Stratford-on-Avon District Development Requirements Supplementary Planning Document (SPD)

Part V: Climate Change Adaptation and Mitigation

July 2020

Part V: Climate Change Adaptation and Mitigation

Contents

This part of the Development Requirements SPD provides further detailed guidance on the interpretation of the following Core Strategy policies in relation to climate change mitigation and adaptation, as appropriate:

- CS.2 Climate Change and Sustainable Construction
- CS.3 Sustainable Energy
- CS.4 Water Environment and Flood Risk
- CS.5 Landscape
- CS.6 Natural Environment
- CS.7 Green Infrastructure
- CS.9 Design and Distinctiveness
- CS.19 Housing Mix and Type
- CS.20 Existing Housing Stock and Buildings
- CS.22 Economic Development
- CS.25 Healthy Communities
- CS.26 Transport & Communications
- AS.1-9 Area Strategies
- AS.10 Countryside and Villages
- AS.11 Large Rural Brownfield Sites

It will be used by Stratford-on-Avon District Council to help reach decisions on whether to approve or refuse planning applications. Making sure that applications comply with the guidance contained within SPD will make it easier for the Council to grant planning permission.

V1. How to Use this SPD – The 5 Principles and Checklists

Stratford-on-Avon District Council is committed to tackling climate change, and in July 2019 the Council declared a 'Climate Emergency' as a pledge to take local action to contribute to national carbon neutral targets.

The National Planning Policy Framework (NPPF) recognises the role of the planning system in supporting the transition to a low carbon future by helping to shape places that contribute to reductions in greenhouse gas emissions, minimise vulnerability and improve resilience.

In February 2019 the independent Committee on Climate Change assessed whether homes are adequately prepared for the challenges of climate change. The Committee identified in its report 'UK Housing: Fit for the Future?' a number of actions including the need for new homes to be built to be low-carbon, energy and water efficient and climate resilient.

In a joint report by the Royal Town Planning Institute and Town and Country Planning Association 'Rising to the Climate Crisis: A Guide for Local Authorities on Planning for Climate Change' (Dec. 2018) it is acknowledged that whilst work is needed at an international and national level, local action is also needed as the solutions to many of the adverse impacts of climate change need to be developed locally.

Land use planning can contribute to the transition to a low-carbon future, centred on the following 5 principles based around two key themes:

1. Reducing greenhouse gas emissions
    - Principle 1: Increasing accessibility - reducing the need to travel by private car
    - Principle 2: Improving energy efficiency

2. Implementing adaptation and mitigation measures
    - Principle 3: Adapting to higher temperatures
    - Principle 4: Mitigating flood risk
    - Principle 5: Mitigating biodiversity loss

This SPD relates to all types of development, including householder applications, changes of use, new build, as well as the retrofitting of renewable and low-carbon technologies and adaptation measures to existing buildings. To assist in the application of the SPD, checklists have been provided within Appendices 1-3 enabling applicants to provide a minimum level of climate change adaptation and mitigation measures, centred around the 5 key principles, within their schemes. Detailed guidelines for how to apply the checklists to new development proposals is provided within **Section V9**. Please note that the checklists do not apply to proposals relating solely to the retrofitting of measures. Advice in this respect is set out in **Section V2**.

Many of these principles apply not only to new development but also to other types of schemes promoted by local authorities and other agencies, such as public parks, playing fields and transport projects. As such the principles and measures set out within this SPD should be applied to a wide range of other schemes wherever possible.

Case Studies that demonstrate the 5 key principles being applied in practice within existing developments in the District and County are provided within Section V8.

V2. Retrofitting into existing buildings

The existing building stock will continue to form the vast bulk of buildings in the District. As such, most of the climate impacts relating to buildings will come from those already built. The Council is therefore supportive of property owners who wish to retrofit appropriate adaptation and mitigation measures into their existing buildings.

Whilst the use of checklists primarily relates to the incorporation of measures into new developments, this partly includes the existing building stock through applications for conversions, changes of use and residential householder developments.

However, many of the measures set out in this SPD also relate to retrofitting into existing buildings and the guidance will be applicable to property owners who are thinking about introducing or enhancing measures within their buildings that help to address the effects of climate change.

It is possible to make significant annual energy and water savings, and reduce greenhouse gas emissions through implementing solutions which improve the performance of existing buildings to make them more resilient to climate change. This process is known as retrofitting and relates to both residential and non-residential buildings.

V.2.1 Permitted Development and Planning Permission

The type, location and scale of the climate change measures proposed on a specific site will determine whether or not planning permission will be required. Some measures may be capable of being installed without needing planning permission. This is known as 'permitted development'. Please note that not all homes and buildings have permitted development rights and they may vary by individual property. Guidance related to Permitted Development Rights can be found via the Planning Portal and assistance may also be provided via Stratford-on-Avon District Council's Planning Service in this respect. It is also possible to establish whether a proposal is lawfully 'permitted development' or whether it requires planning permission by applying for a Lawful Development Certificate.

Should permission be required then proposals will be considered in terms of their impact within the locality and a balanced judgement will be required taking into account factors such as design, climate benefits, and impact on heritage and local amenity.

Further information on Permitted Development is available at the Planning Portal at:

- https://www.planningportal.co.uk/info/200187/your_responsibilities/37/planning_permission/2
- https://www.planningportal.co.uk/info/200140/greener_homes

Information on Lawful Development Certificates is available from the Planning Portal at:

- https://www.planningportal.co.uk/info/200187/your_responsibilities/37/planning_permission/3

Information on how to apply for planning permission to Stratford-on-Avon District Council is available at:

- https://www.planningportal.co.uk/info/200127/planning
- https://www.stratford.gov.uk/planning-building/the-application-process.cfm
- https://www.stratford.gov.uk/planning-building/pre-application-advice.cfm

The Council's Planning Service can be contacted by:

- Email: planning.applications@stratford-dc.gov.uk
- Tel: 01789 267575

V.2.2 Sections within this SPD that are applicable to retrofitting

SPD Section	Measures that may fall under Permitted Development (PD).
V.3.1 Density and Mixed Uses • Digital technological adaptations	Not defined as 'Development' so does not need planning permission.
V.3.4 Cycling • Cycle Storage • Electric Charging Points • Shower facilities in non-residential developments	Storage facilities, charging points and showers in an existing building would be PD. Recommend checking the Planning Portal for other advice on the need for planning permission.
V.3.5 Planning for the Car • Electric Charging Points	Recommend checking the Planning Portal.
V.4.1 Reducing the need for energy • Orientation and window positioning to maximise solar gain • Use of planting to provide shade in summer • Natural ventilation • Food Growing	For new or changed windows recommend checking the Planning Portal. Planting is not development and does not need planning permission.
V.4.2 Using Energy More Efficiently • Higher levels of insulation • Solar/low energy internal and external lighting	Internal insulation and lighting is not development and does not need planning permission.
V.4.3 Using Renewable Energy • Photovoltaics (PV) • Solar Water Heating • Micro Wind Turbines • Air Source Heat Pumps • Ground Source Heat Pumps • Water Source Heat Pumps • Biomass Heating • Micro Hydro • Thermal Stores	Recommend checking the Planning Portal.
V.4.4 Using Clean and Efficient Fossil Fuels • Combined Heat and Power	Recommend checking the Planning Portal.
V.5.1 Shade and Ventilation – The Cooling Hierarchy • Glazing designed for natural ventilation and reducing heat gain	For new or changed windows recommend checking the Planning Portal.
V.5.2 Use of Cool Materials • Exterior materials that minimise heat gain in summer	Recommend checking the Planning Portal.
V.5.3 Green Infrastructure • Green Infrastructure • Green/Brown/Blue Roofs • Green Walls	Planting is not development and does not need planning permission.

V.6.1 Sustainable Urban Drainage Systems (SuDS) • Rain gardens	Likely to be permitted development.
V.6.2 Water Efficiency and Rainwater Harvesting • Rainwater harvesting such as water butts	Likely to be permitted development.
V.6.3 Flood Risk Design Principles • Use of permeable surfacing • Green Infrastructure	For surfacing recommend checking the Planning Portal. Planting is not development and does not need planning permission.
V.7.1 Bio-enhancing existing green space • Using different varieties of native species for landscaping	Planting is not development and does not need planning permission.
V.7.2 Background Wildlife Capacity • Wildlife Friendly planting • Wildlife habitat enhancements such as bird/bat boxes, hibernacula, hedgehog holes and homes • Trees and hedgerows	Planting is not development and does not need planning permission.
V.7.3 Local Wildlife Nodes and Blue/Green Corridors • Green/Brown/Blue roofs • Greening and Blueing outdoor spaces	Planting is not development and does not need planning permission.

Relevant Planning Portal links to a variety of retrofitting measures is set out below:

Electric Vehicle Charging Points:

- https://www.planningportal.co.uk/info/200130/common_projects/16/electrics/2

Glazing:

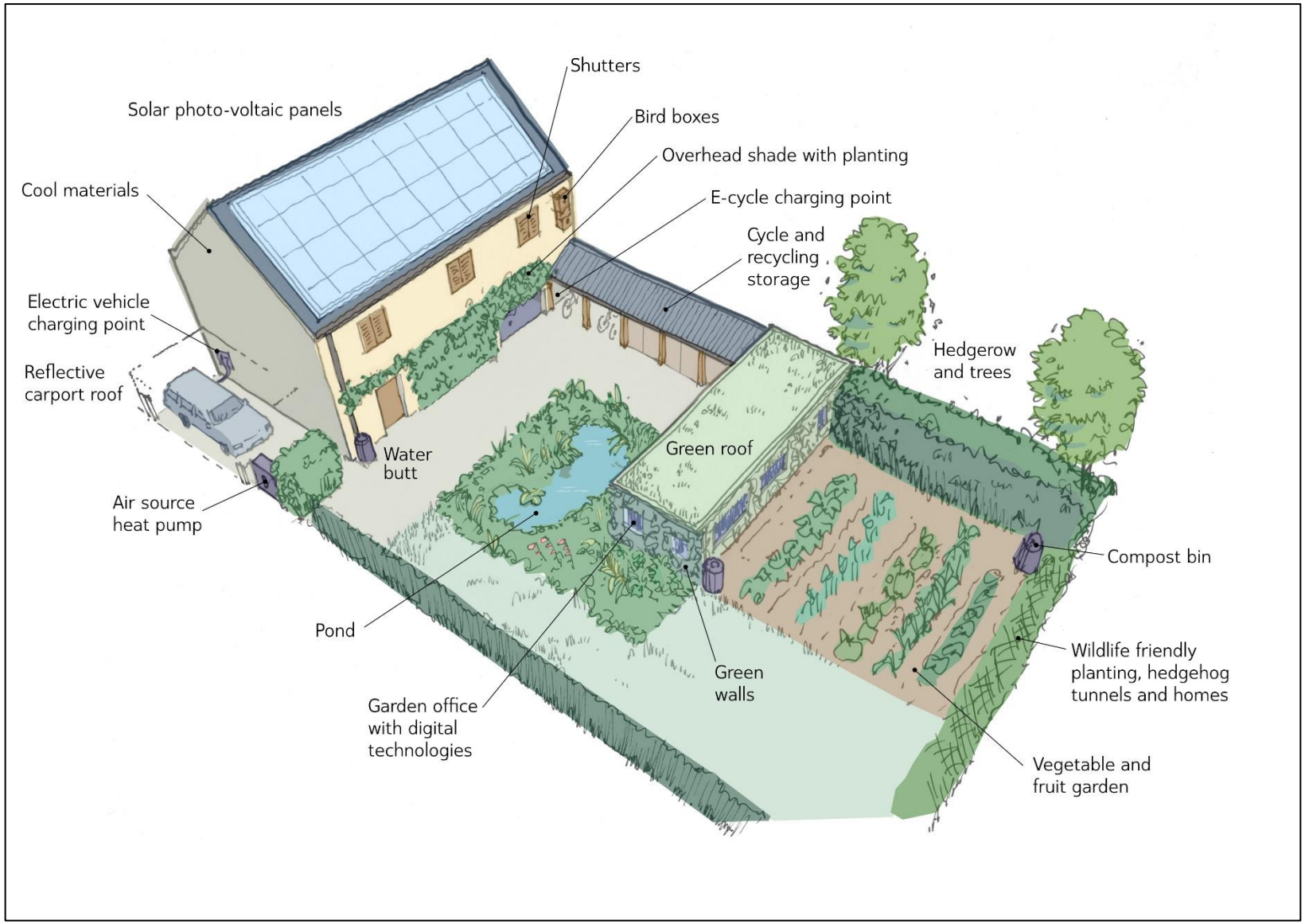
- https://www.planningportal.co.uk/info/200130/common_projects/76/energy_saving/2

Home energy generation:

- https://www.planningportal.co.uk/info/200130/common_projects/75/home_energy_generation

Lighting:

- https://www.planningportal.co.uk/info/200130/common_projects/35/lighting



Ideas for retrofitting climate change adaptation and mitigation measures into homes

V3. Principle 1: Increasing accessibility - reducing the need to travel by private car

Private cars contribute towards a large proportion of the UK's total carbon emissions, with transport being the largest contributor to greenhouse gas emissions in Britain. This has primarily been caused by an increase in the length of trips taken and a modal shift towards the car as well as changing land use patterns. Air pollution is a major factor in contributing towards poor health. However, by encouraging people to use more sustainable modes of transport such as public transport and by encouraging walking and cycling, this can help lead to a reduction in poor air quality as well as having positive mental health and physical benefits. There are opportunities for more sustainable transport choices and healthy lifestyles through well planned development and providing practical and sustainable alternatives to private car travel is therefore critical to tackling the climate crisis.

A report by the Urban Transport Group 'Making the Connections on Climate' (Nov. 2019) highlights the connections that can be made on climate change between transport and energy, and between transport and the decarbonisation and adaptation of the built interventions. Rail is a low carbon mode of transport and it can and will play a key role in helping to minimise the carbon impacts of transport through modal shift. Consideration should be given to enhancing cycle facilities at stations in order to help mitigate the impact from development and encourage interconnecting travel by more sustainable modes of travel.

However, Stratford-on-Avon District is an area of relatively small towns and rural settlements and this context needs to be borne very much in mind when considering viable alternatives to the private car and light commercial vehicles. Where possible, routes should form a coherent network linking both existing and new infrastructure to key destinations and trip origins. These networks should encourage and allow people to travel sustainably without needing to use a car. As it is likely that people will be encouraged to work from home more regularly in the future, good design to facilitate this is supported and encouraged. Furthermore, homeworking can lead to a reduction in car travel.

This section of the SPD provides details of how interventions can be achieved in new development within the District, as well as investment in infrastructure. There are likely to be other new and emerging technologies in the future and therefore development proposals are not restricted to only those technologies listed within it.

V.3.1 Density and Mixed Use

Density plays an important part in reducing people's reliance on using a private car. Higher density developments can make destinations easily accessible by walking or cycling and can bring people together to support local public transport, facilities and local services. Due to Stratford District being rural in nature, an appropriate density will need to be considered for each new development which will help form the context, accessibility, proposed building types, form and character of the area.

Mixed use developments can provide a wide range of services and facilities including employment opportunities, schools, healthcare provision, recreational and leisure facilities, open green spaces and many more. These developments will be expected, where appropriate, to include good cycle and pedestrian access to these facilities and to

be located within 10 minutes (800m) walking and cycling distance of dwellings.

Further information on how developments can be designed to incorporate principles of higher density and mixed uses is available in Part A: Achieving Good Design

Case Study

An example of how higher densities can be successfully used order to reduce the need to travel by the private car is in the **Case Study of the Arden Quarter, Stratford-upon-Avon** in Section V8 (Case Study 1)

V.3.2 Walkability/Permeability

Built form defines a pattern of streets and development blocks. These should be appropriate to the location enabling people to easily move both within and into and out of the site. New developments should provide active frontages that are directly accessible by foot and overlooked from the street. This can help in reducing crime by providing natural surveillance and ensuring streets are community friendly which in turn encourages walking and social interaction.

Developments should provide permeable networks as these encourage walking and cycling and make places easy to navigate through, especially for visitors. Signage should be provided on all new developments to show the main pedestrian and cycling routes to village centres and key facilities and to make it easy for pedestrians and cyclists to find their way through new developments. Signage should be clear and include the distance to key facilities and approximate timings to encourage and promote walking and cycling. Consideration should be given to providing seating/resting places along well used routes to assist less mobile persons to reach key facilities and litter bins in order to prevent litter and ensure that these routes remain attractive.

Cycle and walking routes should become green/blue corridors to encourage wildlife and habitats as well as making these routes more attractive. This could also include tree lined streets.

Where possible, routes should form a coherent network linking both existing and new infrastructure to key destinations and trip origins. These networks will allow people to travel sustainably without needing to use a car.

Case Study

For an example of how to make developments more pedestrian friendly, please see the **Case Study of Northgate, Warwick** in Section V7 (Case Study 2)

V.3.3 Integrated Active Travel

All modes of transport should be positively designed in the built form. A well designed and connected network will ensure that people are given the maximum choice as to how they travel including by rail, bus, other public transport, walking and cycling. Development should be directed to areas that minimise the need to travel and maximise the use of sustainable modes of transport, with walking and cycling actively

being promoted to and from the development site, including employment sites. This includes maximising the number of internal pedestrian and cycle routes through the site as well as maximising the number of external routes into and out of the site. All large-scale developments should ensure that key facilities such as schools, shops, GP surgeries, recreation and play areas and bus stops are well connected by walking, cycling or public transport provision.

Sustainable modes of transport including the introduction of car clubs, car sharing opportunities, park and ride facilities and rail will all be supported. In accordance with Core Strategy Policy CS.26, travel plans should be provided on relevant developments to mitigate unacceptable transport impacts which directly arise from the development in order to promote sustainable travel patterns for work and education related trips.

New homes should receive guidance/information booklets providing information on a range of measures such as sustainable travel options, composting initiatives, renewable energy options and contact details of organisations who can provide advice and guidance.

Cycling and walking provision should provide suitable crossing facilities where necessary as well as appropriate lighting levels and security measures to ensure the safety and security of pedestrians and cyclists. When considering the provision of pedestrian and cycling routes and facilities these should be designed for all users including elderly and disabled residents.

Where there is existing pedestrian/cycling provision, developments should consider whether it is suitable for its proposed use, taking into consideration existing and future links to public transport. These should be improved where appropriate.

The National Design Guide (Oct. 2019) forms part of the government's national planning practice guidance and identifies 'movement' as one of ten characteristics of well-designed places, and highlights the need for an integrated network for all modes of transport giving people maximum choice in how to make their journeys, prioritising pedestrians and cyclists.

Case Study

An example of how a residential development can be designed to promote walking, cycling and public transport as realistic modes of travel is in the **Meon Vale Case Study** in Section V8 (Case Study 3)

V.3.4 Cycling

Cyclists should be directed to routes that are free from motorised traffic. Where this is not possible and cycle routes are provided where there is a higher volume and speed of motor traffic, these should be well designed, segregated spaces to accommodate all cycle traffic. Cycle infrastructure should provide connections that link origins and key destinations, provide direct routes and give priority to cyclists at junctions.

An appropriate amount of cycle storage guided by the standards set out in Tables O1 and O2 of the Development Requirements SPD must be provided for each new dwelling as well as on new employment, leisure, retail and commercial development sites. This should be secured, covered, have good surveillance and be sited conveniently Therefore, consideration will need to be given to the overall design of cycle storage at an early stage of the planning process and full details of this, including the location, type of storage,

spacing, numbers, method of installation and accessibility to the storage should be provided with the planning application.

Cycle storage provision will also be required in householder proposals where additional bedrooms are proposed, and where sufficient site area is available.

Shower facilities should be considered and integrated into non-residential developments to facilitate commuting by cycle.

Consideration should be given to electric charging points for e-bikes on new developments as well as grouped locations for cycle hire. This would need to be considered on a case by case basis as it will be dependent on the size of development.

Further guidance on cycling and cycle parking can be found in

Part O: Parking and Travel

V.3.5 Planning for the Car

Policy CS.15 of the Core Strategy seeks to distribute development to sustainable locations in the District, with most development taking place in Stratford-upon-Avon and the Main Rural Centres and through the creation of two new settlements. This remains the principle mechanism for addressing Climate Change in the District Council's planning policy through the delivery of sustainable development and the promotion of linked trips through improved facilities for walking, cycling and public transport, leading to reduced reliance on the private car.

Car free developments should be considered in locations where the following may apply:

- Extension, alteration or re-use of an existing building with no access to parking;
- Reversion of a previously converted property to its original residential use, including flats above shops;
- Where 100% cycling or walking provision is considered to be a viable option;
- Highly sustainable locations within a 10-minute walk or cycle (800m) of a full range of services, facilities and frequent public transport services.

Consideration should be given to good design and layout in order to accommodate visitor parking and communal parking. Where there are communal parking areas these should be broken up by planting where possible to improve the design and layout, help to improve biodiversity and assist with surface water drainage.

Developments should aim to create streets that control the speed of vehicles using appropriate traffic calming measures. For residential streets, one of the main objectives should be to achieve a maximum design speed of 20mph.

In conjunction with WCC Highways, 'Idle-free zones' (defined areas where vehicles are banned from running engines whilst stationary) outside of sensitive sites such as schools, shops, hospitals and GP surgeries will be strongly encouraged, so as to reduce air pollution and carbon emissions caused by idling vehicles.

