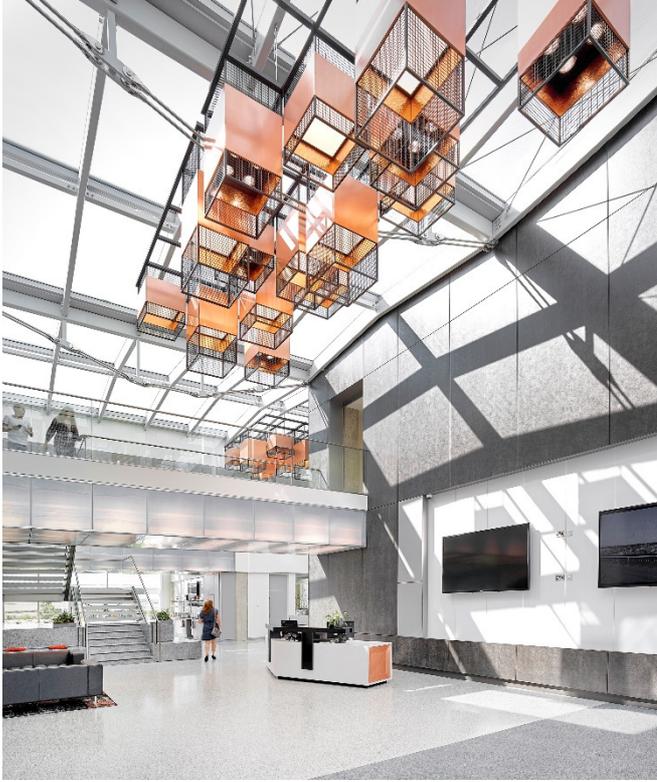


# Land East of Albion Road and North of Copper Lane, Marden

## Energy and Sustainability Statement



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## **1.0 EXECUTIVE SUMMARY**

This Energy and Sustainability Statement has been written to demonstrate the design measures that will be considered for the proposed development at the Land East of Albion Road and North of Copper Lane, Marden, to deliver lower energy, water use, carbon emissions and operational costs than a Building Regulations compliant design.

The energy strategy for the development will be developed by following the nationally recognised energy hierarchy of Be Lean, Be Clean, Be Green and Be Seen. The chosen energy strategy will include both passive and active Be Lean design measures as well as Green LZC technologies. We have reviewed the Maidstone Borough Council Planning Design & Sustainability Plan and have confirmed that, whilst the planning policy is detailed and written to support sustainable design, there are no requirements relating to achieving zero carbon design standards on new construction projects. The policy requires that the buildings achieve reductions in CO<sub>2</sub> emissions of 27% below the Dwelling Emission Rate (DER) against the Target Emission Rate (TER) based on the (outdated) 2013 edition of the Building Regulations. This can be achieved through compliance with updated Part L 2021 regulations.

### **1.1 Proposed Energy Strategy**

- Enhanced building fabric and accredited construction detailing
- Low-E double glazing and suitable G-values
- Passive and active design measures
- 100% low energy LED lighting
- Mechanical ventilation Extract
- Low-temperature flow, Air Source Heat Pumps
- Consideration of a rooftop PV array to dwellings

## 2.0 INTRODUCTION

This Energy and Sustainability Statement has been written by Desco on behalf of Rydon Homes (the Client) to demonstrate the measures incorporated into the design of the Land East of Albion Road and North of Copper Lane which will deliver lower energy and water use, lower carbon emissions and lower operational costs than a Building Regulations Compliant design and be compliant with Sustainable Buildings Policy of Maidstone Borough Council.

The statement compares the predicted actual building energy requirement with a Building Regulations compliant design, outlines passive and active design measures, and assesses the suitability of low and zero carbon (LZC) technologies specific to this site to address the relevant planning policy requirements.

The statement analyses how the development could integrate with its surrounding environment within the context of sustainability to ensure it benefits the surrounding area socially, environmentally and economically.

The proposed site is a residential development, consisting of 117 dwellings, with associated parking, access, open green space, landscaping and other associated works. The proposed development also includes the provision of trail space with associated hard and soft landscape works, new pedestrian and cycle paths and a landscaped attenuation pond area.

