



SUSTAINABILITY STATEMENT

A PROPOSED RESIDENTIAL DEVELOPMENT ON THE SITE OF:

THE GARDENERS ARMS, SURLEY ROW, READING, RG4 8NA

Compiled by Eco Energy and Environmental Ltd.

43 Ousebank Way, Stony Stratford, Buckinghamshire MK11 1LA

Telephone: 01908 261858

Mobile: 07988 847433

E-mail: cliffbull@ecoenergyenvironmental.co.uk

Web: www.ecoenergyenvironmental.co.uk

Author: Clifford Bull –

Licensed SAP Assessor Number L634-0001 and BRE Assessor Number CEL-CB07

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The following documents and sources have been used in the compilation of this Statement:

- Proposed Development Planning Drawings:
 - Location Plan
 - Site Layout
 - Floor Plans
 - Elevations
 - Landscaping Plan
- Caldecotte Group Planning, Design and Access Statement
- Proposed Site Drainage Strategy and Flood Risk Assessment v.2.0 (Nov. 2018)
- Preliminary Ecological Appraisal Survey Report (Oct. 2018)
- Reading Borough Council Criteria for Planning Applications
- RBC Revised Sustainable Design and Construction SPD (July 2011)
- RBC Local Development Framework – Core Strategy (Jan. 2008 and Jan. 2015)
- RBC Local Development Framework – Sites and Detailed Policies (Jan. 2008 and Jan. 2015)
- RBC Revised Parking Standards and Design SPD (October 2011)
- The National Planning Policy Framework

1 The Planning Context

Planning has changed in recent years. It is no longer solely concerned with handling planning applications, and instead has a more proactive role in shaping the areas in which we live and should be heavily linked to an authority's Sustainable Community Strategy. There are many consequences in terms of how this approach affects decisions and planning policy documents.

One of the key changes is the emergence of the concept of 'development management' as opposed to 'development control'. Under this approach, the process of determining planning applications is intended to be more than a reactive decision on a proposal. Instead, a Council (or decision-making body) is a major partner in delivering a sustainable development, and this involves a greater emphasis on pre-application discussions and negotiation throughout the process.

The National Planning Policy Framework (NPPF) of March 2012 (updated July 2018) sets out the Government's planning policies for England and how these are expected to be applied. The purpose of the planning system is to contribute to the achievement of sustainable development and the policies in the NPPF constitute the Government's view of what sustainable development in England means in practice for the planning system.

There are three dimensions to sustainable development: economic, social and environmental. Under the environmental dimension the planning system is expected to contribute to protecting and enhancing our natural, built and historic environment; and, as part of this, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

The NPPF requires Local Planning Authorities to support the move to a low carbon future. Reading BC has incorporated, into its planning application criteria, the requirement that ***sustainable development techniques*** should be included in all new building development.

The Government has placed the presumption in favour of sustainable development at the heart

of its approach to planning, and this is articulated in the National Planning Policy Framework. It was considered necessary to include a policy on this presumption within the local development plan, which is included in the Council's Sites and Detailed Policies Document as follows:

Policy SD1: Presumption in Favour of Sustainable Development

A positive approach to considering development proposals will be taken that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. Where appropriate, the Council will work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.

Planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise. Planning applications that accord with the policies in the development plan (including, where relevant, with policies in neighbourhood plans) will be approved without delay, unless material considerations indicate otherwise. Proposed development that conflicts with the development plan will be refused, unless other material considerations indicate otherwise. Where there are

no policies relevant to the application or relevant policies are out of date at the time of making the decision then permission will be granted unless material considerations indicate otherwise - taking into account whether:

- *Any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies in the National Planning Policy Framework taken as a whole; or*
- *Specific policies in that Framework indicate that development should be restricted.*

This policy aims to ensure that decisions are taken in line with the presumption in favour of sustainable development as set out in the National Planning Policy Framework (NPPF). In doing

so, it helps to achieve all of the core objectives of the Core Strategy.

The purpose of this Sustainability Statement is to address Reading Borough Council's Policies in respect to Climate Change and Sustainability in construction.

2 Reading Borough Council Planning Requirements

Reading Borough Council guidance for planning applications, contained in the Local Development Framework documents (Core Strategy and Sites and Detailed Policies) and the Sustainable Design and Construction Supplementary Planning Document, details the requirement for a Sustainability Statement based on a Sustainable Design and Construction Checklist. In the case of domestic development proposals, the Checklist is based on the Code for Sustainable Homes (CfSH) standards (although the Checklist is not a complete repetition of the Code). Whereas a CfSH assessment and certification is no longer a Planning Condition, use of the Checklist is intended to help provide pointers as to the type of considerations that the designers of the development should be taking into account in order to achieve the required standards in Sustainable Design and Construction. Achieving and illustrating these standards should meet the requirements of policies CS1 and CS2 of the Council's Core Strategy.

Policy CS1: Sustainable Construction and Design

Proposals for new development, including the construction of new buildings and the redevelopment and refurbishment of existing building stock, will be acceptable where the design of buildings and site layouts use energy, water, minerals, materials and other natural resources appropriately, efficiently and with care and take account of the effects of climate change.

To meet these requirements:

- All new housing is required to meet the equivalent CfSH standard of Very Good;
- All new developments maximise the use of energy efficiency and energy conservation measures in their design, layout and orientation to reduce overall energy demand;
- All developments reduce mains water use and demonstrate that water conservation measures are incorporated so that predicted per capita consumption does not exceed the appropriate levels set out in the Code for Sustainable Homes;
- Developments incorporate sustainable urban drainage facilities and techniques as part of the layout of a development as appropriate and as advised by the Environment Agency, including minimising the size of impermeable areas so that peak run-off and annual water

run-off is reduced where possible and in any case is no greater than the original conditions of the site. Particular care will be needed in areas of flood risk where different solutions may be required.

Policy CS2: Waste Minimisation

Development should demonstrate measures to minimise the generation of waste in the construction, use and life of buildings and promote more sustainable approaches to waste management, including the reuse and recycling of construction waste and the promotion of layouts and designs that provide adequate space to facilitate waste storage, reuse, recycling and composting.

The Sustainability Statement should also include a section demonstrating how the application has met the requirements of policy DM1 of the Sites and Detailed Policies document.

Policy DM1: Adaptation to Climate Change

Policy DM1 requires that all developments should seek to demonstrate how they have been designed to incorporate measures to adapt to climate change and sets out that:

- New buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing exposure to wind and other elements;
- Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, etc.;
- Use of trees and other planting, where appropriate as part of a landscape scheme, to provide shading of amenity areas, buildings and streets, designed with plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions;
- All development shall minimise the impact of surface water runoff from the development in the design of the drainage system. To demonstrate the extent to which the proposal has taken account of the need to minimise the consumption of energy and resources (including water) and maximise the use of sustainable or renewable resources.

3 The Proposed Development

The proposal is the construction of 8 new dwellings, including associated private access drives and parking (including a car “barn” for dwellings 7 and 8), a soft landscaping scheme and the planting of numerous new trees. The proposed dwelling configurations are as follows:

Dwelling	Floors	Bedrooms	GIFA (sq.m.)	Garden (sq.m.)
1 - Detached House with part attached Garage	Two Storey	4	125.40	171.70
2 - Detached House with part attached Garage	Two Storey	4	125.40	104.60
3 - End Terrace House with Undercroft Parking	Two Storey	3	95.00	432.90
4 - Mid Terrace House with Undercroft Parking	Two Storey	3	95.00	127.40
5 - Mid Terrace House with Undercroft Parking	Two Storey	3	95.00	127.80
6 - End Terrace House with Undercroft Parking	Two Storey	3	95.00	215.10
7 - Semi-Detached House with Car Barn Parking	Two Storey	2	79.60	48.90
8 - Semi-Detached House with Car Barn Parking	Two Storey	2	79.60	87.10

The development site, at Surley Row, Reading, is a previously developed site situated within a Conservation Area, which comprises the Gardeners Arms public house, a bungalow, a skittles alley, a shed, and associated garden and parking areas. There are also a static and a mobile caravan on the site. An existing storage barn situated at the extreme southern boundary of the site within the area allocated to dwellings 7 and 8, will be retained and provided as garden sheds for these two dwellings.

There is a Grade II Listed cottage at Number 46, Surley Row, adjoining the site boundary immediately to the south. This listed building will not be affected or harmed by the proposed development.

The proposal is to demolish the existing built structures (except for the storage barn), clear the site, and to construct the new development on the cleared site.

4 The Residential Development Sustainable Design Checklist

The Sustainable Design Checklist follows, in the format laid out in the RBC Sustainable Design and Construction SPD, each question being answered according to the proposed development design.

Energy/CO₂

Aim: To conserve energy, in particular carbon dioxide emissions and maximise the use of energy efficiency techniques.

- 1. How has the development been designed to optimise the use of the energy from the sun and limit heat losses?*
- 2. How has the development been designed to optimise natural daylighting, energy efficient lighting, external lighting and natural ventilation?*
- 3. How will the design of the building make efficient use of energy? (e.g. use of thermally massive materials, levels of insulation, energy efficient white goods and use of green/brown roofs etc).*
- 4. Has local energy generation from renewables been considered as part of the scheme?*
- 5. How have cycle storage facilities been considered?*

Response:

Questions 1 and 3

To assist in illustrating compliance with the aims of conserving energy, reducing energy demand and thereby reducing carbon dioxide emissions, the dwelling designs have been modelled using Government approved (and CfSH compliant) SAP software. The results, which relate to the main issues contained in Questions 1 and 3, would have been used to award credits for the Code for Sustainable Home Issues ENE 1 – Dwelling Emission Rate and ENE 2 – Fabric Energy Efficiency.

In order to minimise carbon dioxide emissions, the first, basic, step of the “Energy Hierarchy” involves the incorporation of energy efficient design techniques to ensure the development is designed to be as energy efficient as is feasible and viable. The techniques to be considered include an integrated, site-wide approach to natural systems (i.e. solar gain, daylight), thermal performance, ventilation and heating and hot water, including control systems.

Building designers are encouraged to first, design the fabric of a building to be efficient in reducing the *need* for energy and second, to include efficient building services which produce *less* energy. The benefits of this separation was recognised in the Code for Sustainable Homes and the Building Regulations.

The ENE 1 and 2 CfSH Issues assess the efficiency of the building services (ENE 1) and the building fabric (ENE 2) which, in Criterion 1 of the Building Regulations, require that *predicted carbon dioxide emissions from the proposed dwelling does not exceed the target*. Under the Regulations, there are two targets to meet; as well as the Target Emission Rate (TER) the dwelling needs to meet a Target Fabric Energy Efficiency (TFEE). The TER and TFEE are both based upon the performance of a 'notional' dwelling. This 'notional' dwelling has a fixed specification for U-values, heating, etc., that provides a 'prescription' for one way of meeting the targets.