Electric Vehicle Charging

At least one electric vehicle charging point per unit should be provided for residential developments, with dedicated parking or 1 charging point per 10 spaces where there is unallocated parking. For commercial, retail and industrial at least 10% of parking spaces should have electric charging points. These may be phased with 5% of initial provision and the remainder being provided at an agreed trigger level. The minimum specifications for charging points is set out in Part R of the Development Requirements SPD and higher specifications of charging infrastructure is welcomed by the Council.

Further information can be found in

Part R: Air Quality

V4. Principle 2: Improving energy efficiency in buildings

The UK needs to increase its use of renewable energy for a number of reasons. The increasing impact of the climate change emergency means that carbon dioxide emissions and other greenhouse gases must be reduced. Global energy demand is projected to rise over the coming years as a result of population growth and the desire for higher living standards. At the same time, affordable finite resources (including crude oil and natural gas) are depleting.

Using renewables will help the UK to recover some of its energy self-sufficiency together with assuring that more imported energy comes from reliable sources. An RTPI Research Paper 'Planning for a Smart Energy Future' (July 2019) sets out the main features of 'smart development' that use smart technologies to minimise their carbon emissions. There are likely to be other new and emerging technologies in the future and therefore development proposals are not restricted to only those technologies listed within the Research Paper.

Water efficiency measures are encouraged in order to reduce the demand on water resources, reduce water use and cut down on domestic carbon emissions as well as those from treatment of water. Proposals that encourage technologies for the efficient use of water will support Severn Trent's Water Resource Management Plan (2019).

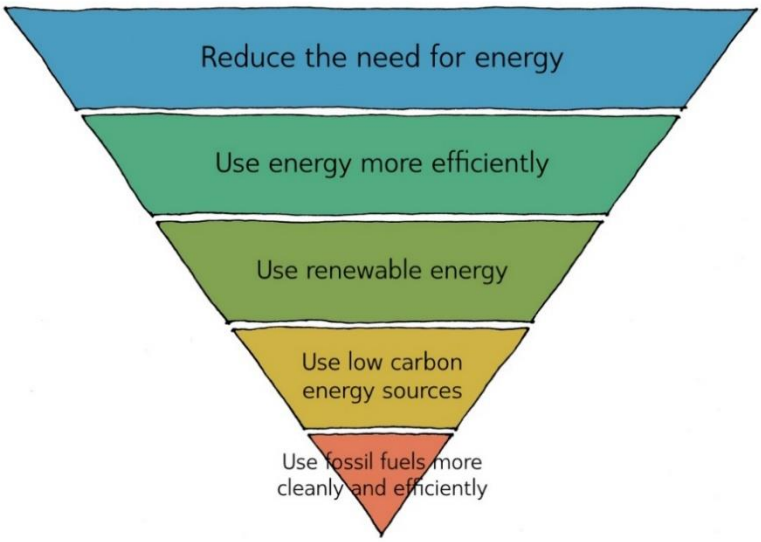
Changes to Part L and Part F of the Building Regulations as part of The Future Homes Standard have recently been consulted on by the Ministry of Housing Communities and Local Government (MHCLG). This will require new build homes to be future-proofed with low carbon heating and high levels of energy efficiency, and is expected to be introduced by 2025. As such, the measures proposed in this SPD accord with the direction of national policy and building regulations.

The Energy Hierarchy

Well-designed schemes and a fabric first approach should be considered at the beginning of the design process. The building of more sustainable buildings will require the Energy Hierarchy to be taken into account from the outset of the design process.

In order to achieve low carbon development, the Energy Hierarchy provides the most practical and cost effective methodology. Developments should consider how energy use can be minimised and the order in which these energy saving and 'green' energy measures should be prioritised are set out in the Energy Hierarchy below. Consideration should also be given to measures which will help to reduce fuel poverty in households where those who are on lower incomes can't afford to keep themselves warm at a reasonable cost. The National Design Guide (Oct. 2019: Ministry of Housing, Communities and Local Government) identifies the need for new developments to follow the energy hierarchy in order to conserve natural resources.

The Energy Hierarchy



V.4.1 Reducing the Need for Energy

Developments should ensure that they are well designed in order to minimise overheating and achieve internal comfort. The following should be considered:

- Design, layout and aspect of internal spaces that reduces the risk of overheating and fuel poverty
- Insulation, air tightness and thermal mass
- Management of solar gain to minimise in summer and maximise in winter
- Natural ventilation which can be easily closed to maximise air tightness
- Positioning, size and orientation of windows
- Outdoor space for food growing.

Passive solar design should be considered as this exploits free heat and light energy provided by sunlight entering buildings through windows and uses air movement for ventilation. In order for this to be effective, the initial design will need to take into account sun orientation and potential shading by landscape design or other buildings. This should be considered at the earliest stage of planning the layout of the development.

Public and other open spaces should be well designed and incorporate planting, structures and water for comfort and appeal. This will ensure there is shade and shelter for users, improve air quality and help to mitigate the effects of pollution. Deciduous trees can help to provide shade to buildings and manage solar gain when needed in the summer months.

New developments should use sustainable materials; for example, using recycled or composite materials, as well as those that have been locally sourced and therefore reduce the carbon footprint of the development both during construction and over its lifetime.

Proposals for new dwellings and domestic buildings which incorporate renewable energy technology prior to occupation, in a manner which would be Permitted Development if the building or dwelling house had already been lawfully occupied, will be strongly supported.

Proposals which incorporate renewable energy technology in new domestic premises in a manner which exceeds Permitted Development thresholds are to be encouraged and will be assessed on their merits against the provisions of the Development Plan and government guidance.

Self-grown food by householders can reduce carbon emissions by reducing food miles as well as the number of car journeys used to visit supermarkets. Allotments should therefore be provided on new developments. If allotments require land drainage, they should ensure that they have a suitable outfall and do not increase flood risk to surrounding land. Rainwater reuse will be encouraged on allotments in addition to water butts, such as rainwater harvesting systems as these reduce the reliance on mains water. They should not be sited on areas that are prone to waterlogging, flooding, or in areas shaded by buildings and trees. Soil should be of good quality and be suitable for food production where possible. A mains water supply is essential, as well as a shed and a connected water butt for each allotment plot, as well as ensuring they can be easily accessed by adequate cycling and walking provision.

The concept of 'Edible Planting' is where fruiting and nut trees (such as apple, pear, plum etc.), fruiting shrubs (such as raspberry, blackcurrant, gooseberry etc.) and herbs and perennial herbs (such as basil, parsley, sage etc.) are planted for both human harvesting and as an animal food source is supported.

The production of compost by householders both encourages the growing of food in gardens, and reduces the amount of food waste sent to landfill. It can also produce a more sustainable form of fertilisation when compared to commercially available composts, mulches and fertilizers. Developers are strongly encouraged to include composting facilities in residential development rear gardens, for example a compost bin to be provided for each new dwelling. If this is not suitable, consideration should be given to providing communal home composting areas on new developments. Communal home composting areas should be situated in areas which are easily accessible and would not have an adverse impact on the local community.

Passivhaus

Passivhaus is a standard for energy efficiency in a building and can be applied to both residential and non-residential development. The Council welcomes Passivhaus schemes within the District and further information on the standard can be found at:

http://passivhaustrust.org.uk/

Case Study

An example of a Passivhaus scheme in the District is the **Wootton Wawen Case Study** in Section V8 (Case Study 6)

V.4.2 Using Energy More Efficiently

Dwellings and other buildings should ensure that the highest level of insulation as possible is provided, including thermal bridge free design and ensuring buildings are air tight, and that lighting is the most energy efficient– for example, by using LED lightbulbs. Air tightness is equally important and natural ventilation should not compromise air tightness. Where dwellings include integrated appliances these should be the most energy efficient with a minimum of A+ rating.

Building Regulations currently set out minimum standards for energy efficiency in new buildings, however it is desirable to incorporate energy efficiency measures that go well beyond these minimum standards and the Council would welcome such approaches.

In order to help make properties more resilient to flooding in future, the installation of self-closing airbricks in flood risk areas is encouraged for all new developments. This will help to mitigate future impact of surface water flooding as a result of climate change. For further mitigation measures in relation to flood risk see V6. Principle 4: Mitigating Flood Risk.

V.4.3 Using Renewable Energy

There are a range of options available to incorporate renewable energy into new developments, and the best solution will depend upon the individual circumstances of a particular proposal. The Environment Agency should be consulted on all proposals beforehand as permits or, in some cases, abstraction licences may be required for which consent is not automatically given. The main options for renewable energy are set out below.

There are likely to be other technologies emerging in the future and therefore the SPD does not restrict the use of only applying the technologies within this section; other new and emerging technologies will be considered on their merits.

Photovoltaics (PV)

Solar Panel systems, also known as PV, capture the sun's energy using photovoltaic cells. The cells do not need direct sunlight to work as they can still generate some electricity on cloudy days but it is important to avoid shading. Small amounts of shading can cause disproportionate performance penalties and software exists to assess effects of shading and should be utilised in cases of doubt.

The cells convert sunlight into electricity which can be used to run household appliances and lighting.

The installation of PV panels will need to be sensitive to all developments, particularly those in Conservation Areas and relating to Listed Buildings. In such cases, ground-mounted PV panels may be preferable. Guidance on how Photovoltaics may be installed on historic buildings or within historic sites is available in the following Historic England report: Energy Efficiency and Historic Buildings: Solar Electric (2017)

The best position for solar panels would be on a south facing roof, due to the intensity of the sun for longer periods of time. However, they are still effective on east and west facing roofs too.


Bishopton, Stratford-upon-Avon

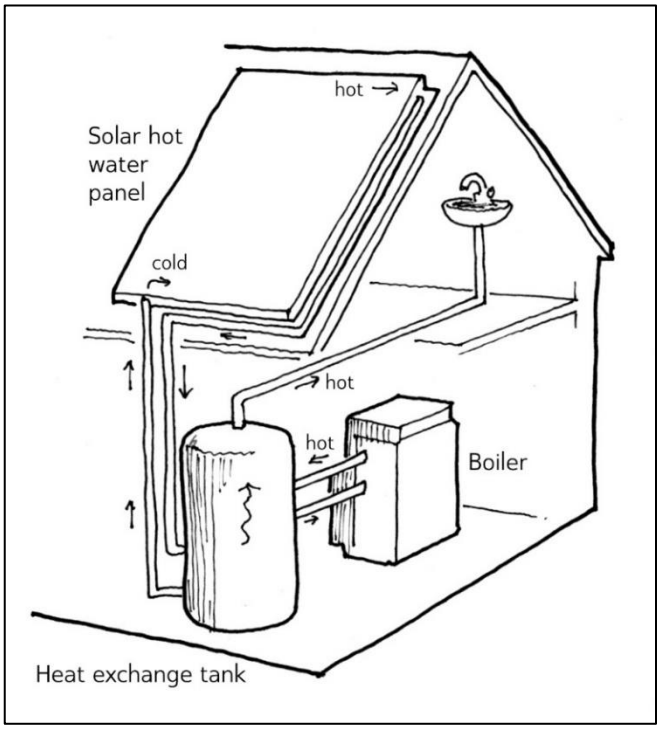
Case Study

For an example of a development in the District where solar panels have been integrated within a small housing development, please see the **Hampton Lucy Case Study** (Case Study 4) in Section V7

Solar Water Heating

These systems or 'solar thermal' systems use free heat from the sun to warm up domestic hot water. If solar energy is unavailable or there is a desire to have hotter water, heating should be provided but note that gas boilers are now not preferred and these will be inadmissible after 2025.