The site is located on the edge of Marden, Tonbridge adjacent to other new residential developments to the North of the site.



Figure 1 – Site Plan of the proposed development



Planning Policy	Requirement				
<p>D&amp;S DPD SB1: Sustainable Design and Construction</p>	<p><b>Overarching Requirements</b></p> <p>a) All developments are required to submit a Sustainability Statement to demonstrate how through its design, construction, operation and use it will contribute to the reduction of carbon emissions, increase resilience to the impacts of climate change and improve sustainability;</p> <p>b) Developments should prioritise retention and retrofit of existing buildings or structures to capture the embodied energy associated with the building’s original construction unless it can be demonstrated to be unviable to do so. Development, as defined below, will be required to meet the relevant minimum defined standards until they are superseded by higher national standards;</p> <p>c) Unless it can be demonstrated that doing so is not technically feasible or unviable, development will be required to achieve the minimum standards below:</p> <table border="1" data-bbox="596 949 1434 1178"> <thead> <tr> <th data-bbox="596 949 1016 1070">Development Type Scale of Development</th> <th data-bbox="1016 949 1434 1070">Minimum Standard</th> </tr> </thead> <tbody> <tr> <td data-bbox="596 1070 1016 1178">Residential new build Up to 150 dwellings</td> <td data-bbox="1016 1070 1434 1178">HQM Star*</td> </tr> </tbody> </table> <p>* Developments must achieve a minimum score of 50 credits in the energy category and 12 in the water category. **Developments must achieve an ‘Outstanding’ rating in energy and water categories and demonstrate reasonable endeavours to achieve an ‘Outstanding’ rating overall.</p>	Development Type Scale of Development	Minimum Standard	Residential new build Up to 150 dwellings	HQM Star*
Development Type Scale of Development	Minimum Standard				
Residential new build Up to 150 dwellings	HQM Star*				
	<p><b>Energy Use</b></p> <p>All new developments should follow the energy hierarchy to contribute to reducing carbon emissions: being lean (using less energy), being clean (supplying energy efficiently), being green (using renewable energy) and being seen (monitor, verify and report on energy performance).</p> <p>Demonstrate how opportunities for incorporating decentralised, renewable, and low carbon energy schemes.</p>				
	<p><b>Water Resources and Water Efficiency</b></p> <p>a) All development must minimise building water use and reuse water including:</p> <ul style="list-style-type: none"> <li>•Water efficient fittings and appliances;</li> <li>•Rainwater harvesting;</li> <li>•Greywater recycling; and</li> <li>•Sustainable drainage systems</li> </ul>				



Planning Policy	Requirement
	Recycled water should be used for the operation of buildings and the maintenance of gardens and landscaped areas.

*Table 1 - Summary of local planning policy requirements*

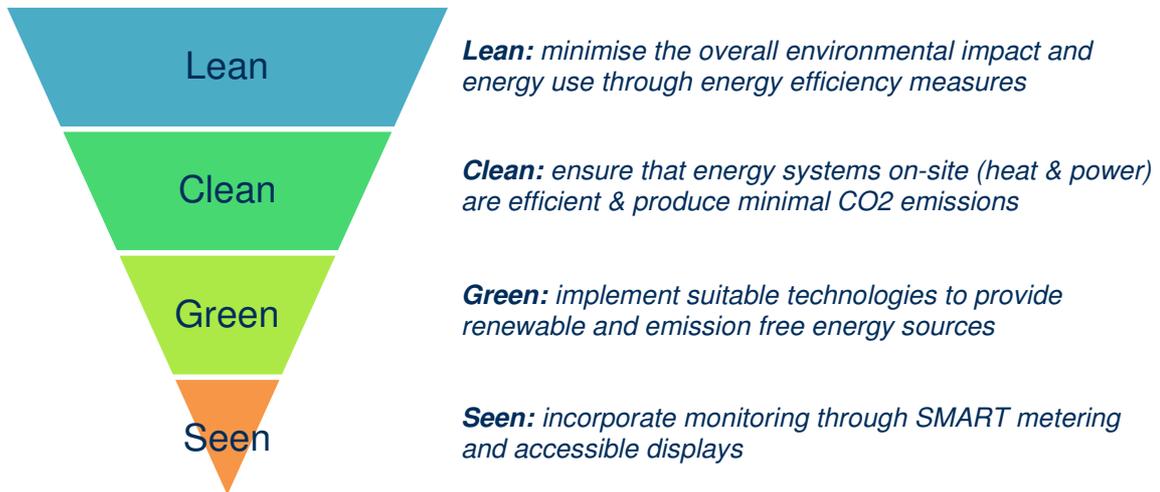
The proposed development will meet the requirements as set out in the Maidstone Borough Council design and sustainability plan, as well as their policy on sustainability. The proposed development will not achieve net-zero carbon but will achieve a betterment in carbon emissions and target a reduction of the total energy demand met by on-site renewables.

