 50Pa;
- Enhanced natural daylighting to primary living areas;
- LED lighting throughout with enhanced controls where relevant;
- Air source heat pump technology to meet the thermal loads
- Solar PV

6.1.5 Other areas which will contribute to the water and resource efficiency of the site have been targeted through the implementation of the following:

- Integration of water conservation appliances such as low flow fittings to reach water consumption targets set by the local authority;
- Production of a SWMP to set good practice target waste benchmarks, set procedures for minimising, measuring, monitoring & reporting various waste streams and identifying potential for re-use to divert potential waste from landfill.

- At detailed design stage, opportunities to reduce the resource intensity and maximise end of life potential of the architectural proposals will be explored; and
- Recommendations to residents in the form of Home User Guides covering guidance on waste disposal.

6.1.6 This report has set out a route map for the future design development of the Application Site to meet the sustainability guidelines outlined in the Mid Sussex District Plan.