Once the initial installation has taken place, the hot water costs should be reduced and solar hot water is a green, renewable heating system which can reduce carbon dioxide emissions. Solar collectors are usually installed on roofs, but they can also be ground-mounted.



Solar Water Heating System

District Heating

District heating schemes deliver heating and hot water to multiple buildings from a local plant. District heating can use low carbon energy sources, including renewable energy technology such as water source or ground source heat pumps. In some cases, it can be combined with electricity production in combined heat and power (CHP) or in combined cooling, heat and power (CCHP).

Further information is available within

Part Q: District Heat Networks

Micro Wind Turbines

These generate electricity by harnessing the power of wind. Wind turbines catch the wind by using large blades and as the wind blows, the blades are forced round, driving a turbine which generates electricity.

Electricity generation is generally around a few hundred watts which would be enough to power energy efficient light bulbs on a windy day throughout a typical home.

Micro wind turbines are often only efficient if installed in undisturbed air flow, i.e. well clear of roofs and trees. If attached to buildings, the design should limit mechanically transmitted noise within the building.

Air Source Heat Pumps

These absorb heat from the outside air which can then be used to provide hot water and to heat the building, preferably by under floor systems which provide greater efficiency than radiators.

Although heat pumps will have some impact on the environment as they require electricity, the heat which is extracted from the air is constantly being renewed naturally.

Depending on the type of fuel that is being replaced the home could see lower carbon emissions.

Careful consideration should be given to noise issues that may be associated with this technology. To ensure that there are no negative impacts on the street scene or character of the area, design and siting must also be given appropriate consideration.

Case Study

For an example of a development in the District where renewable energy has been integrated within housing, please see the **Hereburgh Way Case Study** (Case Study 5) in Section V7

Ground Source Heat Pumps

Ground source heat pumps are used to heat underfloor or warm air heating systems, hot water and radiators, maximum efficiency is normally obtained with underfloor heating. They use pipes that are buried underground to extract heat from the ground, although boreholes should also be considered as they take up less space which means

that there is more land available for other infrastructure such as planting, ponds etc. The ground source heat pump circulates a mixture of water and antifreeze around a pipe, called a ground loop, which is buried in the garden. Heat from the ground is absorbed into fluid which passes through a heat exchanger and into the heat pump. The benefits of using a heat pump is that as the ground remains at a fairly constant temperature under the surface, the pump can be used throughout the year.

If these replace conventional electric heating, depending on which fuel is being replaced there could be lower home carbon emissions. As well as heating the home it will also heat water and minimal maintenance is required.

Water Source Heat Pumps

These work on a similar principle to air source and ground source heat pumps. They take advantage of the consistent temperatures found in a body of water rather than taking advantage of the heat in the air or the ground.

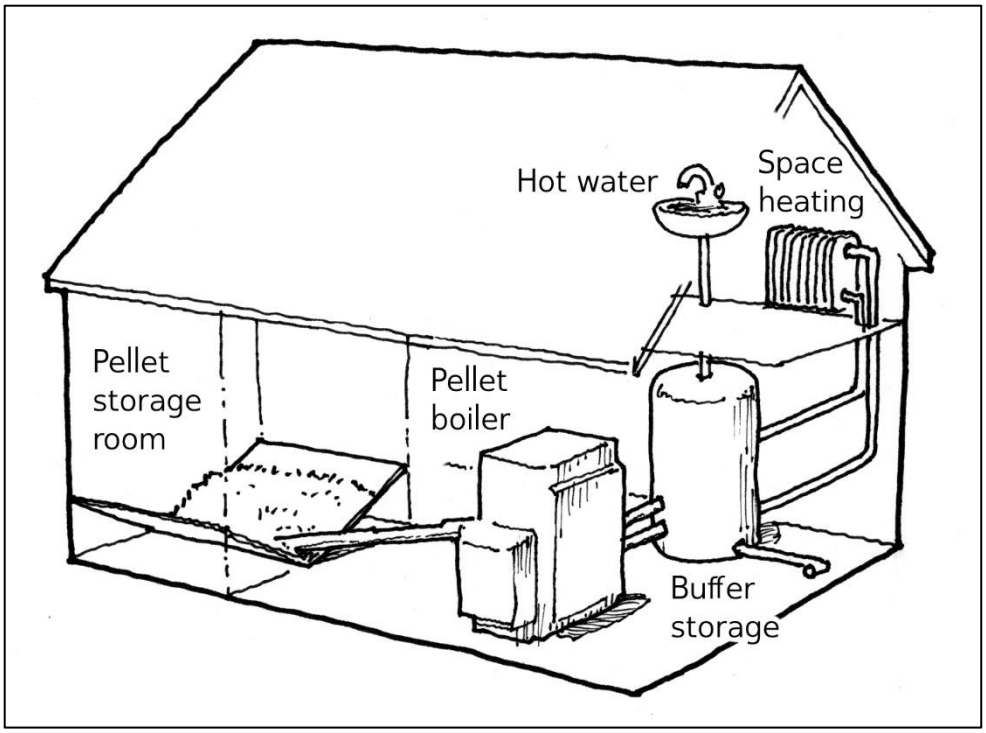
There will be a series of pipes submerged in a body of water, such as a river, stream or lake. A heat pump pushes working fluid through the network of piping, and the fluid absorbs the heat from the surrounding water as it goes.

The fluid is then compressed by an electric compressor which raises the temperature. A heat exchanger can be used to remove the heat from the working fluid, providing hot water that can be used for space heating (radiators but preferably under floor heating for maximum efficiency). Once the heat is removed from the fluid via the exchanger, it is pumped back through the pipes, completing a continuous cycle.

Biomass Heating

Proposals for Biomass will be considered on a case by case basis and will only be appropriate in certain locations, where there are no unacceptable environmental or amenity impacts.

This is a low-carbon and renewable energy source which burns solid fuels such as wood chips and logs to provide heating and hot water. A stove burns logs or pellets to heat up a single room and a back boiler to provide water heating as well. The boiler burns logs, pellets and chips and is connected to a hot water system and central heating. Biomass heating is likely to require a permit from the Environment Agency.



A typical biomass system

Please see the following website for further information:
https://www.energysavingtrust.org.uk/renewable-energy

Micro Hydro

In small streams or larger rivers, small or micro hydroelectricity systems or just hydro systems (also called hydropower systems) can produce enough electricity for lighting and electrical appliances in an average home.

All streams and rivers flow downhill and before the water flows downhill it has potential energy due to its height. The greater the height and the more water there is that is flowing through the turbine, the more electricity that can be generated.

These systems can generate for 24 hours a day, generating all the electricity that you need and more. Excess power that is generated can be used to heat up the home and hot water too.

Hydroelectricity is green, renewable energy and doesn't release harmful carbon dioxide or other pollutants into the air.

Thermal Stores

These can be used with individual renewable heating technology or by combining different renewable heating technologies. They can also be used as a renewables technology with a conventional boiler or immersion heater.

Thermal stores have been proven to work well with wood-fuelled biomass boilers, heat pumps, wind energy and solar water heating systems.

These are good ways of storing and managing renewable heat until it is required. Battery storage allows for energy to be stored for use at a later time. For example, if solar panels are installed these can generate electricity during daylight. If a battery is in place, the energy can be used later when the sun is no longer shining.

V.4.4 Using Clean and Efficient Fossil Fuels

Combined Heat and Power (CHP)

This is a technology that is highly efficient, capturing and utilising the heat that is a by-product of the electricity generation process. As CHP generates heat and power simultaneously it can reduce carbon emissions by up to 30% when compared to the separate means of conventional generation via a boiler and power station. Domestic CHP systems are currently powered by LPG or mains gas, however in the future there may be models powered by oil or bio liquids. This technology is still considered to be 'low carbon' even though LPG and gas are fossil fuels as it can be more efficient than just burning a fossil fuel for heat and electricity from the national grid.

CHP systems are likely to require a permit from the Environment Agency.

Building Research Establishment Environmental Assessment Method (BREEAM)

All non-residential development should achieve as a minimum requirement, a BREEAM 'good' standard. BREEAM ratings for buildings range from Acceptable to Pass, Good, Very Good, Excellent and Outstanding. Exceptions to this requirement will be made where it is considered the BREEAM standards are not appropriate or feasible for the proposed development, on a case by case basis and where the applicant has provided sufficient justification to demonstrate it is not viable.

BREEAM measures sustainable value in a series of categories, ranging from energy to ecology. In order to achieve a particular rating level, the minimum overall percentage score must be achieved through meeting the minimum standards. Further information can be found at www.breeam.com

V5. Principle 3: Adapting to Higher Temperatures

Climate change is anticipated to increase average annual temperatures globally, as well as the occurrence of extreme temperature events, resulting in a more severe threat of heat-related mortality. This is expected to disproportionately affect vulnerable groups such as the elderly and disabled, which due to the District's ageing population, will be an increasingly important issue for Stratford-on-Avon to address. As such, future-proofing the design of new homes and commercial developments to adapt to the effects of higher and more extreme temperature change is an important component of climate change adaptation in the District.

V.5.1 Shade and Ventilation – The Cooling Hierarchy

The cooling hierarchy is an established method of ensuring that developments are cooled in the most sustainable and energy efficient manner possible.

New development proposals, including both residential and non-residential proposals, must utilise the cooling hierarchy within the design of new development as set out below.

1. **Passive design** - using energy efficient design to reduce the amount of heat entering the building in the warmer months. This can be achieved through appropriate orientation, overhangs and shading, albedo, fenestration, insulation and green roofs. Heat can also be reduced within the building through high ceilings and exposed internal mass; however, provision must be made for night purging of heat through secure ventilation. Such ventilation should be closable to preserve air tightness in cold weather.
2. **Passive/natural cooling** – using outside air to ventilate and cool a building without using a powered system.
3. **Mixed mode cooling** – using a mixture of both passive cooling methods and: a. Mechanical cooling, such as fan powered ventilation (preferred option) b. Air conditioning (not preferred option due to being energy intensive).
4. **Full building mechanical ventilation/cooling system using the lowest carbon/energy options** – only to be considered after all other elements of the hierarchy have been considered.