The carbon emissions offset will be calculated using SAP 10 carbon factors and methodologies required for building control.

### 3.0 ENERGY & CARBON

#### 3.1 Method

The energy strategy design follows national policy guidance and seeks to be:



CO<sub>2</sub> conversion factors (Table 2) present the CO<sub>2</sub> emissions per kWh of energy generated for different fuel types. The calculations undertaken use the current Building Regulation 2021 conversion factors.

	CO <sub>2</sub> Conversion Factor (kgCO <sub>2</sub> /kWh)	Primary Energy (kWh <sub>PE</sub> /kWh)
Electricity (mains)	0.136	1.501
Electricity (offset)	0.145	1.534
Gas (mains)	0.210	1.126
Heating Oil	0.319	1.18
Biomass	0.029	1.037

Table 2 - CO<sub>2</sub> conversion factors by energy source

The energy modelling for the residential elements will be calculated during the detailed design stage using SAP software in accordance with Building Regulations Part L Volume 1.

Indicative modelling has not yet been performed at this stage in the project timeline. It is proposed that several sample residential units are assessed when they become available. A mixture of unit types and sizes will be selected for this modelling, with the results then extrapolated for the whole site, to give an indication of the site-wide CO<sub>2</sub> emissions for the different energy scenarios. The ‘Green’ scenario presents the proposed energy strategy for the development, with the ‘Seen’ recognising and monitoring the energy, allowing end users to target operational use reductions.

### 3.2 Baseline Emissions

The proposed design is compared against a Notional design standard, which the development must improve upon to achieve Building Regulations Compliance. The notional buildings provide the energy baseline and are the exact size and shape of the proposed developments but are based on notional specifications outlined in Approved Document L volume 1

### 3.3 LEAN – Demand Reduction

The lean scenario will achieve an initial reduction in indicative site-wide CO2 emissions using passive and active design measures.

#### 3.3.1 Passive Design Measures

The buildings have been positioned within the site to maximise the usable space, both for the buildings and the external spaces. All glazed areas of the buildings could benefit from local shading provided by internal curtains or blinds. The buildings’ orientation and design will maximise natural light and positive solar gains, whilst balancing the risk of overheating. Units that have an East-West aspect, allow a good balance of solar gains whilst minimising potential for overheating by having limited glazing directly facing the stronger, southern sun. Solar gains will be further controlled through the specification and performance of the glazing.

The exact construction method is yet to be determined; however, the buildings will be very well insulated through all external elements with a low infiltration rate. The targeted U-values are provided below. The overall buildings should have a medium thermal mass as construction will consist of load-bearing masonry. A medium thermal mass will balance providing high energy efficiency and limiting overheating during the summer months.

Element	Part L1 Limiting U-Values for fabric elements in new builds (W/m <sup>2</sup> K)	Targeted U values of Houses in development (W/m <sup>2</sup> K)
External Walls	0.26	0.15
Heat Loss Floors	0.18	0.13
Roofs	0.16	0.11
Windows and rooflights	1.6	1.4
External Doors	1.6	1.4
Air Tightness @ 50 N/m <sup>2</sup>	8 (m <sup>3</sup> /hr/m <sup>2</sup> )	3 - 5 (m <sup>3</sup> /hr/m <sup>2</sup> )
Thermal Bridge	Default Values	Accredited Construction Details

Table 3 -Target Fabric energy efficiencies (subject to architectural & build-a-ability restrictions)

### 3.3.2 Active Design Measures

The development will utilise 100% low energy/LED lighting. All external lighting will be positioned to avoid excessive light pollution and be supported by PIR/daylight sensor and time controls with a maximum lamp capacity of 150W (equivalent) for essential security lighting.