The TER has long been a target in the Regulations, but the Fabric Energy Efficiency Standard (FEES) was first developed specifically in response to developing a strategy for the 2016 zero carbon homes target (as it was at that time) by a Task Group led by the Zero Carbon Hub in 2009. The FEE is measured in kWh/m²/yr, and is not influenced by building services, for example heating and hot water system, fixed lighting or ventilation strategy. It is a performance standard, meaning that different combinations of fabric specification can be used to reach a particular level. This allows flexibility when developing a fabric specification.

The Fabric Energy Efficiency methodology reduces the space heating and cooling demand (i.e. requirement) of a dwelling, thereby reducing the amount of energy needed to produce the required heating and hot water. Allied to the installation of efficient means of providing the required energy, this reduces carbon dioxide emissions.

Fabric Energy Efficiency

The Dwelling FEE achieved (the DFEE) is affected by the following features, which the Design Team has aimed to improve above Building Regulations targets:

- **Building Fabric U-values**

A high level of insulation has historically been regarded as the most effective component of a high performance design; improving fabric U-values (the rate of heat loss through an element of the fabric) is, therefore, the first consideration (but not the only consideration) in the improvement of fabric thermal performance. The specification for this development will include high levels of insulation and thermally efficient materials, leading to good fabric U-values.

- **Windows and Doors**

Windows and "French" doors will be Jeld-Wen Elegance timber double glazed with soft low-e coating, a minimum 16mm gap between the glass panes, filled with Argon gas and the frames will be draught proofed. These windows have whole unit U-values of 1.3 W/m²K.

Main and secondary entrance doors will be Jeld-Wen Insulux timber faced composite, insulated, with U-values of 1.2 W/m²K.

Windows and doors will have little or no over-shading, improving solar gains.

- **Thermal bridging**

A thermal bridge, also referred to as a cold bridge, occurs where reduced insulation or gaps in the insulation cause a significantly greater rate of heat loss than there is through adjoining insulated areas. This usually occurs either because a structural element passes through an insulation layer, or because the insulation layer is thinner where two construction elements meet. The most familiar type of thermal bridge is caused in a cavity wall by steel wall ties, but there are other causes where studworks, joists and rafters separate layers of insulation, and mortar joints in blockwork. These are referred to as repeating thermal bridges and are taken account of in the U-value calculations.

In recent years increasing importance has been given to the effects of non-repeating thermal bridges, and these now play a very important part in the energy/heat loss calculations in SAP. Examples of these are corners (where walls meet), junctions between elements (e.g. where walls meet floors), around openings and at some features such as balconies, where supports may pass through the insulation. These bridges are not included in the elemental U-value calculations but are considered separately in the form of linear thermal transmittance (psi) values. The psi value represents the extra heat flow (i.e. heat loss) through the bridge over and above that through the adjoining thermal element.

The effect of these bridges can be reduced with the use of approved construction details. The Energy Savings Trust's Enhanced Construction Details (ECDs), Accredited Construction Details (ACDs) and various other approved details (e.g. Aircrete Constructive Details, Scottish Accredited Construction details, etc.) are examples of useful design approaches. The design of this development will include the use of approved details.

- **Air permeability**

Airtightness forms a significant part of overall energy loss and is crucial to achieving good fabric performance. Poor airtightness causes increased carbon emissions by increasing the heating load, mainly through:

- a. Infiltration – leakage of cool external air into the building (draughts)
- b. Exfiltration – leakage of warmed internal air, which is replaced by cool external air

Both of these mechanisms occur via air leakage through gaps and cracks in the building fabric and happen continuously. In order to minimise air leakage it is fundamental to incorporate an airtightness strategy at the design stage – remedial works after construction are expensive, time consuming and may have a very limited effect on airtightness. The use of approved construction details will augment good design as the details incorporate airtight barriers.

Whilst designing for airtightness is important, it is also vital to ensure that site procedures are clearly explained to site staff and managers, and that these procedures are followed carefully. Airtightness testing is undertaken near to completion and this will demonstrate any leakage in excess of the design rates. The dwellings are designed for an airtightness level of no more than $5\text{m}^3/\text{m}^2/\text{h}$ @ 50Pa (maximum allowable is $10\text{m}^3/\text{m}^2/\text{h}$ @ 50Pa).

Thermal Mass

Maximising fabric energy efficiency is at the heart of government policy on delivering low and zero carbon dwellings and the potential of using a building's thermal mass

to reduce its ongoing heating and cooling energy requirements is being increasingly recognised.

Thermal mass, in the most general sense, describes the ability of a material to store heat. For a construction material to provide a useful level of thermal mass it must have a high specific heat storage capacity, be of high density and have moderate thermal conductivity so that heat conduction is roughly in synchronisation with the daily heat flow in and out of the building.

During warm weather, much of the heat gain in heavyweight buildings is absorbed by the thermal mass in the floors and walls thereby reducing the risk of overheating. This heat is then removed by allowing cool night-time air to ventilate the building. This daily heating and cooling of the thermal mass works relatively well in the UK as the air temperature at night is typically 10 degrees less than peak daytime temperatures during the summer.

For the winter, thermal mass works best when it is used as part of a passive solar design strategy (PSD). This approach seeks to maximise the benefit of solar gain in the winter, using thermal mass to absorb gains from southerly facing windows, as well as internal heat gains from electrical equipment, cooking and lighting. These gains are slowly released overnight as the temperature drops so helping to keep the building warm and reducing the need for supplementary heating.

Exploiting thermal mass so that it helps to reduce heating requirements in the winter and cooling requirements in the summer needs to be considered at the outset of the design process when the building's form, fabric and orientation requirements are being determined.

In SAP, the thermal mass within the calculations is represented by the Thermal Mass Parameter (TMP). The TMP is calculated by multiplying the internal surface areas by their heat capacity (k, or kappa value) and dividing the result by the building floor area. *Generally*, but not necessarily, a low TMP (e.g. timber frame) reduces emissions at low or moderate insulation levels and a higher TMP (e.g. concrete, dense blockwork) reduces emissions at high insulation levels. The latter construction type would be referred to as a “heavyweight” building, which is usually more suited to commercial construction types than to residential types. For this development the designers were looking for a high level of insulation and lighter weight wall and floor materials with good resistance to heat loss.

The design for the proposed development has aimed at producing a medium TMP which, in the SAP modelling of the form, fabric and orientation, results in optimum emission rates. The built form is:

- Ground floors are concrete beam and light block
- Upper floors are timber
- External walls are brick and aerated block cavity with highly efficient insulation
- Party walls are fully filled dense block cavity
- Partitions for the lower storey are block and timber stud partitions for the upper storey
- Ceilings/roofs are timber

Efficient Services

Having taken a “Fabric First” approach to the energy efficiency of the dwellings, the Design team next considered the services (heating, hot water, lighting). The following are proposed:

- Each dwelling will be fitted with an efficient condensing boiler for the Primary Heating provision, with emission reducing controls such as time and temperature zone control, delayed-start thermostats and boiler interlocks. It is likely that the boilers will be regular units, providing both space heating and hot water tanks. However, for the smaller dwelling types it is possible that combi boilers will be specified.
- The two largest dwellings, detached Type 1 (Plots 1 and 2) will include a secondary heating provision with HETAS approved closed front wood burners. As wood is a renewable source of fuel this helps to reduce the demand on the main boiler system and thereby reduce the overall carbon dioxide emissions.

Note that the smaller dwellings are not adequately sized to accommodate secondary heating, so will not be fitted with wood burners but will have false chimneys.

- Where hot water tanks are specified the choice of cylinder will be a suitably sized Megaflo Eco unit (or equivalent); these tanks have excellent standing heat loss reduction characteristics, provided by a 60mm thick void-free layer of high performance polyurethane foam which fills the space between the inner vessel and outer casing for maximum insulation efficiency.

In addition, the hot water system will include the following features:

- Water separately timed to the main heating provision.
- Separate thermostat.
- System located in the heated dwelling space.
- Efficient water fittings will be installed to limit water use to no more than 125 litres per person per day (see the Water section of this Checklist), reducing the hot water heating demand.
- Lighting forms a large proportion of the electricity usage of dwellings and the development specification will call for 100% of light fittings to take low energy lamps (see also Q2).

The following table shows the results for Building Regulations Criterion 1: predicted CO₂ emissions (DER<TER) and fabric energy efficiency (DFEE<TFEE) of the proposed dwellings as modelled in SAP:

THE GARDENERS ARMS, READING, RG4 8NA				SAP RESULTS WITH AREA WEIGHTED DEVELOPMENT AVERAGING							08/03/2019	
URN	Ver.	Status	Description	DER	TER	DER<TER	DFEE	TFEE	DFEE<TFEE	G.I.F.A	Regs C1	Regs Overall
Gardeners Type 1	1	Planning	4 Bedroom Detached House	15.65	17.07	-8.32%	49.1	58.3	-15.78%	125.40	pass	pass
Gardeners Type 1	1	Planning	4 Bedroom Detached House	15.65	17.07	-8.32%	49.1	58.3	-15.78%	125.40	pass	pass
Gardeners Type 2	1	Planning	3 Bedroom End Terrace House	17.88	18.64	-4.08%	49.1	59.3	-17.20%	95.00	pass	pass
Gardeners Type 2	1	Planning	3 Bedroom End Terrace House	17.88	18.64	-4.08%	49.1	59.3	-17.20%	95.00	pass	pass
Gardeners Type 3	1	Planning	3 Bedroom Mid Terrace House	16.85	17.31	-2.66%	44.1	52.1	-15.36%	95.00	pass	pass
Gardeners Type 3	1	Planning	3 Bedroom Mid Terrace House	16.85	17.31	-2.66%	44.1	52.1	-15.36%	95.00	pass	pass
Gardeners Type 4	1	Planning	2 Bedroom Semi-Detached House	17.83	18.59	-4.09%	45.2	53.7	-15.83%	79.60	pass	pass
Gardeners Type 4	1	Planning	2 Bedroom Semi-Detached House	17.83	18.59	-4.09%	45.2	53.7	-15.83%	79.60	pass	pass
Development Totals				136.42	143.22	-4.75%	375.0	446.8	-16.07%	790.00	pass	pass
Area Weighted Averages				17.05	17.90	-4.75%	46.88	55.85	-16.07%	98.75	pass	pass

Natural Systems

- **Solar Gain and Daylight**

The surrounding area is low-level suburban housing, with some green spaces, sports facilities and small business premises. The existing site is fairly open but with some heavy tree growth, particularly in the northern and eastern parts of the site, giving quite high shading. Some of this is to be reduced, to be replaced with new tree planting strategically placed to allow good levels of sunlight and daylight over the site, but to maintain sufficient shade.

The shape and location of the site, with access from Surley Row to the west/south-west, limits the most advantageous built layout of the proposed dwellings to being orientated to the west/south-west at the front and the north/north-east to the rear. As would be expected, the majority of the glazed areas are to the front and rear of the dwellings, therefore the open nature of the proposed development allows very positive solar gain and daylight areas.

The glazed areas are well sized in relation to floor areas, include “French” style doors to the rear gardens and have been designed to achieve the best of the available sunlight and daylight.