Proposals must always utilise the preferred options 1 and 2 of the hierarchy, unless there are exceptional circumstances that make options 3 or 4 the only feasible methods of ventilation. Where a non-preferred option (i.e. options 3 - 4) of the cooling hierarchy has been incorporated within development proposals, robust justification will be required for why the preferred options (1 and 2) have not been used.

Householder applications will be encouraged to demonstrate how they have considered the principles of the cooling hierarchy within the design.

New development proposals should integrate cooling features within their design. Examples of such features include overhangs, external blinds, louvres and shutters. High performance glazing, such as low-e glass and smart glass will be encouraged in new developments where large areas of glazing are proposed, particularly to south facing aspects, so that the level of solar heat gain can be managed. The

appropriateness of different types of cooling features will depend on the type, scale and location of the development proposed. It should be noted that the above list of potential cooling features is not exhaustive, and other forms of cooling measures are also available.

V.5.2 Use of Cool Materials

Roofs and Paving

Where local site constraints (including conservation and historic considerations) allow, new or replacement roofs, pavements and hardstanding will be encouraged to be constructed using cool materials.

Cool roof materials are light in colour or have solar reflective properties, and can significantly reduce the solar heat gain produced by roofs by minimising the amount of light converted into heat and increasing the amount of heat that is radiated away from buildings. Whilst this can result in increased heating requirements for buildings in winter, the overall net outcome is positive as cool roofs reduce the need for artificial cooling in summer. In comparison, solar heat gain in winter is usually less of a consideration as hours of direct sunlight are reduced, and residential heating requirements are not usually during the day when solar heat gain occurs. However, in designing cool homes, applicants should note that this may result in increased energy costs in winter. Homes should not be designed to be excessively cold in winter as this may disadvantage the elderly and disabled who are more likely to be at home during the daytime.

Cool roof materials include primarily the use of clay, ceramic or concrete tiles, asphalt shingles or metal roofs. Cool roof reflective coatings include the use of white, pigmented or aluminium coatings, as well as roofing membranes made from felt, fibreglass or polyester, or alternatively, single-ply thermoplastic. Whilst white roofs provide the best cooling outcome, more traditional roof colours can also be produced to reflect more sunlight. Curved tiles also provide greater cooling effects than flat tiles, by allowing air to circulate below the surface.

Cool pavements and hardstanding can be achieved by using permeable surfaces and light coloured materials. Permeable surfaces can cool local temperatures through the process of evapotranspiration, whilst light materials are more solar reflective and therefore absorb less heat.

V.5.3 Green Infrastructure

Green/Brown/Blue Roofs

A green roof (or Biodiverse Roof) has seeds or plants introduced into the substrate of the roof at the time of construction. A brown roof is where the roof surface is left to self-vegetate. Blue roofs store water and can act as attenuation storage, storing water for irrigation, cooling of buildings or non-potable use within the building. Green, brown and blue roofs can provide evaporative cooling, reducing the 'heat island' effect of built-up areas. They can also extend the life of the roof by shielding it from the harmful impact of UV rays. In addition, they can provide a more suitable surface for solar panels by providing a more consistent ambient temperature.

Both green/brown/blue roofs and cool roofs lower surface and surrounding air temperatures, and decrease energy demand. However, green/brown/blue roofs also offer additional benefits such as filtering and reducing storm water run-off, enhancing biodiversity and reducing air pollution. Blue roofs can also act as attenuation storage.

All proposals for green, brown and blue roofs must demonstrate that sufficient and ongoing maintenance is available, as well as access to the roof to undertake the maintenance requirements.

Green Walls

Green walls can provide multiple benefits including providing a natural cooling effect and enhancing biodiversity, particularly on sites without sufficient space for traditional green infrastructure (for example, town centre apartment blocks). Green walls will be encouraged in all new developments, where appropriate and where sufficient maintenance can be provided.

Green walls at Fordham House, Stratford-upon-Avon

Further information on green roofs and walls is available in

Part E - Architectural Style, Construction and Materials

Green/Blue Corridors

Green/blue corridors are strips of green and/or blue (watercourse) infrastructure which link green/blue spaces in developments to the surrounding biodiversity network. They can have multiple benefits, including the cooling of local temperatures, the provision of flood management and the enhancement of biodiversity.

Trees and Landscaping

Research undertaken by the Forestry Commission indicates that areas with many trees can be as much as 4 degrees cooler than places in the same city without vegetation (Forestry Commission, 2019).

Trees should be integrated into layouts to provide natural cooling to surrounding buildings, ensuring that trees are of appropriate size, location and orientation to provide maximum cooling benefits to buildings. Trees should be incorporated into all new development schemes unless site constraints prevent this, and existing trees should be retained on site where feasible.

In considering the relationship between trees and buildings, the design of site layouts will be expected to ensure that trees are given adequate space, including sufficient allowance for future growth.

Trees should also be included within street design, public open space, pedestrian and cycle routes to provide shading and temperature reduction to the surrounding area.

Where feasible, new car parks should include trees, landscaping and/or areas of grass/greenery to provide a natural cooling effect. The implementation of car park shading structures will be supported where appropriate.

The following considerations for trees should be adhered to when deciding how to incorporate trees into site layouts:

- Health and condition of the tree;
- Age and species of tree;
- Size of the tree when mature; and
- Location (to avoid future conflicts and maximise cooling benefits).

The Good Homes Alliance (July 2019) states that the level of blue/green infrastructure considered to have a beneficial effect on reducing temperatures is at least 50% cover, within a 100m radius from the site. As such, new developments will be encouraged to meet this standard, although it will be most easily achieved within a rural context and in low-density developments. Green walls/roofs can also be included towards meeting this figure.

Proposed landscaping should utilise appropriate native plants to the site. Non-native species may also be appropriate in some circumstances, dependent on species and specific site constraints.

Guidelines on suitable planting can be found within the Tree and Design Action Group Guide for Specifiers, available at the following webpage:

http://www.tdag.org.uk/species-selection-for-green-infrastructure.html.

Further information on trees can be found in

Part M - Landscape Design and Trees

Case Study

For an example of where adaptation to higher temperatures has been designed into a development in the District, please see the **Jaguar Land Rover Case Study** in Section V8 (Case Study 7)

Maintenance of Green Infrastructure

Green Infrastructure plays an important role in mitigating the higher temperatures that are predicted to occur as a result of climate change, and as such will be encouraged in all new developments. However, the management of green infrastructure and landscaped areas requires careful consideration, and therefore it is strongly recommended that the design of these spaces is discussed at the pre-application stage of all proposed major developments.

Example of a grass swale in a Harbury housing development. Swales are a type of SuDS consisting of a wide, shallow grass covered depression, leading surface water from a drained surface to a storage or discharge system.

Further information on Green Infrastructure can be found in

Part N – Biodiversity and Green Infrastructure

V6. Principle 4: Mitigating Flood Risk

Climate change is anticipated to increase the occurrence of extreme weather events, including both flooding and drought events. As such, adapting development to efficiently manage the use and storage of water is considered to be a critical component of effectively mitigating the effects of climate change.

V.6.1 Sustainable Urban Drainage Systems (SuDS)

SuDS can provide biodiversity benefits by mimicking natural drainage on sites and minimising the impact of development through filtering sediment and contaminants out of surface water runoff.

Further information on SuDS can be found in

Part N - Biodiversity and Green Infrastructure

New development proposals should integrate SuDS at the design stage of site layouts, ensuring that they are incorporated into the proposals at the earliest stage. The type of SuDS that may be appropriate will depend on the type and location of the development proposed. All schemes for the inclusions of SuDS should demonstrate high quality design and that the proposed SuDS and development will fit into the existing landscape. Types of SuDS that may be implemented include:

- Rainwater gardens
- Infiltration basins and trenches
- Soakaways
- Filter drains
- Swales
- Detention basins
- Retention ponds
- Filter strips.

Good SuDS design can be key for creating a strong sense of place and pride in the community for where people live, work and visit, making the surface water management features an integral part of developments.

Trees, hedgerows and other vegetation also play an important role in improving surface water drainage in SuDS strategies. The planting of trees and hedgerows to support SuDS will be encouraged and existing trees and hedgerows should be retained on site unless there is overriding justification for their removal.

Wherever feasible and safe to do so, SuDS provided should be multifunctional in nature. For example, SuDS can also be used as features within playgrounds, recreation areas or landscaping within a development.

SuDS should follow the Drainage Hierarchy within National Planning Policy Guidance, as follows:

1. Into the ground (infiltration)
2. To a surface water body
3. To a surface water sewer, highway drain or another drainage system
4. To a combined sewer

Sufficient SuDS maintenance for the lifetime of the development should be incorporated within all SuDS proposals. Completed SuDS schemes for Major and Minor development should be accompanied by a maintenance schedule detailing maintenance boundaries, responsible parties and arrangements to ensure that the SuDS are maintained in perpetuity.

Applicants will be encouraged to utilise SuDS guidance contained in the SuDS Manual C753 available at:
https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

Rain Gardens

Rain gardens are a form of SuDS that can be implemented in small areas where other SuDS methods are not appropriate or feasible. They consist of small depressions in the ground that act as infiltration points for roof water and other surface water that is low in contamination. Rain gardens are easy to maintain, provided that they are incorporated as part of an appropriately designed and managed landscaping scheme.

All minor and householder developments with sufficient outdoor space should integrate rain gardens into development where soil conditions allow for infiltration, unless another form of SuDs is being proposed.