Controls will be provided to all spaces that allow the controlling and programming of temperatures within the space. The individual houses will be provided with time and temperature zone controls.

In modern buildings that achieve good levels of air tightness, careful consideration needs to be given to the specification of ventilation systems to ensure moisture is removed and ventilation standards are met to ensure a healthy standard of internal air. The residential units could utilise, balanced mechanical ventilation with heat recovery (MVHR) which would give a high levels of air change and improves air quality, whilst minimising heat losses.

Openable windows will also provide purge ventilation when required, the acoustic report (Cass Allen – Noise Impact Assessment – June 2023) determines that *“the external noise is unlikely to exceed the noise limits provided in Approved document O when windows are opened”*. *“Therefore likely to be able to rely solely on open windows” (sic. for Ventilation and overheating purposes)*.

### 3.3.3 Cooling

The cooling hierarchy has been used to ensure that passive building design has been optimised to reduce the cooling load for the development.

Cooling Hierarchy	Potential Design Measures
Minimising internal heat generation through energy efficient design	All primary pipework to be insulated, therefore low system losses. High specification hot water cylinders installed with low heat loss. Low energy lighting throughout.
Reducing the amount of heat entering the building in summer	Low E glass windows and internal blinds could help to minimise solar gain. All walls are to be well insulated.
Use of thermal mass and high ceilings to manage the heat within the building	Thermal mass is anticipated to be medium with some element of exposed mass.
Passive Ventilation	Where possible openable windows are provided. These will be able to be used based on user requirement, but not as part of the ventilation strategy which will help reduce the transmission of noise throughout the site.
Mechanical Ventilation	Balanced Mechanical Ventilation with Heat Recovery is proposed, with automatic summer bypass to reduce overheating potential.

Table 4 - Design measures following the cooling hierarchy

For the residential units, it is the intention to have no active cooling with each dwelling to be assessed against Building Regulations AD Part O – Overheating to demonstrate compliance. Whilst no active cooling is proposed it may be necessary to consider this for the most acoustically sensitive plots

### **3.4 CLEAN – Heating Infrastructure**

Connection of the development to a district heating system is not currently feasible, therefore not investigated further. The location of the site is not located near any existing heat network areas and there are also currently no proposals for a network nearby. Therefore, there is no further improvement of 'Clean' measures above the 'Lean' scenario.

### **3.5 GREEN – Low Carbon and Renewable Energy**

The addition of 'Green' technologies can provide a significant reduction in CO2 emissions and enable the development to meet the carbon reduction requirements and minimise the energy demand reductions for the site being met by renewable/LZC technologies.

#### **3.5.1 Air Source Heat Pumps**

The use of heat pumps is often the most direct method of reducing CO2 emissions for a development with minimal change in aesthetics or the way in which a building is designed. Often a 'straight swap' alternative for a gas system boiler, the use of heat pumps has the potential to provide significant offset in CO2 emissions.

All heat pump systems consume electricity to operate, however due to the Coefficient of Performance (CoP) of the system, the ratio of heat energy inputted is significantly less than the output of heat consumed. Generally, a CoP of 2 to 4 can be achieved, meaning 2 or 4 units of thermal energy are produced for each unit of electricity consumed.

Heat pumps operate best at low grade heat (up to ~55°C), and therefore HP systems alone can be inefficient in providing hot water, as this requires additional electrical input (immersion or increased compressor use). This can be supplemented with a solar PV diverter to utilise the immersion heating with electricity generated from PV.

Air-to-water heat pumps are proposed for the residential units providing space heating and hot water. High efficiency hot water cylinders would also be required – with immersion top-up – to store and heat hot water as needed.

ASHPs tend to generate some noise and therefore the location/space in which the pump is positioned would need to be adequately sound insulated or appropriately located to prevent disturbances to the occupants of these and/or neighbouring buildings.

#### **3.5.2 Photovoltaics**

Photovoltaic (PV) panels convert energy from daylight into direct (DC) electrical current. These are

generally roof mounted and provide electrical generation which can either be utilised directly on-site (or nearby), stored in batteries, or exported back to the National Grid.