- **Minimising the risk of overheating in summer**

Avoiding the risk of overheating reduces the need for mechanical cooling. The proposed design places the majority of the glazed areas to the west/south-west and north/north-east. The glazing will consist of double glazed window units with argon between the glazing, helping to prevent overheating in hot weather, whilst also limiting heat loss and maximising solar gains in cold weather.

In addition to this, the attention in the design given to the thermal mass of the fabric, and the benefits of natural ventilation, assists with minimising the risk of overheating. The SAP modelling includes an assessment of overheating and the dwellings as designed are shown to have minimal risk of overheating in the summer.

- **Natural Ventilation**

All windows are openable and designed with trickle ventilation to enable the free flow of air through the building. This helps to maintain comfortable internal conditions, particularly in hot weather, and helps to obviate the need for mechanical cooling.

Energy Efficient Equipment

- **White Goods**

A+ or A rated white goods (rated by the EU Energy Labelling Scheme) will be provided as follows:

- Fridges and freezers or fridge-freezers: A+ rating
- Washing machines and dishwashers: A rating
- Tumble dryers or washer dryers: B rating

(note - where a washer dryer is provided, this could be an alternative to a washing machine)

The EU advisory leaflet on energy rating of white goods will be included within a Building User Guide distributed to all dwellings.

- **External Drying Facility**

Each dwelling will have a drying line installed in the rear private garden. This will encourage natural drying of clothes rather than the use of electrically powered tumble drying.

Question 2

- **Natural Daylighting**

As stated above, the open nature of the site and the orientation/format of the dwellings allows good levels of daylighting into the dwellings. Good levels of daylighting reduces the need for energy to light the home and has the additional benefit of improving the quality of life.

The measure of daylighting is measured in terms of the Average Daylight Factor (ADF) in a particular room in the dwelling (refer also to the Health and Well-being section (Question 19) later in this report.

- **Energy Efficient Lighting**

External space and security lighting will be low-e (efficacy greater than 40 Lumens/Circuit Watt), with relevant controls. This will be with switchable energy efficient lighting at the front entrance, PIR lighting to the rear, with maximum wattage of 150 and daylight cut-off devices (i.e. for burglar security lighting).

- **Natural Ventilation**

As stated earlier, all windows are openable and designed with trickle ventilation to enable the free flow of air through the building. This helps to maintain comfortable internal conditions, particularly in hot weather, and helps to obviate the need for mechanical cooling.

Question 4

On-site energy generation from renewables has been considered and the most likely option would be a Photovoltaic (PV) system on the roofs of the development. However, as a minor development of less than 10 dwellings, the applicant has not specified renewables at this time. It is very possible that the eventual builder/purchaser will decide to install on-site renewable energy generation.

Question 5

Cycle storage facilities are specified according to the Revised Parking Standards and Design Supplementary Planning Document as follows:

- **Plots 1 and 2:** Storage for 2 cycles within each garage (car parking is available on the forecourt in front of the garages).
- **Plots 3 to 6:** Storage for 2 cycles for each dwelling within a dedicated cycle shed on the rear patio area.
- **Plots 7 and 8:** Storage for 2 cycles for each dwelling within the retained storage barn marked 7 / 8 on the proposed site layout.

The cycle storage is:

- i. Conveniently accessed from the dwellings.
- ii. Secure in lockable enclosures and with suitable fixings where appropriate to the storage.
- iii. There is easy and direct access to the public right of way.

Water

Aim: To improve efficiency in the use of water, conserve water resources and minimise vulnerability to flooding.

6. *How will the development incorporate the use of water saving devices to achieve a maximum consumption of 105 litres per person per day?*
7. *How will the development incorporate recycling rainwater and reduce the use of potable water?*
8. *Has the collection, treatment and re-use of grey water been considered? If so, how will these facilities be incorporated within the development?*

Response:

Question 6

The proposed specification will reduce the consumption of potable water through the use of water efficient fittings, flow restriction, and efficient water heating systems, to no more than 105 litres per person per day, which is equivalent to Code for Sustainable Homes Level 4. This compares to a Building Regulations Part G limit of 125 litres per person.

The brands of fittings and appliances have not yet been agreed but, based on fittings recommended by the Green Building Store, Waterwise and other guides, the applicant will specify fittings and appliances which will restrict flows and volumes as follows (all specified "or equivalent"):

- Dual Flush 4.5/3 litre WC (valve flush)
- WHB Taps 2.5 ltr/min (Monoblock with spray insert restrictor)
- Kitchen Taps 3.5 ltr/min (Monoblock fitted with flow regulator)
- Shower flow 7 ltr/min (flow restrictor)
- Bath capacity to overflow 180 litres (medium depth)
- Washing Machine – make not yet specified
- Dishwasher – make not yet specified

All flow rates stated above are at 0.3MPa as specified in the CfSH and the Building Regulations Part G/17.K.

The fittings above would give a consumption of 95.5 litres per person which, with the 17.K external allowance of 5 litres, equates to a total consumption of 100.5 litres per person (refer also to the reduction of external water use outlined in Q7 below).

The applicant will specify that a risk assessment of microbial contamination will be carried out and all hot and cold water systems will be designed to avoid the risk of such contamination in line with best practice.

Questions 7 and 8

The applicant will specify the provision of rainwater collection for garden watering by fitting water butts to collect rainwater from the dwelling and/or outbuilding roofs, with the physical characteristics as follows:

- Each dwelling will be provided with a butt (or butts) with a minimum capacity of 200 litres.
- The butts will be fitted with a child-proof lid.
- The butts will be fitted with a tap for drawing off water.
- The butts will be fitted with a connection to the rainwater downpipes with an automatic overflow into the conventional rainwater drainage system.
- There will be a means of detaching the rainwater downpipe and access provision to enable the interior to be cleaned.
- The material used for the butts will be durable and opaque to sunlight in order to reduce spoilage of the water.
- The butts will be stable and adequately supported on a stand.

As a minor development, with low consumption internal fittings and external rainwater collection for landscape watering, it is not considered economically viable to install other means of rainwater recycling or grey water re-use in the dwelling.

Materials

Aim: To retain local character and promote the use of materials with a low environmental impact.

9. How will the selected materials help retain local character, ensure long life and ensure a low environmental impact?

Response:

Question 9

• Local Character

The Council's development policy requirements are concerned with the impact of the proposed development on the character and appearance of the Conservation Area and setting of the listed cottage at no. 46, Surley Row.

The NPPF (paragraph 200) is supportive of new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset or which better reveal its significance should be treated favourably. In this case, the extensive car park associated with the Public House detracts from the character and appearance of the area when viewed from Surley Row and hence its re-development with dwellings that reflect the character of the surrounding area would be an enhancement to the Conservation Area. It is also imperative to note that the proposed dwellings would not be any closer to the listed cottage than any of the existing adjoining dwellings and as such, the development would not be harmful to the setting of the Grade II Listed building.

The surrounding area is predominantly residential in character and comprises a mix of design styles. The proposed dwellings would be 2 storey high and would complement the existing properties in the immediate vicinity of the application site. In the wider street scene, dwellings are mostly traditional in style. The proposed dwellings would be finished in materials that would be in keeping with the surrounding developments and this could be secured through a planning condition. Overall, the proposed development would reflect the general pattern of developments in the area and thus conform with Policies CS7 and CS33.

- **Long Life and Low Environmental Impact**

The proposed design specifications will aim to consider sustainability and minimise energy use in the construction of the development by sourcing and using sustainable materials as follows:

- **The Green Guide to Housing Specification**

The Green Guide is an environmental profiling system for building materials and components developed by the Building Research Establishment (BRE). The Guide arranges materials and components into various construction categories or 'elements', such as *external walls, internal walls, upper floors, ground floors, windows, etc.*, so that designers and specifiers can compare and select from comparable systems or materials specifications.

Green Guide ratings are calculated according to the impact on a range of environmental issues against which building materials and components are judged. These issues, such as *Climate Change, Fossil Fuel depletion, Ozone depletion, Pollutants, Water extraction and various other issues*, reflect the generally accepted areas of concern related to the production of building materials.

Green Guide ratings are determined from calculations based on a Life Cycle Assessment (LCA), which measures and evaluates the environmental impacts of the manufacture of materials. The LCA results are used to analyse the elemental specifications over a 60-year building design life, taking into account maintenance and refurbishment over the building life, and demolition at the end of its life, to give the total environmental impacts for each specification. The LCA analysis results in a summary rating of an elemental specification, with ratings ranging from A+ (best environmental performance) down to E (highest environmental impact).

The CfSH awarded a climbing scale of credits from D up to A+, but with zero for an E-rated element. The design specification of the proposed dwellings has aimed at an excellent performance and the expected ratings are as follows:

Roof:

100% Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and tiles; **Rated A+**

External Wall

100% Brickwork outer leaf, insulation, aircrete blockwork inner leaf, cement mortar, plasterboard on battens, paint; **Rated A+**

Internal Walls:

30% Lightweight solid blockwork with cement:lime mortar, plasterboard, paint; **Rated B**

30% Timber stud, plasterboard, paint; **Rated A+**

40% Party Wall - Aircrete blockwork cavity wall, minimum 75mm cavity, 1 sheet plasterboard (min. 10kg/m²) and paint to each side; **Rated A**

Floors:

50% Ground - Screed on insulation laid on grouted beam and aircrete block flooring; **Rated B**

50% Upper - OSB2 decking on timber joists; **Rated A+**

Windows:

100% Timber windows, double glazed; **Rated A+**

This specification would have achieved 13 out of the 15 credits available in a CfSH assessment.

From this it is clear that the materials specified result in very low environmental impact over the full design life of the dwellings.

- Responsible Sourcing of Materials

Materials used in the structure and the finishing elements will be locally sourced, will be recycled, or re-used wherever possible. Where not possible, materials and timber will be certified by a third party responsible sourcing scheme which is recognised by the Building Research Establishment (BRE). The following are widely recognised and used:

BES 6001:2008 Framework Standard for Responsible Sourcing of Construction Products

BES 6001:2008 is a BRE Global standard that provides a framework for the assessment of responsible sourcing schemes and provides a route to certification of construction products.

The framework comprises a number of criteria setting out the requirements for an organisation to manage the supply of construction products in accordance with a set of agreed principles of sustainability. To comply with the standard, a product must meet a number of mandatory criteria; where the product demonstrates compliance beyond the mandatory levels, higher levels of performance can be achieved. The standard's performance ratings range from Pass to Good, Very Good and Excellent.

The development of this standard and subsequent certification schemes is intended to provide construction products, not wholly covered under earlier recognised standards, a means for demonstrating their responsibility sourced credentials. In turn this will allow clients, developers and design teams to specify responsibly sourced construction products with greater assurance and provide a means of demonstrating responsible sourcing.

Key process and Supply Chain Environmental Management Systems

This covers all the major aspects of processing and extraction involved in the supply chain for the end product. There are various schemes, such as ISO 14001, BS 8555 and the Welsh Green Dragon Environmental Standard.