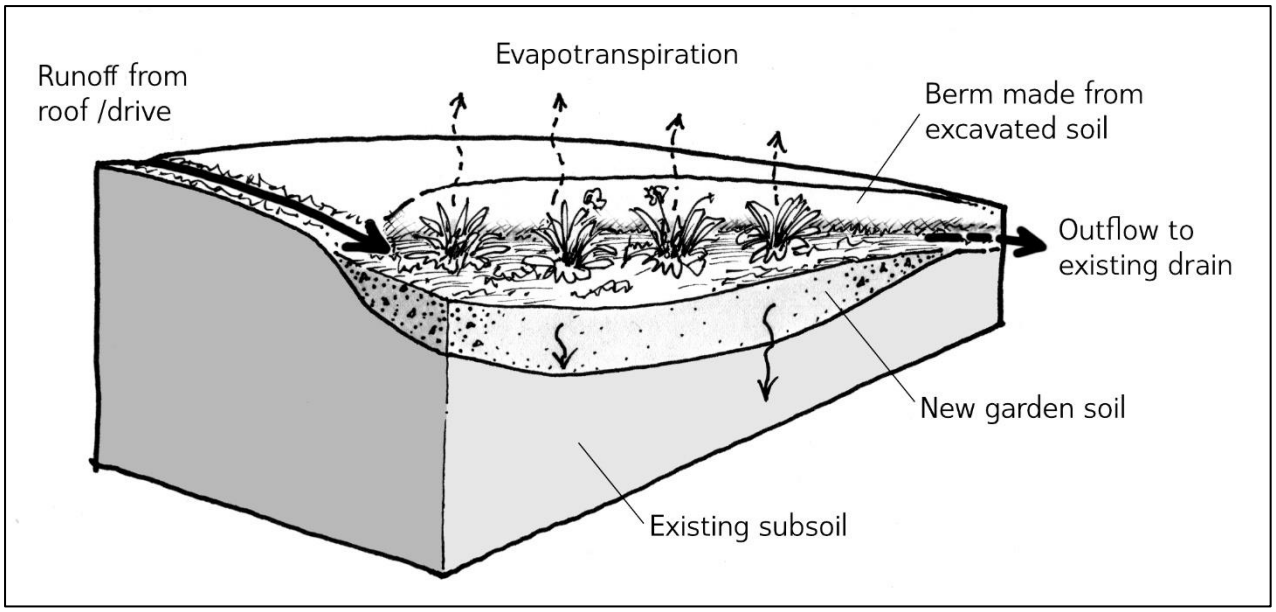


Diagram of a typical rain garden

Case Study

Examples of developments within the District which have successfully incorporated SuDs are provided within the **Meon Vale and Hereburgh Way Case Studies** in Section V8 (Case Studies 3 and 5)

V.6.2 Water Efficiency and Rainwater Harvesting

Retrofitting water efficient measures into buildings can often be costly, time consuming and difficult to implement. As such, water efficient measures should be integrated at the design stage of new developments.

Rainwater collection facilities such as communal rainwater tanks and water butts should be installed in all residential developments and householder developments where appropriate.

In accordance with the requirements of Core Strategy Policy CS.4 (Water Environment and Flood Risk), non-residential developments will be expected to achieve a minimum 'good' BREEAM standard. This standard requires a minimum level of water consumption improvements over baseline usage.

Further information on BREEAM can be found at: https://www.breeam.com/

Low carbon rainwater harvesting and/or greywater recycling systems will be supported within new developments as a method to increase water efficiency. These options need to be properly considered at the earliest possible stage in the design process to determine whether a dual pipework system is required.

In addition to the requirement for non-residential developments to meet the BREEAM 'Good' standard for water efficiency, all development proposals will be encouraged to meet the optional higher water efficiency requirement of Part G of Building Regulations, and not exceed 110 litres/person/day.

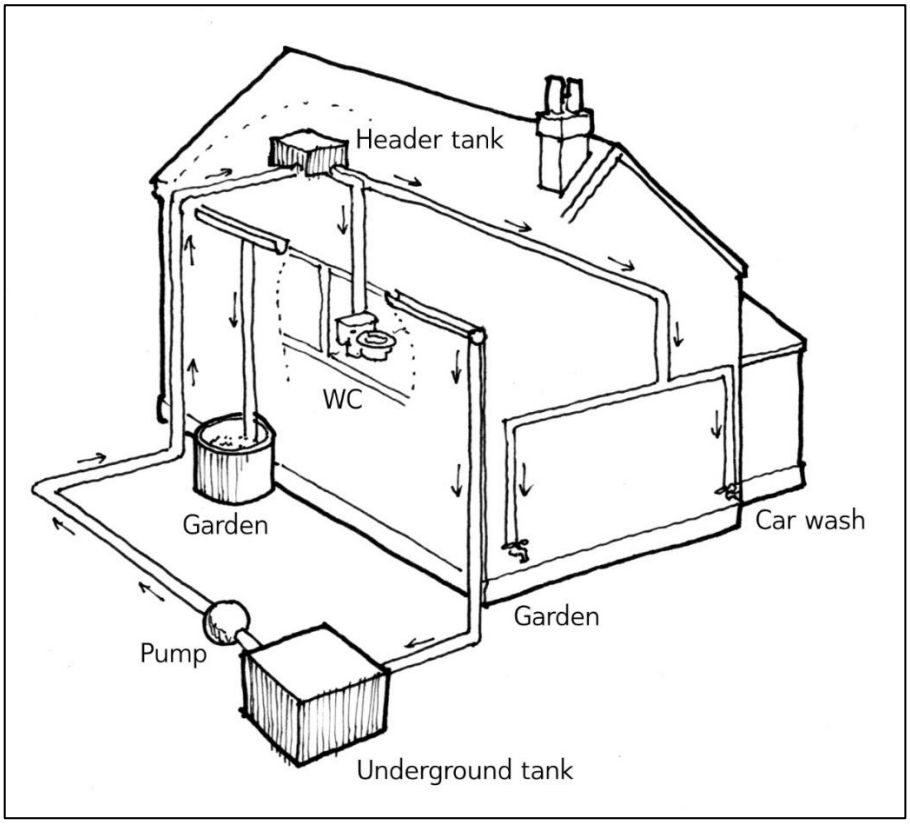
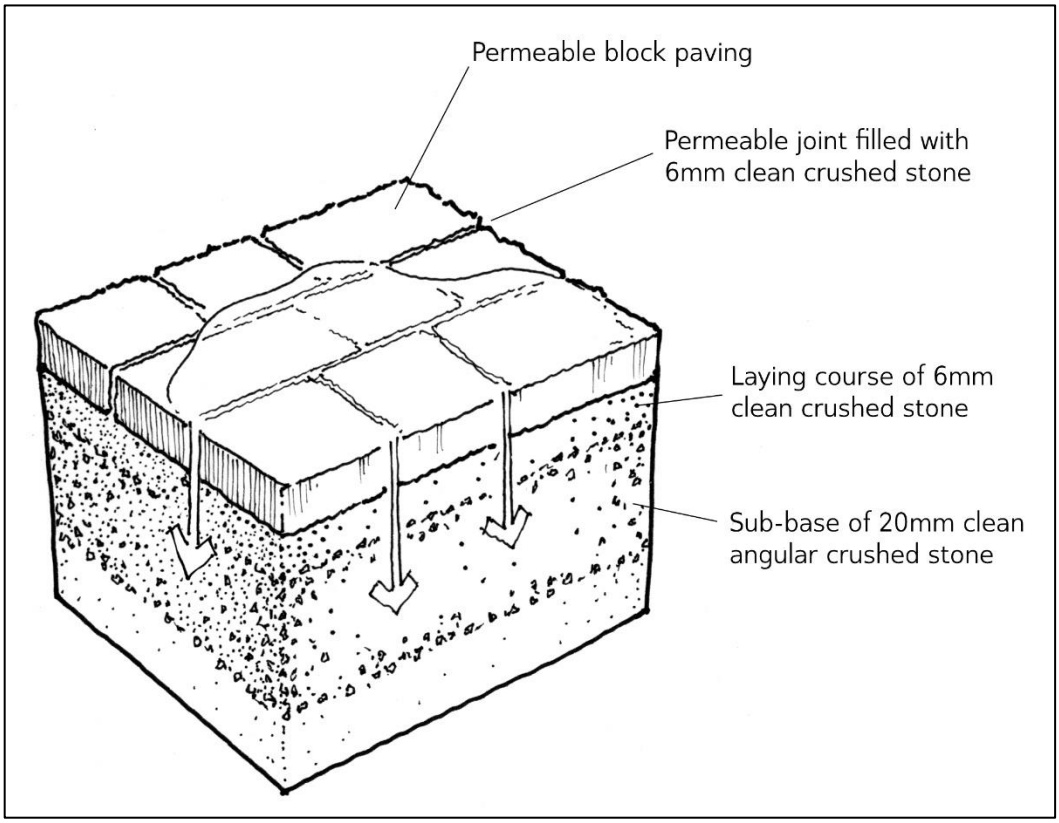


Diagram of a rainwater harvesting system

V.6.3 Flood Risk Design Principles for New Developments

The landscaping of new developments should be designed to respond to the increased likelihood of both drought and flooding as a result of climate change.

Permeable surfaces should be used for all hardstanding, driveways and paved areas in new and existing development to allow for enhanced drainage of surface water.



Typical structure of permeable paving

Green roofs will be encouraged as an appropriate method of reducing and filtering storm water run-off from buildings; blue roofs are also an effective method of storing excess water.

Further information on green roofs is available in

Part E - Architectural Style, Construction and Materials

CIRIA have produce a tool called the 'B£ST tool' which can be used to calculate the monetary values of blue/green infrastructure. The tool can be used to assess how SuDS feature contribute to the four pillars of water quantity, water quality, biodiversity and amenity value. It is available to download here: https://www.susdrain.org/resources/best.html

For developments where a Flood Risk Assessment is required, applicants must consider the climate change allowances for peak river flow, peak rainfall intensity and floodplain compensation. Where applicable, applicants will be encouraged to use the highest level of climate change allowance identified for the time period covering the lifetime of development, based on the appropriate River Basin serving the development. Further information is available at:
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

In line with Environment Agency advice, new development should maintain at least an 8m easement between any built development and the top of the bank of a watercourse and/or the toe of a flood defence to allow for maintenance and inspection requirements. Greater buffers of 20m are preferred as they can allow for access for larger maintenance works, minimise future impacts on flood flow routes, and account for the natural movement of watercourses during a development's lifetime. The suitability of a 20m buffer is dependent on several factors, including but not limited to:

- The size of the watercourse;
- Whether there are existing flooding issues from the watercourse in the vicinity of the site;
- The anticipated change to watercourse flows over time;
- The size of the development site;
- Whether there are alternative means to access the watercourse in the vicinity of the site; and
- Whether there are any flood defence works planned in the vicinity of the site.

Where a 20m buffer is considered appropriate and beneficial to the flood risk management of the site and will help reduce flood risk to the proposed development and/or surrounding area, these will be encouraged.

Buildings with stilts should not be used as a flood management method. Areas under stilts are often used as storage spaces and have the potential to become blocked during flood events which will have a cumulative impact in terms of flood risk.

Case Study

An example of a non-residential development within the District which has successfully incorporated water efficiency is the **Jaguar Land Rover Case Study** in Section V8 (Case Study 7)

V7. Principle 5: Mitigating Biodiversity Loss

The effects of climate change are predicted to have particularly negative impacts on biodiversity and wildlife habitats, thereby affecting oxygen production, carbon storage and the natural filtering of toxins. The Environment Bill, announced in October 2019, proposes to make provision for biodiversity net gain a condition of most planning permissions in England. As such, providing opportunity to mitigate against biodiversity loss and enable local plant and animal species to thrive is therefore considered to be a key goal for new development in the District. Core Strategy policies CS.6 (Natural Environment) and CS.7 (Green Infrastructure) set out the Council's approach to conserving and enhancing existing biodiversity assets and the creation of new biodiversity provision.