The installation of PV could be used to offset electrical demand within each dwelling. A PV array could be connected into the electrical system via an inverter or series of inverters, depending on system size and setup.

Noise will not be an issue – A PV system does not feature moving parts and is silent during operation.

The development features sloped roofs, which the PV panels could be installed to / or flush with on each dwelling.

### 3.5.3 Energy Storage

Whilst the development could include battery energy storage, it is believed that this will be additional option for the occupants who will live in the dwellings to pursue once occupied.

### 3.6 SEEN – In-use monitoring

It is recommended that the development will be supplied with Smart Meters (where available from the utility supplier) with associated internal energy displays. This will further improve energy efficiency by allowing building residents to observe their energy use in 'real time' and manage it more effectively.

### 3.7 Conclusions

The proposed development will deliver passive and active energy demand reduction measures along with low and zero carbon technologies in order to reduce energy demand and associated CO2 emissions resulting from the development's operation.

The calculations to demonstrate these savings will be undertaken once fixed dwelling floor plans are available from the architectural team. This will prove that the development could successfully achieve the carbon emissions, in-line with local planning policies.

In delivering the energy strategy, the proposed development provides:

- Enhanced building fabric and accredited construction detailing
- Low-E double glazing and suitable G-values
- Passive and active design measures
- 100% low energy LED lighting
- Mechanical ventilation with heat recovery (MVHR) considered
- Low-temperature flow, Air Source Heat Pumps
- Consideration of a rooftop PV array to each dwelling

#### 4.0 SUSTAINABILITY

The World Commission on Environment and Development (WCED) report: Our Common Future, describes Sustainable Development as development that:

*“meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

#### 4.1 Pollution

##### Air

Poor specification of resources as part of the construction process can have a major environmental impact both in terms of the resources’ manufacturing process, but also in terms of transport of the resources to site. Therefore, it is recommended that emissions related to building specifications and their transportation to the construction site are limited as much as practicable.

As standard practice, all insulation on the site will target an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of less than 5, further minimising the development’s effect on global Climate Change.

The ASHP systems would emit no onsite NOx emissions but will consume grid electricity (when not consuming electricity generated by the PV). As the NOx emissions resulting from the production of electricity decreases at the national scale, the resulting theoretical emissions from the development will do also. Furthermore, the use of PV panels will decrease the import of electricity from the national grid and replace it with PV electricity which produces no emissions during operation.

The development is located within a high NOx emissions area as defined by the UK NOx emissions map, see Figure 2.

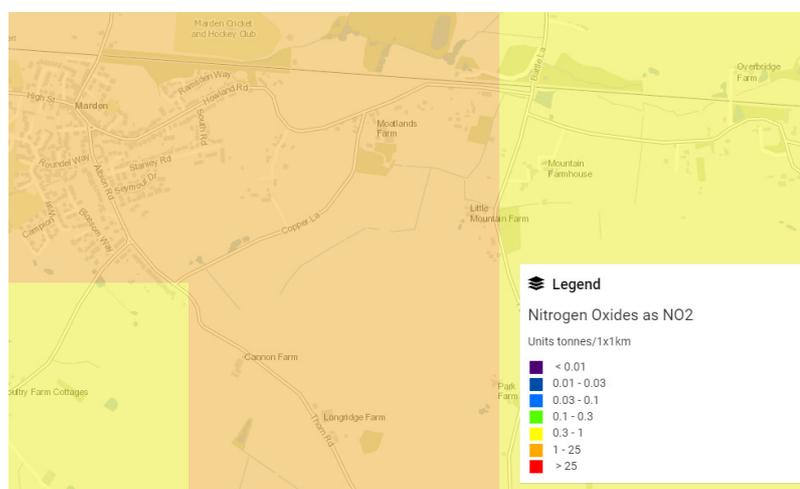


Figure 2 - UK Air Pollution Map showing pollution from Nitrogen Oxides as NO2  
(<https://naei.beis.gov.uk/emissionsapp/>)

The proposed development will therefore have mitigation measures in place to reduce the impact on local air quality.