Timber Chain of Custody (CoC)

This is a process used to maintain and document the chronological history of the evidence/path for products from forests to consumers. Wood must be tracked from the certified forest to the finished product. All the steps, from the transportation of wood from the forest to a sawmill until it reaches the customer, must maintain adequate inventory control systems that allow for separation and identification of the certified product. Third Party verified Chain of Custody certification ensures that a facility has procedures in place to track wood from certified forests and avoid confusion with non-certified wood. Chain of custody is established and audited according to the rules of relevant forest certification systems.

Examples of CoC certification schemes are FSC and PEFC (the most widely recognised), but there are various other schemes.

Legally Sourced Timber

Where it may prove impossible to source certified timber, the minimum requirement will be that the timber is legally sourced. The definition of legally sourced timber follows the UK Government's definition of legally sourced timber, according to the CPET 2nd Edition report on UK Government timber procurement policy. The report states that legal timber and wood derived products are those which originate from a forest where the following criteria are met:

1. The forest owner/manager holds legal use rights to the forest
2. There is compliance by both the forest management organisation and any contractors with local and national legal criteria including those relevant to:
 - a. Forest management
 - b. Environment
 - c. Labour and Welfare
 - d. Health and safety
 - e. Other parties' tenure and use rights
3. All relevant royalties and taxes are paid
4. There is compliance with the criteria of CITES

Surface Water Run-off

Aim: To reduce flooding, pollution and other environmental damage.

10. - How has the development considered flooding and pollution?

11. - Has the design considered the use of sustainable drainage systems (SuDS) and how will they be incorporated within the development?

Response:

A Drainage Strategy report, including a Flood Risk Assessment, in support of the proposed development, was prepared by RAB Consultants. Version 2.0 was issued in November 2018 and this report has been used as the basis for the response to this issue.

Please refer to the RAB report for detailed figures, calculations and full details of the SuDS proposals.

Question 10

• Flood Risk Assessment

Section 3 of the above report assesses flood risk and has referred to the following sources:

- British Geological Survey (BSG) records.
- Reading Borough Council Strategic Flood Risk Assessment (SFRA) of 2017.
- The Environment Agency flood maps and records.

The assessment of existing surface water management and site constraints, calling on the above reference sources, confirm that the site is in the Environment Agency Zone 1 flood risk area, which indicates a very low risk of flooding. Specifically:

Sec. 3.1 Groundwater

The majority of the proposed development site overlies bedrock composed of the Lambeth Group – Clay, Silt and Sand. There are no records of any superficial deposits. Clay is highly likely to prevent rising groundwater given its impermeable nature.

The Council's Strategic Flood Risk Assessment (SFRA) indicates that the site has not been affected by groundwater flooding.

Sec. 3.2 Pluvial (Surface water)

When the infiltration capacity of land or the drainage capacity of a local sewer network is exceeded, excess rainwater flows overland. This water will collect in topographic depressions and at obstructions, which can inundate development in low lying areas. The severity of the rainfall event, the degree of saturation of the soil before the event, the permeability of soils and geology, and the gradient of the surrounding land and its use; all contribute to and affect the severity of overland flow.

The Environment Agency Flood Map for Surface Water identifies that the majority of the site is at very low risk from surface water flooding. There is an apparent flow path from the north of the site, possibly due to the topography of that area which seems to encourage water to pond and weir out towards the site. Expected flood depths within the site are shown to be 0.6 m. However, the south area of the site, which demonstrates the lowest elevation, remains dry during the 1% AEP. As such, it is unclear whether this surface water risk represents reality or is a LiDAR survey deficiency at that point. Nevertheless, this risk will inform the proposed drainage scheme so that it provides betterment.

Sec. 3.3 Sewers

According to the 2017 Reading SFRA, the site has not been impacted by infrastructure failure.

Sec. 3.4 Natural Flow Path

The report shows the natural flow path that surface water will follow, in the statistically unlikely event of drainage failure or similar, based on ground elevation. The site naturally drains towards the central part of the site, away from the dwellings.

Flood Risk Conclusion

On the basis of the available information from the Environment Agency and Lead Local Flood Authority, the majority of the site is at very low risk from surface water flooding except for an area to the north of the site. The risk is mainly associated with the topography of the area which encourages water, from the land to the north, to pond at the site. The proposed drainage scheme, with the use of SuDS, (as follows below) takes these factors into consideration.

- **Water Quality (Avoiding Pollution)**

In line with the SuDS Manual, the water must receive a certain degree of treatment. The development is classed as a low risk in terms of pollution hazard level (Table 26.2 of the SuDS Manual). Therefore, the proposed scheme satisfies the water quality criterion. Consequently, the proposed scheme is in line with the water quality requirements of the SuDS Manual.

Question 11

- **The Proposed Drainage Scheme and Incorporation of Sustainable Urban Drainage Systems (SuDS)**

The 2017 Draft Reading Borough Council Local Plan states that all major developments must incorporate sustainable drainage systems (SuDS) as appropriate and in line with the Government's Technical Standards. Smaller schemes are encouraged to incorporate SuDS, where possible. Runoff rates should aim to reflect greenfield conditions and, in any case, must be no greater than the existing conditions of the site. Schemes should ensure that the movement of water does not worsen contamination effects. Wherever possible, SuDS provision should link into the existing Green Network and incorporate tree planting. All new developments in areas of flood risk should give priority to SuDS.

- **Greenfield Runoff**

In accordance with the NPPF, a development must not increase the risk from flooding to others. The Greenfield runoff rate for the existing site has been calculated (using the proposed 0.155 ha hardstanding area) to identify the existing discharge characteristics, which the development proposal must mimic to ensure this risk is adequately managed. This was calculated using the IH124 method for determining Greenfield runoff rate built into Microdrainage 2018.1 (including the modification given in the Interim Code of Practice for SUDS, Chapter 6).

When designing for the management of surface water runoff it is necessary to design-out the possibility of flooding in an exceptional storm event of 1 in a 100 year period (1%), the greenfield peak flow runoff rates for the existing site for a range of Annual Exceedance Probabilities (AEPs).

The following table shows the Greenfield peak flow runoff rates for the existing site for a range of AEP's.

AEP (%)	Greenfield peak flow rate (l/s)
100	0.2
3.33	0.6
1	0.9

- Surface Water Runoff Management

The SuDS Manual discusses the SuDS approach to managing surface water runoff which is intended to mimic the natural catchment process as closely as possible. The approach sets out the design objectives in respect of SuDS:

- i. Use of surface water runoff as a resource;
- ii. Manage rainwater close to where it falls (at source);
- iii. Manage runoff of the surface (above ground);
- iv. Allow rainwater to soak into the ground (infiltration);
- v. Promote evapotranspiration;
- vi. Slow and store runoff to mimic natural runoff rates and volumes;
- vii. Reduce contamination of runoff through pollution prevention and by controlling the runoff at source;
- viii. Treat runoff to reduce the risk of urban contaminants causing environmental pollution.

Depending on the characteristics of the site and local requirements, these may be used in combination and to varying degrees.

- Proposed Management of Surface Water Runoff

The proposed design aims to provide betterment with respect to the management of surface water runoff, in line with recommendations made in the 2015 CIRIA SuDS Manual C753.

The proposed development will result in a hardstanding area of 0.1431 ha. This is smaller than the existing hardstanding area of 0.155 ha. As such, the proposed development will provide betterment on surface water runoff rate and volume.

a) The Discharge Hierarchy

The SuDS Manual recommends a specific hierarchy in terms of surface water discharge destinations:

- i. Discharge into the ground;
- ii. Discharge into a surface water body;
- iii. Discharge to a surface water network;
- iv. Discharge to a combined sewer.

Based on the infiltration testing at the site, undertaken to BRE Digest 365 standards, infiltration is feasible at the site. The infiltration tests identified three different rates and the lowest rate of 0.0079 m/hr has been taken forward as a conservative approach. This rate is higher than the minimum 0.0036 m/hr and indicates that infiltration is viable, as suggested by the SuDS Manual. Therefore, the proposed development will discharge surface water runoff into the ground relieving the local sewer from the existing loadings associated to the existing buildings.

b) The Proposed Drainage Scheme

The proposed scheme will utilise the access drives to Plots 1 and 2 along with the access road to the remainder of the site as Type A permeable pavements, in line with Table 20.1 of the SuDS Manual. The permeable pavements have been sized to accommodate runoff from the Manual. The sizes are:

Drive to Plots 1 & 2 (PP1): Area 150m²; Depth 1.0m
Access Road (PP2): Area 450m²; Depth 1.3m

The following recommendations, made by RAB Consulting, will be included in the drainage specifications:

i. Roof Runoff

It is recommended to discharge roof runoff directly onto the permeable pavement surface where possible. Alternatively, or where it is not practicable roof runoff should discharge to the sub-base on the permeable pavement via catchpits and diffusers, as described in the Interpave Guidance Document, 2008.

ii. Road Runoff

Road runoff from the access road and relevant parking areas will infiltrate to the permeable pavement and receive an appropriate level of treatment. Kerb design should be in line with local standards and at least 100 mm to encourage water to infiltrate to the permeable pavement structure efficiently. An ACO S100 (or similar product) should be installed at the site's both entrances and discharge to the sub-base with an appropriate catchpit installed upstream.

iii. Permeable Pavement

The proposed System A pavement is sometimes known as 'Zero Discharge', as no additional water from the new development is discharged into traditional drainage systems, therefore the need for pipes and gullies is eliminated resulting in cost savings. This system allows all water falling onto the pavement to infiltrate down through the joints or voids between the concrete blocks, passing through the constructed layers below and eventually into the subgrade. Some retention of the water will occur temporarily in the permeable sub-base layer allowing for initial storage before it eventually passes through. Permeable pavements may be used close to buildings as they allow dispersed infiltration similar to natural vegetation, therefore the 5 meter buffer guidance provided in the Building Regulations for soakaways (which, in contrast, provide a single point discharge) need not apply.

The total area of PP1 & PP2, 600 m², with a porosity of 0.33 and a half drain time of <1440 minutes for the 1% AEP, will safely manage the 1% AEP plus an additional 40% to account for Climate Change (producing an 'extreme event' Greenfield peak flow runoff rate of 1.2l/s); this is in line with the SuDS Manual. The permeable pavement should be installed in line with the SuDS Manual, CIRIA C768 document, and strictly to manufacturer's instructions.

The following table shows the Greenfield peak flow runoff rates for the existing site, including the 1% plus 40% Climate Change allowance, together with the runoff rates and reduction in risk for the proposed development:

AEP (%)	Greenfield peak flow	Proposed peak flow rate (l/s)	Reduction (%)
50%	0.3	0	100
3.33%	0.6	0	100
1%	0.9	0	100
1% plus Climate Change	1.2	0	100

As can be seen from this table, the proposed drainage scheme will offer significant betterment compared to the existing situation and reduce the risk of flooding to others downstream.

c) Exceedance

Although the proposed drainage design manages the 1% AEP plus 40% extreme event, it is inevitable that as a result of heavy or extreme rainfall, the capacities of sewers and other drainage systems could be exceeded on occasion. Drainage exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or pipe system becomes overloaded, when the outfall becomes restricted due to flood levels in the receiving water, or due to poor maintenance of the SuDS features.