All measures to implement green infrastructure and enhance biodiversity should be undertaken holistically, ensuring that connectivity is maintained and enhanced. Development should maintain existing linear features such as hedgerows and respect existing blue/green corridors such as rivers in the landscape by leaving a buffer to enable people and wildlife to move freely in response to climate change. Maintaining and improving connectivity is crucial to ensuring the local populations are resilient. The impact of improving a site for wildlife is magnified when the site is connected to other species rich areas or wildlife corridors.

V.7.1 Bio-Enhancing Existing Green Space

Opportunities to enhance biodiversity are available across all scales of development, with a need to minimise impacts on and provide net gains for biodiversity. Working with Warwickshire County Council, Major and Minor scale development proposals will be expected to secure a net gain in biodiversity, unless exceptional circumstances satisfactorily demonstrate that this is not possible. Warwickshire County Council Ecological Services have produced a Biodiversity Impact Assessment (BIA) calculation, based on the Defra metric, to measure the biodiversity impact of Minor and Major development proposals. Where a development will have a negative impact on a biodiversity asset, 'offsetting' will be sought in line with the Warwickshire County Council biodiversity offsetting programme.

In order to enhance and mitigate against the loss of existing biodiversity, development proposals will be expected to provide wildlife friendly planting and landscaping within proposed green infrastructure. A variety of native species should be used to enhance local biodiversity. For details of species of plants native to different areas of the district, please refer to Part N (Biodiversity and Green Infrastructure) of this SPD and Warwickshire Landscape Guidelines.

Proposed landscaping in major developments should incorporate informal areas of planting to encourage wildlife and biodiverse habitats.

For more information, please see

- https://www.gov.uk/government/consultations/biodiversity-net-gain-updating-planning-requirements
- Part N (Biodiversity and Green Infrastructure) of this SPD
- https://www.warwickshire.gov.uk/biodiversityoffsetting

V.7.2 Improving Background Wildlife Capacity

Measures to improve the background wildlife capacity of an area should be incorporated into all new developments. These can include enhancements at a range of scales and can therefore be included in a variety of development types from householder applications to major developments.

It should be noted that the Environment Bill proposes to make biodiversity net gain a condition of all development proposals with the exception of householder developments and some brownfield sites. It is expected that this Bill will mandate the use of the Defra metric when calculating biodiversity impact in developments.

Wildlife habitat enhancements such as bird/bat nesting boxes, hibernacula (places for animals to hibernate), amphibian kerbs, hedgehog holes in fencing and hedgehog homes should be incorporated within all new developments wherever appropriate.

External lighting can negatively affect wildlife, as well as wasting energy. Applicants will be encouraged to assess as to whether developments could take place without external lighting or whether it can be designed and located to be less intrusive and/or regulated, such as timed to switch off late at night, to minimise its impact on nocturnal species.

Innovative methods to encourage biodiversity will be encouraged where sites are constrained by scale, topography or other considerations. For example, green walls can be incorporated into many different types of development including large scale commercial and residential buildings. These can be planted with native species of ferns and wildflowers to enhance the biodiversity of the development, without requiring any additional site area to implement. Green/brown roofs are another alternative where flat roofs are proposed, and can be retrofitted to existing buildings.

In major developments, proposals should aspire for less than 50% of the wider site (excluding buildings) to consist of paved/hardsurfaced areas. Lawns, planting beds, trees, allotments, gardens, ponds and other landscaping features can all contribute to enhancing local biodiversity, as well as providing a natural cooling effect and enhance drainage. Green roofs and walls can also contribute towards the 50% target.

Trees should be incorporated into all major developments and also into minor developments where feasible. Veteran trees and trees which are of high public amenity value should be retained within site layouts. The removal of protected trees will be resisted unless there are overriding planning reasons for doing so. Tree planting should take account of the considerations detailed in Section V5 to maximise cooling benefits to buildings, as well as the guidelines provided within Part M of this SPD.

Incorporating trees into street frontages has multiple benefits, including reducing local temperatures, improving air quality, enhancing biodiversity and improving wellbeing of residents. Major developments will be expected to include trees in all primary street frontages. Trees should also be incorporated into the street frontages of minor developments where possible. Trees should be provided with suitable protection from vehicle collision where near to vehicle routes and parking areas.

Development proposals should retain native species hedging within and surrounding sites wherever feasible. The planting of native species hedging within and surrounding sites will also be encouraged as a method to enhance biodiversity and background wildlife capacity. The District Planning Authority will not support proposals for close

board fencing to the side and rear of properties where these would be visible in the public realm or adjacent to the countryside, in accordance with Part D (Buildings and Layout) of the adopted Development Requirements Supplementary Planning Document. In all other cases, it will discourage the use of close board fencing where hedgerows between properties and at the boundaries of sites would be appropriate. Such hedgerows should use wildlife friendly, and native plant species. Where close board fencing is proposed, such fencing should include 'hedgehog holes' so as to allow connectivity for wildlife.

V.7.3 Local Wildlife Nodes and Blue/Green Corridors

Green/blue corridors are strips of green and/or blue infrastructure which link green/blue spaces in developments to the surrounding biodiversity network, enabling the bridging of habitats where they have been separated by human development. The provision of these will be encouraged in all major developments, and also in minor developments where appropriate. They can be either land or water corridors, and can be designed to incorporate walking and cycling routes, thereby reducing reliance on the car by promoting active travel, as well as enhancing biodiversity and encouraging wildlife in the area. Where walking and cycling routes are proposed, these should integrate green/blue infrastructure. Blue/green infrastructure can have multiple benefits, including flood management provision, the encouragement of biodiversity and the lowering of local temperatures.

The creation of local wildlife nodes, utilising underused land such as verges at junctions and street corners for wildlife friendly planting and wildlife habitats will be encouraged in new and existing developments. Proposed planting must appropriately maintain highway safety, such as keeping important pedestrian and vehicle visibility splays clear, and avoid long term conflicts with building foundations.

Development near watercourses, such as blue corridors, will be expected to provide easements in accordance with the criteria set out in Section V.6.3.

Pocket parks are small areas of public green space which involve the reuse of areas of land for community benefit. They can be both natural and more formal in character, and provide a green open space that also offers habitat opportunities to enhance biodiversity and a way for people to connect with nature. Developments which propose the creation of appropriately managed pocket parks will be encouraged.

Further information on enhancing biodiversity in developments can be found in

Part N – Biodiversity and Green Infrastructure

Case Study

Examples of residential developments that have incorporated biodiversity are the **Meon Vale, Hampton Lucy and Wootton Wawen Case Studies** in Section V8 (Case Studies 3, 4 and 6)

V8. Case Studies

This section contains a number of case studies which address different aspects of climate change mitigation and adaptation and are considered to be examples of good practice.

Case Study 1: The Arden Quarter, Stratford-upon-Avon

The Arden Quarter lies on the edge of Stratford-upon-Avon town centre consisting of 198 homes in a range of types and scales. Designed at a higher density, the site is in close proximity to a range of facilities such as the town centre, train station and bus interchange. As such, the development promotes the use of sustainable travel through its central location, reducing the need for travel by private car.

Principle 1: Reducing the need to travel by private car

The Arden Quarter, Stratford-upon-Avon

Case Study 2: Northgate, Warwick

This scheme in Warwick Town Centre was undertaken by Warwickshire County Council in order to make the area more pedestrian and cyclist friendly. This area was heavily congested and very car dominant, making it extremely unsafe for pedestrians to cross and access the town centre.

For pedestrians, there have been improvements by way of wider pavements, increased lighting, landscaping and a small pedestrian square with seating area together with improved accessibility into the town centre. In order to make it safer for pedestrians and cyclists, informal crossing points have been constructed as well as a raised table and narrow carriageways for cars encouraging them to slow down.

Principle 1: Reducing the need to travel by private car

Before and after photographs of Northgate, Warwick (Source: Warwickshire County Council)

Case Study 3: Meon Vale, Long Marston

Meon Vale is a large residential development which includes up to 1,050 new homes, a community centre, leisure centre, sports pitches and convenience store as well as a business park on a 190 hectare site.

This site has been designed to promote walking, cycling and public transport as realistic modes of travel but has also recognised the need to use the private car. The site provides direct cycle and pedestrian connections and parts of the site will link to the Greenway extension that runs through the site. This development has seen a 1 mile extension to the existing Greenway into Stratford upon Avon which allows connectivity to employment and leisure by walking and cycling.

There will be direct bus connections with the surrounding network which includes a 2 ½ hourly peak service between Moreton in Marsh and Stratford upon Avon. This is an increase in frequency of the current service.

The development has been sensitively designed to minimise the impact on local wildlife by retaining important habitats and maintaining or improving pathways to enable species to move freely within the site. There is public access to 35 acres of woodland which is provided as part of the development and an attractive lake and lakeside area as part of the Sustainable Urban Drainage System (SuDS).

Principle 1: Reducing the need to travel by private car

Principle 4: Mitigating Flood Risk

Principle 5: Mitigating Biodiversity Loss

Meon Vale, Long Marston

Case Study 4: Replacement dwelling and additional new dwelling in Hampton Lucy

This development incorporates a number of features that contribute to climate change adaptation and mitigation:

Energy Efficiency
The dwellings have been orientated to maximise solar gain and incorporates high quality walling and roofing materials to optimise insulation internally, along with triple glazed windows.

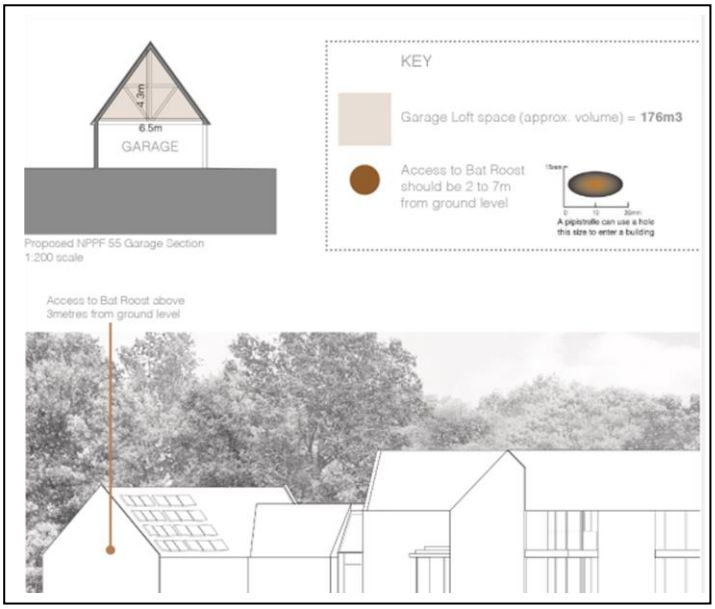
A powerwall home battery has been incorporated which charges using the energy from solar panels and a back-up storage solution. A Mechanical Heat Recovery System which can recover 90% of the heat from 'stale air' on extraction, in addition to a Heat Pump and Earth Energy Bank are also incorporated.