To mitigate the impact on local air quality, the heating strategy for the development will utilise an all-electric scheme via the specification of ASHPs, emitting no on-site NOx emissions. Electric vehicle charging and cycle parking is also being provided for the scheme, which encourages the use of vehicles that emit no NOx or PM emissions.

### **Noise**

The proposed development will have mitigation measures in place to ensure any noise pollution generated from the site will be limited.

Firstly, the buildings of the proposed development will be well insulated with excellent air-tightness which should limit any noise from inside the buildings.

The positioning of any equipment for the dwellings will be carefully considered to avoid nuisance to the surrounding new/existing properties. This will include the positioning of ASHP external condenser units which will need to be placed considerately to avoid any inadvertent noise intrusion into habitable spaces.

The provision of electric vehicle charging, and cycle parking also encourages the use of electric cars and bicycles, which are quiet in operation compared to traditional cars with petrol/diesel engines.

### **Light**

The design and layout of the site for practical use will be considered while trying to maximise internal daylight levels. All spaces occupied by residents have glazing to provide natural daylight, and light-coloured curtains or roller blinds could be used to enable glare control and privacy.

Light pollution will be minimised where possible through the careful specification and positioning of external lighting around the site, ensuring minimal light pollution. Special attention will be given to security lighting (where fitted) to ensure it is appropriately focussed and controlled.

All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight/timer controlled. Any external signage, where installed and lit, will be installed and controlled in-line with best practice.

## **4.2 Flood Risk**

The selected site is at very low risk of flooding from rivers and seas (Figure 3) and low risk of flooding from surface water. As a result, no flood risk mitigation measures are required for the development.