The system has been designed to safely manage, with no flooding, a 1% AEP + 40% CC, which is an extreme event. Nevertheless, if the system becomes inundated or surface water from the land to the north flows to the site, the system could become overloaded and flood. During such an event, surface water will be contained on the permeable pavement surface due to the kerb height in the central part of the site. Surface water will naturally run towards Surley Row while the ACO S100 (or similar) at the site entrances will collect this water and redirect it back to the permeable pavement.

Therefore, it is a reasonable assumption to accept that during a drainage system exceedance event, it is highly unlikely that there will be a risk to the health and safety of the site users and others downstream. However, RAB Consulting has recommended that the proposed development should set the finished floor levels at least 300mm above ground to mitigate against the unpredictable occurrence of infrastructure failure. This will be included in the specifications.

Given height constraints and planning policy, Units 7 and 8 will need additional protection against residual risk of infrastructure failure. The kerb will offer protection to these units, but it is recommended to include flood resistance measures at ground floor level and up to 600mm above ground level (for Units 7 & 8). These measures should include:

- Flood resistant doors and windows (ideally windows located 600mm above ground level).
- Auto-closing airbricks.
- Installation of non-return valves on foul drain pipes and foul inspection chambers.
- Cable entry points located 600mm above ground level.
- All service entry points (gas, electricity, etc.) to be located 600mm above ground level.

As such, exceedance can be considered controllable at site level.

d) Maintenance

Maintenance can be categorised to into three main groups:

- Regular maintenance
- Occasional maintenance
- Remedial maintenance

It is vital that SuDS construction is supervised and inspected on completion if owners and the Lead Local Flood Authority (Reading Borough Council) are to avoid taking on liabilities. This will help to ensure that the specified materials are being used and that they are being placed

correctly. Incorrect materials or installation should be rejected as they will adversely affect the performance, maintenance costs and ultimately the design life of the SuDS components.

The SuDS features incorporated to the proposed design will be maintained in order to ensure efficient water treatment and water management. The drainage scheme will be managed by the site management company (details are not known at this stage).

Waste

Aim: To minimise the production of waste and maximise re-use and recycling.

12. - How will the development minimise waste sent to landfill?

13. - How will the development make the maximum use of construction and demolition waste?

14. - How will the development make maximum use of re-used and recycled materials?

15. - How will provision be made for the storage and recycling of waste for all users of the site?

Response:

Questions 12, 13 and 14

- **Minimising Construction Site Waste**

The applicant is committed to minimising and reducing waste arising from the project and reducing the waste sent to landfill. A Resource Management Plan (RMP) – previously known as a Site Waste Management Plan - will be developed covering the non-hazardous waste related to on-site construction and any off-site manufacture or fabrication generated by the building's design and construction, including demolition and excavation waste.

This commitment, detailed in the RMP, is to:

1. Design out waste.
2. Reduce waste generated on site.
3. Re-use and recycle demolition and construction waste both on-site and off-site.

The strategy for minimising and reducing construction waste is based on the principles of the waste hierarchy:

- **Prevention:**

Waste minimisation/materials optimisation - using less material in design and manufacture; care of materials on site; keeping products for longer; re-use; using less hazardous materials

- **Preparing for re-use:**

Checking; cleaning; repairing; refurbishing whole items or spare parts

- **Recycling:**

Turning waste into a new substance or products

- **Other recovery:**

Includes anaerobic digestion; incineration with energy recovery; gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste; some backfilling

- **Disposal:**

Landfill and incineration without energy recovery

The RMP will identify 'designing out waste' opportunities at the pre-site stage, by investigating how to influence the following design functions:

- a. Waste-efficient procurement.
- b. Materials optimisation.
- c. Off-site manufacture and construction of building elements.
- d. Materials re-use and recovery.
- e. Deconstruction, adaptability and flexibility post construction and building use.

The purpose of the RMP is to promote resource efficiency and to prevent illegal waste activities. Resource efficiency includes minimising waste at source and ensuring that clients, designers and principal contractors assess the use, reuse and recycling of materials and products on and off the site.

The RMP will define:

- a. Opportunities and procedures for designing out waste.
- b. A target benchmark for resource efficiency, i.e. m³ of waste per 100m² floor area or tonnes of waste per 100m².
- c. Procedures and commitments for minimising non-hazardous waste in line with the target benchmark.
- d. Procedures for minimising hazardous waste.
- e. A waste minimisation target and details of waste minimisation actions to be undertaken for each different waste type, including reuse, recycling, recovery and disposal.
- f. Procedures for estimating, monitoring, measuring and reporting hazardous and non-hazardous site waste, according to the European Waste Category (EWC) codes. If waste data is obtained from licensed external waste contractors, the data needs to be reliable and verifiable, e.g. by using data from EA/SEPA/EA Wales/NIEA Waste Return Forms.
- g. Procedures for sorting, reusing and recycling construction waste into defined waste groups, either on-site or through a licensed external contractor.
- h. Procedures for reviewing and updating the plan; a Design RMP will be prepared, with waste minimisation, generation and diversion from landfill estimates. This will be updated during

the on-site activities of demolition and construction to monitor and record the actual waste activities.

- i. The name or job title of the individual responsible for implementing the above on site.

- Demolition

As the proposed development requires the demolition of existing buildings, a Pre-Demolition Audit of the existing buildings, structures and hard surfaces will be completed to determine if refurbishment/reuse of the materials is feasible, particularly for potential use in the new development on the existing site. If the audit finds that this is not feasible, then its purpose will be to maximise the recovery of material from demolition for subsequent high grade/value applications.

The audit will be referenced in the RMP and will cover:

- a. Identification of the key demolition materials.
- b. Potential applications and any related issues for the reuse and recycling of the key refurbishment and demolition materials.
- c. What the recovery target will be, this target being influenced by the following:
 - i. The potential for segregating desirable materials from contamination.
 - ii. The waste produced from reprocessing e.g. fines produced from crushing processes.
 - iii. The market available for purchasing the demolition materials.

• Diverting Waste from Landfill

The Resource Management Plan will include procedures and commitments to sort and divert waste from landfill according to the defined EWC waste groups (in line with the waste streams generated by the scope of the works), through:

- a. Re-use on site (in situ or for new applications).
- b. Re-use on other sites.
- c. Salvage/reclaim for re-use.
- d. Return to the supplier via a 'take-back' scheme.
- e. Recovery and recycling using an approved waste management contractor.
- f. Compost.

The following minimum percentage of non-hazardous construction waste will be specified to be diverted from landfill:

Type of Waste

Construction	85%
Demolition	90%

• Making use of Re-used and Recycled Materials

There are two aspects of making use of re-used and recycled materials, both of which will be specified for the proposed development:

1. Waste Disposal

When diverting waste from landfill, the RMP will require Waste Recycling contractors to be

used to channel waste for re-use and recycling off site. However, there is also the possibility for contractors to re-use and recycle waste on-site, or on other of their development sites.

a. Re-use

Materials generated will be re-used wherever possible, with reuse on the proposed site given priority.

Where materials are re-used on the contractor's own sites they will be required to:

- i. Reuse materials as many times as possible (e.g. pallets, formwork).
- ii. Reuse onsite aggregates arising from the demolition for low-specification hardcore.
- iii. Reuse excess or reclaimed bricks, blocks, tiles, etc.
- iv. Crush bulk / inert materials such as brick and concrete and reuse in hardcore etc.

The RMP will require that, where the contractor is not able to re-use materials on their own sites they will be required to:

- i. Find end markets offsite for the sale of suitable materials.
- ii. Whenever possible, use suppliers who operate excess material take-back for resale services.
- iii. Have materials collected for reuse elsewhere.
- iv. Materials that cannot be reused will be recovered for recycling.
- v. Offer surplus materials to other organisation through Material Exchanges and Re-use Networks. These are popular and well used in the United States but, although "invented" in the United Kingdom they have not, until relatively recently, been widely used. In all cases, using this method should be subject to Duty of Care checks

b. Recycle

Construction waste recycling is the separation and recycling of recoverable waste materials generated during construction and demolition. Packaging, new material scraps and old materials and debris all constitute potentially recoverable materials. In demolition, appliances, timber and masonry materials, tiles, doors and windows are recyclable.

The construction industry uses many different types of materials in large quantities, which means there are many opportunities reusing or recycling waste. There are many benefits associated with recycling waste from construction projects:

- i. Reducing disposal costs.
- ii. Reducing carbon emissions.
- iii. Helps compliance with environmental legislation and restrictions on what can be sent to landfill.

To maximise recycling rates of waste construction materials, the RMP will require:

- i. The involvement waste management contractors at the early stages of the project to discuss opportunities for recycling and agree high levels of recycling of waste.
- ii. There can be limitations on the suitability of waste materials for recycling, particularly where the material is salvaged from the demolition, but the specifications will maximise the recycling possibilities by requiring the use of specialist waste recycling contractors.
- iii. Targetting the key waste streams in each project phase.

- iv. Where possible, the separation of waste on site; skips and other containers for holding waste will be colour coded and clearly labelled to comply with the National Standard for the colour coding of waste containers.
- v. Where space is too limited for segregation, waste materials will be removed from site in mixed skips and taken to licensed waste transfer stations for sorting and redistribution to recycling / re-use facilities. A detailed report will be obtained from the waste transfer station.
- vi. The return of discarded materials to the suppliers so that they can be reincorporated back into the factory process e.g. cable drums, pallets.
- vii. The setting of targets for trade Sub-Contractors in relation to recycling rates and waste recovery rates.
- viii. The arrangement of packaging collection by suppliers for recycling.
- ix. The setting out of a general strategy for the recycling and reuse of specific waste streams

2. Materials Procurement

As stated in the Materials section earlier in this report, the materials used in the structure and the finishing elements will be locally sourced, will be recycled, or have been previously used wherever possible. Some suppliers are able to offer re-used materials for certain applications and, although not widely available yet in the UK, re-used materials can be sourced from Materials Exchanges and Re-use Networks (see above).

In addition, the RMP will require the use of recycled and secondary aggregates, thereby reducing the demand for virgin material and optimising material efficiency in construction and hard landscaping.

- Recycled or secondary aggregate must be specified to be at least 25% the total amount of high grade aggregate used on site.
- The recycled or secondary aggregates must be either:
 - i. Construction, demolition and excavation waste obtained on-site or off-site or;
 - ii. Secondary aggregates obtained from a non-construction post-consumer industrial by product source.

Question 15

• The Storage and Recycling of Waste for all Users of the Site

Reading Borough Council provides a refuse and recycling collection service. Internal and external bins will be provided. The internal recycling collection bins will be given a dedicated internal storage space.