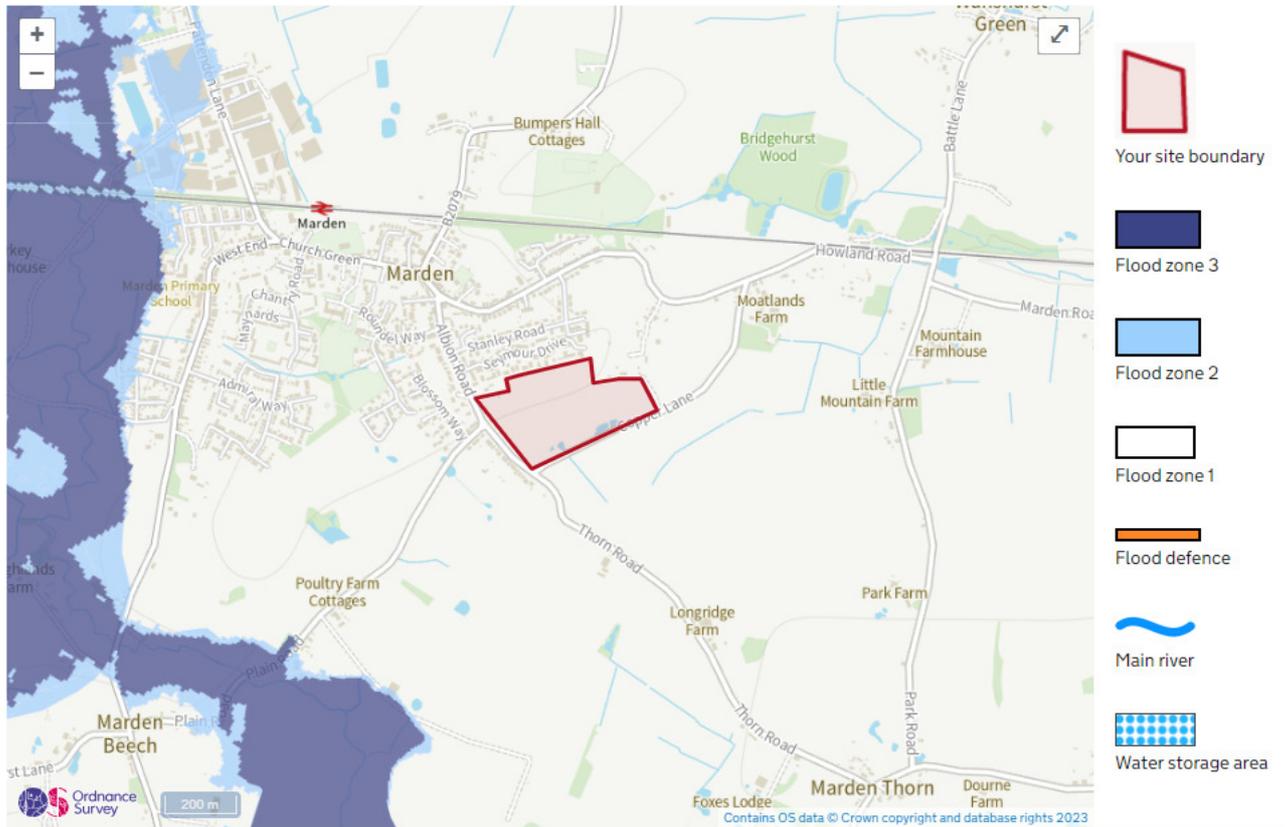


Figure 3 - Flood map showing risk of flooding from rivers or the sea (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>)

### 4.3 Transport

#### Public Transport

The proposed development is less than 200m from the nearest bus stop, with a regular service and less than a mile to a railway station connecting to central London in less than an hour.

The development is approximately a 30 minute drive to the nearest motorway (M20).

#### Electric Vehicle Charging

In-line with Local Planning Policy requirements (D&S DPD S6: Off-Street Parking), appropriate provision for electric vehicle charging, including charge points and laying of cables, should be made on both residential and non-residential developments where parking is provided.

### 4.4 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The proposed development currently consists of greenspace, including rough grassland and some boundary trees.

The proposed development will aim to conserve, enhance and maintain existing environmental quality

in-line with the Maidstone Borough Council Planning Design & Sustainability Plan. This will be achieved by the following:

- Retention of trees and planting of new trees;
- Retention of existing hedgerow and creation of new hedgerows;
- Retention of existing grassland / re-planting with native wildflower and grassland seed mix; and

For more details of the Proposed Development's impact on site biodiversity, see the Ecology Survey and Risk Assessments Report for the scheme.

#### 4.5 Resource Efficiency

##### Construction Phase Waste Management

The development will aim to minimise the waste produced from the site during the construction phase.

The construction waste generated as part of the development will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

Reusing materials on site will reduce the embodied energy of the development through the reuse of the energy that exists in that material. Transportation of new material to the site will be reduced, reducing the CO2 emissions associated with transportation and material manufacture.

Where waste will need to be disposed of, this will be done in-line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste recycling contractor. Nominal construction waste should be sent to landfill or for incineration unless this is unavoidable.

Appropriate targets and benchmarks will be set in-line with best practice requirements.

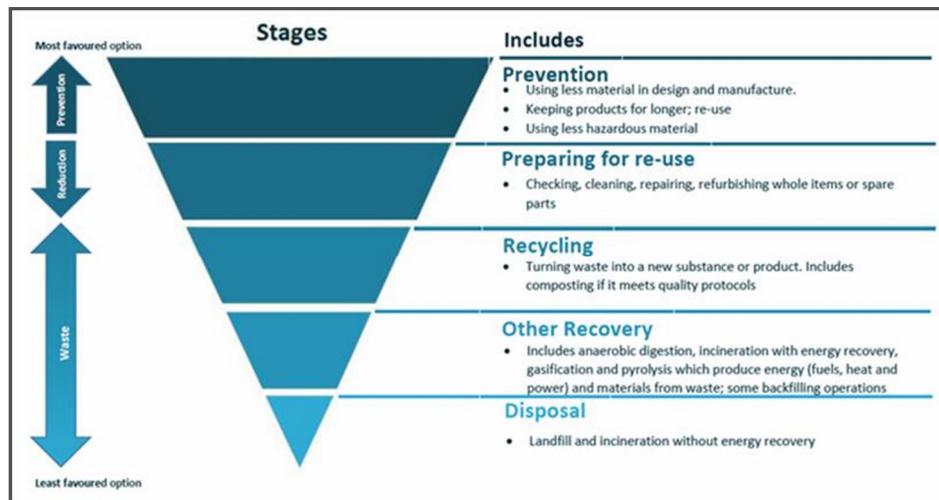


Figure 5 - The waste hierarchy

## Resource Management

Policies will be put in place for management of site impacts such as air and water pollution in-line with industry best practice. Monitoring and reporting on carbon emissions and water use from site related activities will take place in-line with national benchmarks.