• External Storage of Household Waste

The design of the proposed site provides dedicated bin storage areas on paved surfaces within the external areas of each dwelling. These external bin storage areas should provide sufficient space to accommodate the recommended bin volume requirements of BS 5906 2005, which is 100 litres for the first bedroom and an additional 70 litres for each subsequent bedroom. requirement follows:

The space provided –

Plots 1 & 2 = 4 Bedroom: $100 + 70 + 70 + 70 = 310$ litres

Plots 3 to 6 = 3 Bedroom: $100 + 70 + 70 = 240$ litres

Plots 7 & 8 = 2 Bedroom: $100 + 70 = 170$ litres

The Council bins which need to be used –

Non-Recyclable Refuse (grey): 240 litre; base dimensions 580mm x 730mm

Recyclable Waste (red): 240 litre; base dimensions 580mm x 730mm

Garden and Food Waste (sack): 70 litre (approx.); base dimensions 600mm x 600mm

The Council bins have a larger capacity than the BS 5906 minimum, therefore the external bin storage area will be sized to accommodate this; accordingly, as the bins and garden waste bag will be stored side-by-side, the external space will be at least 1800mm wide by 800mm deep, an area of approximately 1.5m².

The bin area will be accessible to wheelchair users, including adequate turning space.

- **Internal Storage of Recyclable Household Waste**

A bin for collecting dry recyclable waste will be provided and fixed within a cupboard in the kitchen area on the ground floor. The bin will have a capacity of at least 30 litres and will be detachable from the fixing to enable the waste to be tipped into the external bin when required, and for cleaning.

The dwellings will also be provided with a kitchen food waste caddy, which can be used with bio-degradable bags for leaving in the garden waste sack when full. Also, the dwellings will be provided with a composting guide as part of the Home User Guide.

- **The Council Refuse and Recycling Collection Service**

The Council provides a fortnightly kerbside service to collect the grey non-recyclable rubbish bins, the red recyclable waste bins and the garden/food waste sacks. These are not on the same day, which makes moving the bins and sacks to the collection point less onerous for residents.

Pollution

Aim: To minimise damage to the environment through air, ground/surface water, land, noise or light pollution.

16. - *What measures have been incorporated to ensure that noise and light pollution will be minimised throughout the development?*
17. - *What measures have been incorporated to reduce nitrogen oxide emissions and reduce the global warming potential of insulants?*
18. - *What measures have been incorporated to reduce the release of pollution into the atmosphere?*

Response:

Question 16

• Noise

The proposed development would fulfil the environmental requirements of SDPD Policy DM17, Policy CS36 and Core Strategy Core Objective 4, by making provision for a landscaped buffer to the rear of the site. This part of the site is higher than the rest of the site, which slopes down towards Surley Row.

This buffer to the rear part of the site is a designated green link, which lies within the gardens of plots 3 to 6 and between these plots and the rear gardens of the properties on Stuart Close. It is proposed that this buffer be lined with a number of trees, the species of which have been identified on the site layout plans. The buffer and the height of the site at this point will help to mitigate any noise between the site and the properties on Stuart Close.

The overall design of the site provides a fairly low density of dwellings, further reducing the possibilities for noise pollution. Surley Row passes the front of the site, but this is not a particularly busy road and the dwellings at this part of the site are positioned sufficiently back from the road to mitigate traffic noise.

The change of use from a public house, with a fairly large car park, to (relatively) low density housing will also reduce the existing noise nuisance levels.

Finally, apart from existing residential development, there does not appear to be any noise-sensitive areas or buildings in the vicinity.

• Light

In accordance with the requirements of Policy CS34 of the Core Strategy, proposals for new development will be expected to demonstrate that light pollution will be minimised.

- *Minimisation of the upward spread of light:* Specially designed lighting equipment can be used that minimises the upward spread of light near to or above the horizontal.
- *Keep glare to a minimum:* Ensuring that the main beam angle of all lights directed towards any potential observer is kept below 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare.

External lighting should be minimised within any development proposals, unless it is necessary for reasons of security and safety. In particular, lighting and light spillage should be avoided along the site boundaries.

The proposed positioning of the dwellings would maintain adequate separation distances with the adjoining existing properties such that no harm to residential amenity would be caused through excessive night time lighting. Additionally, the lighting design strategy will require the lighting design to consider the ILP (Institution of Lighting Professionals) guidance notes for the Reduction of Obtrusive Light, 2011, particularly Table 2 of the guide, which outlines:

- a. Limits to the average upward light ratio of the luminaires, to restrict sky glow.
- b. Limiting illuminance at the windows of nearby properties for which light trespass might be an issue.

- c. Limiting the intensity of each light source in potentially obtrusive directions beyond the site boundaries.
- d. Limiting the average luminance of the building, if it is floodlit – *note that floodlighting is not envisaged for the proposed development.*

The proposed lighting within the development is restricted to burglar and essential space lighting. This will be:

Space Lighting

Space Lighting will be controlled by PIR and Daylight cut-off sensors and will also be switchable. The lamps fitted will be LED and have a luminous efficacy greater than 40 lumens per circuit watt and will be provided at:

- The main (front) entrance
- Parking areas
- The rear of the dwellings where necessary for external bin storage and cycle storage areas

Security Lighting

Burglar Security Lighting will be controlled by PIR and Daylight cut-off sensors. The lamps will have a maximum wattage of 150W and will be provided at:

- The rear and/or side of the dwellings as appropriate

Question 17

• **Nitrogen Oxide Emissions**

The boilers will be specified to have a maximum dry Nitrous Oxide (NO_x) emission level of 40 mg/kWh, which is considerably lower than the BS EN 297: 1994 Class 5 level of 70 mg/kWh.

Nitrous oxide is a chemical compound with the formula N₂O. It is an oxide of nitrogen and at elevated temperatures is a powerful oxidizer similar to molecular oxygen. Nitrous oxide gives rise to nitric oxide (NO) on reaction with oxygen atoms, and this in turn reacts with ozone. As a result, it is the main naturally occurring regulator of stratospheric ozone. It is also a major greenhouse gas and air pollutant. Considered over a 100-year period, it is calculated to have between 265 and 310 times more impact per unit mass (global-warming potential - GWP) than carbon dioxide.

• **Global Warming Potential of Insulants**

Global Warming Potential is defined as the potential for global warming that a chemical has relative to 1 unit of carbon dioxide, the primary greenhouse gas. In determining the GWP of the blowing agent, the Intergovernmental Panel on Climate Change (IPCC) methodology using a 100-year Integrated Time Horizon (ITH) must be applied.

The specification will encourage the reduction of emissions of gases with high GWP associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials.

All insulation materials used in the development will be specified to have a Global Warming Potential of less than 5 in manufacture and installation. Additionally, insulation should have zero Ozone Depletion and will be specified with an A+ or A Green Guide rating.

Question 18

• The Release of Pollution into the Atmosphere

Most of the relevant issues related to the release of atmospheric pollution have been discussed in other Checklist issues (Energy, Materials, Nitrogen Oxide, etc.). Another, principal, source of air pollution is vehicle emissions and developments are encouraged to reduce the need to travel by private car, by providing alternatives such as walking, cycling and the use of public transport.

The means of reducing this source of air pollution (by alternatives to private car travel) are limited where the proposed development is on an existing brownfield site, because these means are typically addressed by the location of the site and its proximity to local services and public transport links. However, the typical means of discouraging the use of private car travel should still be investigated and promoted where possible.

There are numerous facilities in the local area, within 1000 metres walking or cycling distance, and many are within a short bus journey (see Public Transport below) including:

- i. Highdown Sport and Leisure complex
- ii. North Reading Badminton Club
- iii. Emmer Green Primary School
- iv. Emmer Green Playing Fields
- v. True Food Community Co-Op
- vi. St. Barnabas Church
- vii. Grace Church
- viii. Reading Golf Club
- ix. Balmore Park
- x. Various other amenities, including food shops and public houses.

- Public Transport

The Revised Parking Standards and Design SPD identifies the application sites as falling within Zone 3 – Secondary Core Area. Typically, these areas are within 400 metres of a Reading Buses high frequency 'Premier Route', which provides high quality bus routes. These buses link not only to the Central Core Area, but also Zone 2 areas and beyond to major supermarket and local centre facilities.

There are a number of Reading Buses stops in close vicinity of the site, all of which terminate at Reading Central and include stops at Emmer Green and/or Caversham, and Reading Railway Station. In some services the route is a circular Reading Central to Reading Central, another runs each way between Lower Earley and Reading Central. The services are:

- i. Rotherfield Way: Bus Stop 200 metres walk from the site

Service 24 every 30 minutes

Service 22 every 30 to 60 minutes

Service F12 to Reading Madejski Football Stadium on match days

ii. Peppard Road: 580 metres walk from the site

Service 25 every 30 to 60 minutes

Service F10 and F11 to Reading Madejski Football Stadium on match days

iii. Evesham Road (near Stuart Close: 300 metres walk from the site

Service 24 every 30 minutes

Service 22 every 30 to 60 minutes

Service 25 every 30 to 60 minutes

Service F12 to Reading Madejski Football Stadium on match days

iv. Grove Road: 350 metres walk from the site

Service 23 every 30 to 60 minutes

- **Walking**

There are safe walking routes through the development and onto Surley Row. Much of Surley Row in the environs of the site has a 20mph speed limit, and there are various road crossing points.

A public park is situated to the north of the application site. A pedestrian access runs from Surley Row, very close to the proposed site entrances, through the park towards Stuart Close.

There are many other green areas and parks in the locality, either within safe walking distance, or a short bus journey. A number of bus stops and many local amenities (see above) are available within walking distance.

- **Cycling**

As stated in the Energy/CO₂ Section, Question 5, adequate cycle storage facilities are specified in accordance with the Revised Parking Standards and Design Supplementary Planning Document .

The design of the site, with easy and safe access and movement within the site, encourages safe usage of cycles into and out of the site and onto Surley Row.

- **Car Club**

The Revised Parking Standards and Design SPD states that, for developments of more than 10 residential units in Zones 1 and 2, developers will be required to:

- i. Provide or support a car club on the site or demonstrate that the development will have access to and the use of a car club on a nearby site.
- ii. Create dedicated car parking spaces on the site for the car club.

As the proposed development has 8 dwellings, within the Zone 3 Secondary Core Area, it is not deemed appropriate or viable to consider setting up a car club.

Health and Well-being

Aim: To improve the quality of life in homes through good daylighting, improved sound insulation, provision of outdoor space with good accessibility.

19. - *What How has the development been designed to maximise natural lighting, reduce the likelihood of noise complaints, incorporate private outdoor space and ensure the layout of the development can be easily adapted to meet the needs of future occupants?*

Response:

- **Natural Light**

The open nature of the site and the orientation/format of the dwellings allows good levels of daylighting into the dwellings. Good levels of daylighting reduces the need for energy to light the home and has the additional benefit of improving the quality of life.