The overall management of the construction waste will be monitored through the Considerate Constructors Scheme as part of best practice site management.

## Materials

The development is to use high quality, low impact materials in order to minimise the overall impact on the environment as far as possible.

The form of construction is anticipated to be of traditional load bearing masonry construction.

All timber and timber-based products used on-site will be legally sourced with appropriate Chain of Custody certification to confirm this.

As standard industry best-practice, all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the development's effect on global Climate Change.

## Water

Water is a vital resource and efficient usage should be encouraged in all new buildings. The development aims to significantly reduce mains water use through a combination of efficiency measures, including the use of fittings with a low capacity or flow restrictors to reduce water use.

The following specification below gives an example of the requirements needed to achieve low water usage in residential properties:

- WCs: 4/2.6 litre effective flush volume
- Hand wash basin taps: 4.50 litres/min
- Kitchen taps: 5.00 litres/min
- Showers: 6.00 litres/min
- Baths: 140 litres
- Domestic sized dishwashers (if installed) 12.00 litres/cycle
- Domestic sized washing machines (if installed) 40.00 litres/use

#### 4.6 Sustainability Conclusions

Through a considered approach to sustainability, the proposed development is aiming to deliver a highly sustainable residential development which is within an appropriate area for this use and at an appropriate scale. The development will make maximum use of the application site, providing a mixture of individual private and affordable homes, in-line with the adopted Maidstone Borough Council Planning Design & Sustainability Plan.

The adoption of a sustainable approach to the design and construction has allowed the Proposed development to provide:

- Development which is suitable for the site with access to public transport and services
- Low internal water use
- Low impact development with minimal noise, light and air pollution
- Consideration of biodiversity on the site within the landscaping design
- Comprehensive site waste management during construction and operation.



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## **Appendix B - Unfeasible Low and Zero Carbon Technologies**

### **Biomass Boiler**

Biomass boilers generate heat from the burning of renewable or 'waste' fuels. They require a regular feed of fuel and regular heat demand to operate efficiently. A flue taller than the surrounding buildings must be incorporated into the design to minimise air pollution impacts at ground level from particulate emissions.

The use of a biomass boiler system to supply space heating and DHW has been deemed unsuitable due to the high level of particulates emitted from their use. The use of such a system would negatively impact the air quality of the surrounding area.

### **Wind Power**

Wind power is a developed and productive method of renewable energy generation, however the main limiting factor to its implementation is opposition at a local public and local government level.

To generate a meaningful amount of electricity, large-scale turbines are required which have noise and the visual impacts for the local area. The use of wind turbines has therefore been deemed unfeasible.

### **Solar Water Heating**

Solar Water Heating (SWH) can be used to offset a proportion of the domestic hot water demand (DHW) within a building.

However, due to the low DHW demand at the development it is likely to provide minimal CO<sub>2</sub> emissions reductions, while taking up roof-space, better utilised for photovoltaics.

### **Ground Source Heat Pump**

As with ASHP, ground source heat pump (GSHP) systems consume electricity in order to operate.

Beyond 1m below ground level, an average temperature of 15°C is maintained throughout the year. Because of the ground's high thermal mass, it stores heat from the sun during the summer. GSHP can transfer this heat from the ground into a building to provide space heating by a similar process to an air source system.

It is recommended that the ground conditions of the site be assessed in detail (through consultation with a GSHP manufacturer and/or purchase of a Ground Conditions report from the British Geological Survey) before a system is installed – the primary heat source that GSHP relies on is solar derived, and shading can affect the 're-charge' of the ground within which the ground loop is laid. This can affect year-on-year CoPs, steadily increasing running costs and reducing CO<sub>2</sub> offset.

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Although GSHP can provide a greater efficiency performance than ASHP, it comes at a significantly higher capital cost and risk , due to the extensive groundworks needed to install either 'slinky' ground loops or 50-100m deep boreholes.

Because of the significantly higher capital costs of installing a GSHP system, it is not considered to be financially viable for the scheme. Alternative additional technologies will be considered for inclusion within the energy strategy at the site.