The measure of daylighting is measured in terms of the Average Daylight Factor (ADF) in a particular room in the dwelling. The Average Daylight Factor is:

“The average indoor illuminance (from daylight) on the working plane within a room, expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane under an unobstructed CIE ‘standard overcast sky’”

The proposed development, if assessed under the Code for Sustainable Homes, would achieve the required ADF in relevant rooms, apart from a notional home office in one of the bedrooms, as follows:

Kitchens: ADF at least 2%

Living and Dining areas: ADF at least 1.5%

Home Office (a bedroom other than the main bedroom): Would not achieve the required 1.5%

An additional aspect of daylighting is a “View of the Sky”. This improves the visual wellbeing of residents. For relevance in terms of the CfSH, 80% of the working plane (i.e. desk/worktop height of 850mm) in each kitchen, living room, dining room and study (including any room designated as a home office) must receive direct light from the sky. The open nature and surroundings of the development site would qualify on this basis.

- **Noise Attenuation**

The specification will require an improvement in both airborne and impact sound insulation of at least 5dB over the Building Regulations Part E standards. This could be demonstrated in either of two ways:

1. A programme of pre-completion testing based on the Normal programme of testing described in Approved Document E, for every group or sub-group of houses (as directed by the Building Control Body), demonstrating that the 5dB, or better, improvement has been achieved.

OR

2. Use of constructions for all relevant building elements that have been assessed and approved as Robust Details by Robust Details Limited (RDL) and found to achieve the required performance standard stated above. All relevant dwellings must be registered with RDL.

Robust details (RDs) are construction solutions that provide an alternative to pre-completion sound insulation testing as a method of complying with Requirement E1 of Approved Document E of the Building Regulations (England and Wales).

The relevant dwellings are Plots 3 to 8 as issue of noise is a potential problem in attached dwellings. The detached dwellings, Plots 1 and 2, are not relevant to this issue.

- **Private Outdoor Space**

Each dwelling plot contains a part paved and part lawned garden area as shown on the proposed Site Layout plan. Each plot is:

- a. Secured by a boundary fence to the external garden perimeter and is fenced between plots.
- b. More than adequately sized for the number of occupants.
- c. Private and accessible only to the residents of the individual dwellings.

The private space will be designed to provide inclusive access and usability, following guidelines drawn from BS 8300:2009, BS 5709:2006, BS 1703:2005, Approved Documents Part M and H, such as wheelchair access, level thresholds, etc.

- **The needs of Future Occupants**

The design intent is to provide inclusive general needs housing that caters for the widest possible segment of the population (including older people), and which can easily be adapted to meet the changing needs of current and future occupants. The aim is to prevent barriers that create undue effort and separation and enable everyone to participate equally, confidently and independently in everyday activities such as taking out rubbish and spending time outside.

Accordingly, all principles of Lifetime Homes have been considered and incorporated where possible and appropriate.

Management

Aim: To manage the site in an environmentally and socially considerate manner.

20. - What measures have been taken to ensure the construction of the site is managed in an environmentally and socially considerate manner, mitigating environmental impacts?

21. - How has the development been designed to ensure people feel safe and secure?

Response:

Question 20

- **Considerate Constructors Scheme**

The Considerate Constructors Scheme (CCS) is a UK certification scheme that encourages the

considerate management of construction sites. The scheme awards points in increments of 1, up to a maximum of 10 in each of the following five sections:

- i. Enhancing the appearance of the site
- ii. Respecting the community
- iii. Protecting the environment
- iv. Securing everyone's safety on site
- v. Caring for the workforce

The site will be registered with the Considerate Constructors Scheme and the specification will require the development to achieve CCS 'best practice' as a minimum but will be encouraged to go beyond best practice.

- **Best practice**

Achieving a score of at least 5 in every section, and a total score between 25 and 34, of the Considerate Constructors Scheme's Code of Considerate Practice indicates that a site is being managed in accordance with best practice

- **Beyond best practice**

Achieving a score of at least 7 in every section, and a total score of between 35 and 50 of the Considerate Constructors Scheme's Code of Considerate Practice indicates that a site is being managed significantly beyond best practice

• **Construction Site Impacts**

The intention is to ensure the construction is managed in a manner that mitigates environmental impacts.

The CfSH set out six construction site procedures which, managed correctly, would mitigate the environmental impacts of demolition and construction. These are:

1. Monitor, report and set targets for CO₂ production or energy use arising from site activities.
2. Monitor and report CO₂ or energy use arising from commercial transport to and from site.
3. Monitor, report and set targets for water consumption from site activities.
4. Adopt best practice policies in respect of air (dust) pollution arising from site activities.
5. Adopt best practice policies in respect of water (ground and surface) pollution occurring on the site.
6. Ensure that at least 80% of timber used in site construction activities is reclaimed, re-used or responsibly sourced

One credit was awarded for procedures covering 2 out of the 6 items and two credits awarded for 4 out of the 6.

The applicant is committed to specifying at least 4 of the actions are carried out on site. The specification will require the minimum of four procedures, but the choice of which will be agreed with the Principal Contractor prior to the commencement of demolition and construction activities.

Question 20

- **Design for Safety and Security**

The applicant is committed to designing a development where people feel safe and secure - where crime and disorder, or the fear of crime, does not undermine quality of life or community cohesion.

The specification will require the appointment of an Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA) at the design stage to advise and recommend the requirements for the achievement of 'Secured by Design – New Homes' certification. Their recommendations will be incorporated into the design of the dwelling.

Ecology

Aim: To manage the site in an environmentally and socially considerate manner.

22. - How have the wildlife habitats and natural features on and adjacent to the site been considered and how will they be retained, protected and enhanced?

Response:

An Ecological Appraisal survey has been undertaken by Windrush Ecology Limited and the consequent report has been used to determine this response, with reference also to the Caldecotte Group Planning, Design and Access Statement. The response to this issue needs to take into account the ecological status of the site as it exists, and then the ecological status of the proposed development.

The aims of this survey were to describe and evaluate the habitats present within the site and to assess the potential for the site to support protected species. The report discusses the likely impact of the proposed works on the ecology of the site and the local area and makes recommendations for appropriate mitigation/compensation measures and habitat enhancement.

One specific aim of such a survey is to assess the potential for the site to support protected and notable species. The buildings were surveyed for bats and/or evidence of bats and to assess the overall potential of the buildings to support roosting bats and other protected species, such as nesting birds. The report discusses the likely impacts of works to the buildings on bats, nesting birds and other protected species and makes recommendations for appropriate mitigation, compensation and enhancement measures in this regard.

The potential impacts are assessed in accordance with the legal protection afforded to bats under The Conservation of Habitats & Species Regulations 2017. The need for a European Protected Species (bat) licence is also discussed in light of the impact assessment.

Recommendations were made by the Ecologists for the enhancement of habitats and features and to compensate for the loss of some habitat. The applicant will commit to incorporating these enhancements within the specifications.

- **Ecological Value of the Site**

- **The Proposed Development Site**

The development site is a previously developed site situated within a Conservation Area, which comprises the Gardeners Arms public house, a bungalow, a skittles alley, a shed, a static and a mobile caravan and an existing storage barn situated at the extreme southern boundary of the site. The buildings were all assessed as having 'negligible' bat roost potential, except the public house and the bungalow, which were assessed as having 'low' bat roost potential.

Tarmacked hard-standing is present to the south and north of the public house in the form of a car park and an access drive respectively. Additional areas of hard-standing are created by footpaths leading around the peripheries of the public house and a children's play area within the rear gardens. These areas are of negligible ecological value.

A small area of amenity grassland is present to the western side of the public house, with a larger area of lawn present in the rear gardens to the eastern side of the building. The habitat is managed as lawn and maintained at a short sward height (<4cm). Species present include white clover *Trifolium repens*, dandelion *Taraxacum officinale* and daisy *Bellis perennis*. The grassland is species-poor and does not meet the criteria of any priority grassland habitats, such as those listed in Section 41 of the NERC Act 2006. The habitat is of negligible ecological value.

A small tree belt is located to the western side of the public house. Species present include elm *Ulmus* sp., elder *Sambucus nigra*, hawthorn *Crataegus monogyna*, maple *Acer* sp., ash *Fraxinus excelsior*, hazel and cherry *Prunus* species. Several young/semi-mature trees exist amongst an area of scrub to the rear (north-east of the bungalow), these include western red cedar *Thuja plicata* and sycamore. These trees are considered to be of ecological value within the context of the site, but are not considered to be of significant value within the wider context.

An area of dense scrub is present to the rear (north-east) of the bungalow. The habitat is largely dominated by bramble *Rubus fruticosus* and stinging nettle *Urtica dioica* with some elder also present. Scrub is considered to be of low ecological value, as it is dominated by very common and widespread plant species.

- Species

The following sections collate data collected during the site survey of 14th August 2018 with the species data held by the Local Records Centre (TVERC) in order to assess the suitability of the habitats within the study for protected species.

There are no records of protected/notable species from within the site. The TVERC holds records of protected/notable plant, invertebrate, reptile, bird and mammal species from within a 1km radius of the site. A summary of the most pertinent species, given the nature of the habitats within the site and the surrounding landscape, are provided below.

Full details of protected/notable species records can be found in Appendix 5 of the survey report.

i. Plants

Bluebells *Hyacinthoides non-scripta* and butcher's broom *Ruscus aculeatus* have been recorded from Rotherfield Way Copse LWS, located approximately 140m to the east of the site. Both bluebells and butcher's broom are woodland species and are not present within the site. Other notable plants returned within the data search include wild strawberry *Fragaria*

vesca, hoary plantain *Plantago media*, field scabious *Knautia arvensis* and sanicle *Sanicula europaea*.

The amenity grassland and scrub habitats within the site are unsuitable for rare/uncommon species of plant.

ii. Invertebrates

Small heath butterfly *Coenonympha pamphilus* and small blue *Cupido minimus* butterfly have been recorded from gardens of Emmer Green in the early 1990s. These species inhabit species-rich grassland and chalk downland where their larval stages feed on fine grasses and kidney vetch (in the case of the small blue).

Habitats within the site are not considered suitable for rare/uncommon species of butterfly.

The records centre holds numerous records of stag beetle *Lucanus cervus* from within the local area. Stag beetles are saproxylic requiring deadwood to complete their lifecycle.

This species is unlikely to occur within the site, given the lack of woodland habitats, dead wood and dead stumps.

iii. Bats

No bats or evidence of bats were found during the initial bat survey of 14th August 2018. In particular, no bat droppings were noted within the loft space of the public house.

The public house and the bungalow were assessed as having 'low' bat roost potential, whereas all other buildings are assessed as having 'negligible' roost potential.

The semi-mature cherry *Prunus* sp. tree within the tree belt to the west of the public house was assessed as having 'low' bat roost potential due to a dense coverage of ivy *Hedera helix*.

No bats were seen to emerge from the public house or the bungalow during a dusk emergence survey carried out on 5th September 2018. Levels of bat activity were considered to be low, and there was no indication of bats emerging from any of the buildings.

Species of bat observed/recorded foraging and commuting within the site included common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus* and noctule *Nyctalus noctula*. Records of other species held by TVERC include Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, brown long-eared bat *Plecotus auritus* and Nathusius' pipistrelle *Pipistrellus nathusii*.

iv. Birds

No evidence of nesting birds was recorded within buildings during the inspection of 14th August.

A number of bird records from the local area are held by TVERC (see Appendix 4 of the survey report). The breeding bird assemblage within the site is likely to consist of common and widespread species of garden bird, with nesting opportunities limited to trees and scrub.

v. Reptiles

Slow worm *Anguis fragilis* have been recorded from gardens in Emmer Green on several occasions in the past. The species typically inhabits rough grassland with a thatched sward. The hard-standing and amenity grassland habitats are not considered to be suitable for slow worm and other reptiles, as they offer no obvious shelter. The dense bramble scrub is also considered unsuitable for reptiles.

vi. Amphibians

There are no ponds within the site. The hard-standing and amenity grassland habitats are not considered to be suitable for amphibians whilst on land, as they offer no obvious shelter. There are no records of amphibians including the great crested newt *Triturus cristatus* from within 1km of the site and it is considered that amphibians are absent from the site.

vii. Badgers

No badger *Meles meles* setts, or evidence of badger activity, were noted within the site.

viii. Other Species

The dense bramble scrub provides potential sheltering for hedgehogs *Erinaceus europaeus*.

- Potential Impacts

i. Sites of Nature Conservation Importance

There are no foreseeable impacts on Local Wildlife Sites. This is due to the distance of such sites from the proposed area of the development, as well as the scale of the proposals, which will have no foreseeable effects beyond the site boundary.

ii. Habitats

The proposed development will result in the loss of existing buildings (except for the barn), as well as areas of amenity grassland, scrub and hard-standing. These habitats are considered to be of negligible or low ecological value and their loss will have no foreseeable impacts on the ecology of site or the wider area.

The proposed scheme will also result in the loss of some trees, which will result in habitat loss within the site, but will not result in any foreseeable impacts within the wider context.

Compensatory planting is recommended to ensure that there will be no net loss of biodiversity.

iii. Bats

There is no evidence to suggest that the public house or other buildings at The Gardener's Arms are being used as places of shelter/protection by roosting bats. As a result of this conclusion, the proposed works to the buildings are unlikely to result in any significant impacts on bats or the places that they use for breeding, shelter and/or protection (roosts) and no specific compensation measures are considered necessary (Mitchell-Jones 2004).

With the adoption of careful works practices and the removal of the tree identified as having 'low' bat roost potential by an experienced arboriculturalist it is considered that impacts on bats can be avoided.

Since no significant impacts on bats are predicted under The Conservation of Habitats and Species Regulations 2017, a European Protected Species (bat) licence will not be required for the proposed works to proceed.

Since there are no predicted impacts on bats or their habitats, it is not necessary to consider the 'three tests' of The Conservation of Habitats and Species Regulations 2017 in this instance.

iv. Birds

Removal of woody vegetation during the bird breeding season may result in the damage or destruction of active birds' nests.

v. Hedgehogs

Without careful works clearance of the dense bramble scrub could result in the killing/injury of sheltering hedgehogs.

- Summary of the Survey Report

- A Phase 1 Habitat Survey and Preliminary Bat Roost assessment of the Gardener's Arms Public House, Emmer Green, Reading were undertaken on the 14th August 2018.
- The buildings within the site were surveyed for bats and evidence of bats in accordance with best practice guidelines published by the Bat Conservation Trust (Collins, 2016).
- Habitats within the site were evaluated and assessed for their potential to support protected species.
- Trees and scrub habitat are considered to be the features of greatest ecological value within the site and provide suitable habitat for nesting birds.
- Other habitats are considered to be of low ecological value, and of negligible value to protected species.
- Subsequent to the preliminary roost assessment, one bat activity survey (dusk emergence watch) of the public house and bungalow was undertaken on 5th September 2018, involving four surveyors; these two buildings are assessed as having 'low' bat roost potential (Collins 2016).
- The other buildings within the site are assessed as having 'negligible' bat roost potential (Collins 2016).
- One tree was assessed as having 'low' bat roost potential.
- No bats were seen to emerge from the dwelling during the emergence watch of 5th September 2018.
- With the adoption of careful works there are no foreseeable impacts on roosting bats or other protected species.
- Since significant impacts on bats and their roosts can be avoided a European Protected Species (bat) Mitigation Licence is not considered necessary in this instance.

• Ecological Enhancement of the Site

- Recommendations

i. Habitats

In order to compensate for the loss of trees, new areas of landscape planting should be designed, planted and managed to maximise their value to wildlife . One key element of this would be the species used within the planting, which should comprise native species (preferably of local provenance) where possible, as well as ornamental plants of known value to wildlife. The key will be to provide a variety of flowers and fruits throughout the year in order to provide food for insects and birds, as well as providing potential nest sites through the planting of trees and shrubs.

Native tree and shrub species which are considered suitable for the site were listed in the report.

ii. Bats

a. Timing of Works

No timing restrictions are considered necessary with regard to bats.

b. Careful Work Practices

Works should proceed in a careful and controlled manner. Contractors should be briefed with regard to the fact that individual bats can often exploit very small crevices as roost sites and that bats can move between roost sites on a regular basis.

The tree assessed as having 'low' bat roost potential (a semi-mature cherry) should be removed by an experienced arboriculturalist who should attempt to remove sections of ivy stems in order to expose the trunk before its removal.

In the very unlikely event that bats or significant evidence of bats (for example large accumulations of fresh bat droppings) are encountered, works should stop immediately and advice sought from a qualified ecologist.

c. Enhanced Roosting Opportunities

Roosting opportunities for bats could be incorporated in a number of ways. This could be achieved through integrated features or externally mounted bat boxes on new buildings.

Options include:

- Ibstock Bat Brick
- Schwegler 1FR Bat Tubes, integrated into buildings
- Schwegler 1FF or 1FQ Bat Boxes for external mounting on buildings
- Traditional wooden (oak) bat boxes for buildings and/or trees
- Beaumaris Woodstone Bat Box

Bat roosting opportunities such as these would be seen as an enhancement measure and one or two features would be seen as an appropriate level of enhancement in this instance. Where possible, bat roost features should be erected on south or east facing facades, and/or facing garden and boundary habitats. Exterior lighting should be avoided around bat roost features.

d. Lighting

External lighting should be minimised within any development proposals, unless it is

necessary for reasons of security and safety. In particular, lighting and light spillage should be avoided along the site boundaries. Avoidance of external lighting will ensure that bat activity is not adversely affected.

If lighting is required, it should be kept at low level and at low intensity, with hoods and baffles used to direct the light to where it is required (Bat Conservation Trust 2008, Emery 2008). To minimise the impact on bats, the use of low pressured sodium lamps is recommended in preference to mercury or metal halide lamps which have a UV element that can affect the distribution of insects and attract bats to the area, affecting their natural behaviour (Bat Conservation Trust 2008).

The key principals for choosing a suitable type of lamp are:

- Avoid blue-white short wavelength lights: these have a significant negative impact on the insect prey of bats. Use alternatives such as warm-white (long wavelength) lights as this will reduce the impact on insects and therefore bats.
- Avoid lights with high UV content: (e.g. metal halide or mercury light sources), or reduce/completely remove the UV content of the light. Use UV filters or glass housings on lamps which filter out a lot of the UV content.

Selecting an appropriate lamp unit that is designed to be environmentally friendly will minimise light spill, but further controls can be imposed by installing directional accessories such as baffles, hoods and louvres on lamps to direct light away from ecologically sensitive areas.

LED (Light Emitting Diode) units are an effective way to direct the light into small target areas and are recommended for lighting the proposed parking and turning area. Composite LEDs can be switched off to reduce/direct the light beam to specific areas.

iii. Birds

a. Timing

Removal of trees and dense scrub should be undertaken outside the breeding bird period, avoiding March to August inclusive.

b. Enhanced Nesting Opportunities

As an enhancement, it is recommended that nest boxes for common or garden bird species are erected on new buildings. Over 60 species are known to adopt nest boxes including blue tits, great tits, starlings, robins and sparrows.

The location and nature of the nest box depends on the species it is designed for; boxes for tits, sparrows or starlings should be fixed two to four metres up a tree or a wall; open-fronted boxes for robins and wrens need to be low down, below 2m, and well-hidden in vegetation. Unless there are trees or buildings which shade the box during the day, boxes should be faced between north and east, thus avoiding strong sunlight and the wettest winds. Consideration should also be given to the incorporation of house sparrow terraces and swift boxes within the new building.

On buildings, the integration of bird boxes is particularly recommended as species such as

house sparrow, house martin and swift will readily adopt such features as nest sites. The following bird nesting features are recommended:

- Ibstock Swift Box
- Schwegler Swift and Bat Box 1MF
- Schwegler Swift Box Type 25
- Schwegler House Sparrow Brick Box Type 24
- Schwegler Sparrow Terrace 1SP

iv. Hedgehogs

a. Careful Work Practices

Clearance of the dense bramble scrub should be undertaken carefully, contractors should be briefed as to the potential for sheltering hedgehogs to be present. In the event a sheltering hedgehog is encountered, the animal should be moved to a hedgehog house installed within the site.

b. Hedgehog Houses

At least two Igloo Hedgehog Houses will be installed within the new gardens.

c. Provision for Movement by Hedgehogs

A 13cm x 13cm will be cut at the base of every row of fence panels within the site to allow hedgehogs to move between gardens.

- Further Enhancement

The proposed development would fulfil the environmental requirements of SDPD Policy DM17, Policy CS36 and Core Strategy Core Objective 4, by making provision for a landscaped buffer to the rear of the site.

The rear part of the site is a designated green link which connects two areas of designated Public and Strategic Open Space Major Landscape Feature Areas to the north and south of the site. The area of land to the south of the site is also identified as a wildlife site.

The green link has been incorporated into the scheme though a buffer which lies within the gardens of plots 3 – 6 and between these plots and the rear gardens of the properties on Stuart Close. Being located within private garden space would ensure that the green link would be maintained, protected. It is proposed that this buffer be lined with a number of trees, the species of which have been identified on the site layout plans. Furthermore, it is not envisaged that the development would have an adverse impact on the function of wildlife corridors.

• Protection of Ecological Features

The applicant is not aware of any tree specific tree preservation orders but recognise that the trees on and adjacent to the site have wider protection through the conservation area designation. An arboricultural report has been undertaken. It is formed of two parts, one for general tree care and management and the second, tree work required in order to facilitate

the development. Following the recommendations of the arborist, a number of replacement trees are proposed (as referred to above) within the green link.

Following the mitigation measures as provided by the ecologist and arborist, the integrity of the Green Link would be protected, in the context of a holistic view of the Green Network as envisaged by relevant policies of the Core Strategy and Sites and Detailed Policies Document.

Further to any recommendations for protection made in the survey report, the specifications will require the protection of retained ecological features, specifically the trees and retained hedges, during site clearance and works.

Protection will be in accordance with BS 5837, Trees in relation to construction. This standard requires a tree protection plan to be developed which involves erecting physical barriers to prevent damage to existing trees, with an exclusion area around the trees. It also looks at defining a root protection area and requires consideration when compulsory work is carried out within the root protection area.