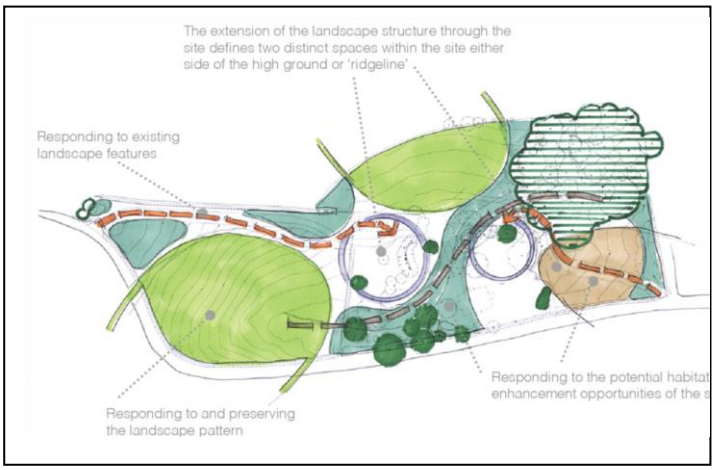
Mitigating Flood Risk and Biodiversity Loss
Enhancements to the site includes native species rich hedgerows, semi-improved grassland, a swale, species rich meadow, bird boxes and bat lofts.

Principle 2: Improving Energy Efficiency

Principle 4: Mitigating Flood Risk

Principle 5: Mitigating Biodiversity Loss





Case Study 5: Hereburgh Way, Harbury

Consisting of 22 homes, including 13 affordable, this scheme incorporated SuDS, involving a swale and an infiltration basin, which provides for surface water run-off as well as creating a natural habitat area. Air source heat pumps were also incorporated in order to reduce the predicted carbon dioxide emission from the development by a minimum of 10%.

Principle 2: Improving Energy Efficiency

The swale leading to the infiltration basin at Hereburgh Way, Harbury

Case Study 6: Passivhaus Scheme, Wootton Wawen

This is a development of 14 dwellings comprising a mixture of houses and bungalows built to a passivhaus standard.

Space heating costs will be 70% less than a standard house construction, achieved through levels of insulation, air tightness and orientation to max solar gain:

- Wrought iron canopy porches
- Brick corbel detailing
- Significant levels of insulation
- Triple glazing
- Ecological zones to promote wildlife and amenity value
- Community woodland belt

There is a 12 metre wide planted native tree buffer zone, which will act as an eco-soakaway for surface water and mitigate visual impact on the surrounding area.

Principle 2: Improving Energy Efficiency

Principle 4: Mitigating Flood Risk

Principle 5: Mitigating Biodiversity Loss

Photographs of the passivhaus houses and bungalows at Wootton Wawen.

Case Study 7: Jaguar Land Rover, Advanced Product Creation Centre

The proposal was designed for the research, design and development of motor vehicles and to provide a new gateway and parking. These new offices are rated in the top 10 per cent of most sustainable non-domestic buildings in the UK and it is intended that this development will reach BREEAM 'excellent' rating.

Energy – This building has followed the energy hierarchy approach with up to 20% of its energy coming from almost 3,000 m² of photovoltaic solar panels on the roof, and the remainder from 100% renewable sources.

Biodiversity – A natural landscape is at the heart of the site, creating an ecologically diverse area reusing 80,000 m³ of natural soil excavated during the construction process, which is the equivalent of 30 Olympic sized pools. Introduction of large lakes and water features also contribute to improving local biodiversity whilst providing new receptor sites for wildlife. There is also a protected species master plan for the site.

Temperature Control – The development has been designed to reduce overheating through the careful selection of glazing and appropriate shading and glazing/solid ratio in order to minimize the internal solar gains. The same glazing as the Eden Project has been used to bring natural light in to the building wherever possible and make it more energy efficient. The roof overhangs also provide shading to the facades and roof lights have high performance glazing, external fixed solar shading and internal blind system.

Water Management – The landscape integrates the SuDS. Roof and surface water run-off feed feature water channels that discharge into a system of lakes. Lakes provide attenuation during heavy rain period and mitigate the risk of flooding.

Principle 2: Improving Energy Efficiency

Principle 3: Adapting to higher temperatures

Principle 4: Mitigating Flood Risk

Principle 5: Mitigating Biodiversity

V9. Climate Change Checklist

It is important that the principles of climate change adaptation and mitigation are considered from the outset of a development proposal to help shape the design.

It is the aim of the District Council to work with developers to maximise the opportunities for climate change adaptation and mitigation and the purpose of the checklist is to help developers consider the potential measures possible and thus encourage better design solutions.

As the evolution and use of adaptation and adaptation measures is rapidly growing across the UK, the ability for developments to respond to the impacts of climate change without compromising design quality is more achievable than ever. The aim is to create visually attractive sensitive development and to achieve an acceptable balance between good design and climate change measures.

Given the critical importance of ensuring that new development addresses the effects of climate change, satisfying this requirement will be given high priority when considering site specific proposals. However, it is acknowledged that proposals affecting Listed Buildings may not be able to fully comply and in these circumstances Case Officer discretion will be used as to what is feasible on a case-by-case basis. Guidance on how Part L (Energy Efficiency) of the Building Regulations can be applied to historic buildings is provided by Historic England in the following report: Energy Efficiency and Historic Buildings: Application of Part L of Building Regulations (2017).

The checklist is required to be completed and submitted with planning applications for certain householder, new build and conversion / change of use proposals. To assist applicants in the completion of a checklist, there are 3 separate checklists which identify the main mitigation and adaptation measures considered appropriate for that type of development. The checklists in Appendices 1 and 2 apply to both residential and non-residential development, while the checklist in Appendix 3 relates to residential householder developments.

The Checklists are set out in appendices to this SPD as follows:

- Appendix 1: Climate Change Checklist for new build developments
- Appendix 2: Climate Change Checklist for conversion and change of use developments
- Appendix 3: Climate Change Checklist for householder developments

The Council encourages applicants to maximise the number of measures incorporated into a development in order to address the problems of climate change. As a very minimum, proposals must incorporate at least one suitable adaptation and mitigation measure from each of the 5 principle areas. Measures that incorporate renewable energy as an option, at a scale that reduces the building's dependence on imported energy, will be strongly supported and is encouraged.

- For new build dwellings and new build non-residential developments over 20 square metres (external area measurement), at least 15 measures in total must be incorporated.
- For conversion and change of use proposals, at least 10 measures must be incorporated
- For householder proposals over 20 square metres (external area measurement), at least 5 measures are expected to be incorporated.

Where a particular measure has been provided which addresses more than one principle, this will only count as one measure overall (i.e. it cannot be counted as more than one measure).

The Council welcomes innovative and emerging technological solutions to help developments adapt and mitigate to climate change and an 'other' category has been added to each objective for this reason to enable suitable and appropriate alternative measures to be considered.

A holistic approach should be taken to the incorporation of measures into developments to ensure that they are considered as a whole and not in isolation. This will ensure that the benefits can be maximised and will reduce the need for future retrofitting.

Measures that are incorporated into developments are required to be appropriately managed and maintained and may be controlled through the use of planning conditions and / or S106 Agreements. The Council's planning enforcement and legal services teams are responsible for ensuring compliance with planning conditions and obligations.

Further information can be found in

Part U – Section 106 Planning Obligations

The Council will monitor the effectiveness of Part V of the SPD through the analysis of checklists on individual planning applications. This will inform any review of the SPD.

Appendix 1: Climate Change Checklist for new build dwellings and new build non-residential developments where over 20 square metres of additional floorspace is proposed (external area measurement)

NB: Highlighted measure MUST be provided for all new build developments

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of new build minor and major development	Has this been addressed in the planning application submission? (Yes/No/Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
Increasing accessibility - Reducing the need to travel by private car	CS.2 (Climate Change and Sustainable Construction) CS.9 (Design and Distinctiveness) CS.22 (Economic Development) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.19 (Housing Mix and Type) CS.25 (Healthy Communities) CS.26 (Transport and Communications)	V.3.1 Density and Mixed Uses	Higher densities and mixed uses in sustainable locations and at key transport nodes		
			Design standards to allow for future building adaptation including technological adaptation		
			Horizontal and vertical mix of uses within blocks where appropriate		
			Other- please state		
		V.3.2 Permeability/ Walkability	Active frontages/edges with opportunities for natural surveillance		
			Use of sensory features and opportunities to stand and stay, places to sit and stand utilising views and sun		
			Pedestrian friendly – no obstacles, good surface, access for all, crossings, good sightlines, appropriate lighting, interesting facades		
			Signposting to local facilities		
			Appropriate block sizes to location		
			Local facilities accessible through walking/cycling (within 800m of new developments)		
			Maximising the number of internal pedestrian routes through the site		
			Maximising the number of pedestrian external routes in and out of the site linking to the wider area		
			Other- please state		
		V.3.3 Integrated Active Travel	Easy access to a range of transport modes		
			Signposting of active travel routes and facilities		
			Easy transition from cycling and walking to public transport		
			Education/promotion campaigns to residents		
			Well lit travel facilities and appropriate crossings for pedestrians and cyclists		
			Other- please state		

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of new build minor and major development	Has this been addressed in the planning application submission? (Yes/No/Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
		V.3.4 Cycling	Covered and well-located cycle storage facilities		
			Cycle routes linking to wider area		
			Shower facilities provided in non-residential developments		
			Off-road cycle routes		
			Short cuts for cyclists		
			Cyclist priority at junctions		
			Clearly marked or segregated cycle lanes		
			Other- please state		
		V.3.5 Planning for the car	Car-free, limited and timed zones at certain times and/or locations		
			Use of electric vehicle/cycle charging points	REQUIRED	
			Co-ordinated traffic calming approaches		
			Other- please state:		
Improving energy efficiency	CS.2 (Climate Change and Sustainable Construction) CS.3 (Sustainable Energy) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) CS.19 (Housing Mix and Type) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites)	V.4.1 Reducing the need for energy	Plot and block orientation to maximise solar gain		
			Window positioning to maximise solar gain		
			Use of vegetation for shade in summer		
			Natural ventilation and easy to regulate ventilation (air tight when needed)		
			Private outdoor space for food growing		
			Community Food Growing opportunities (such as allotments, orchards and 'Edible Planting')		
			Other- please state:		
		V.4.2 Using energy more efficiently	Solar/low energy internal and external lighting (e.g. LED lightbulbs)		
			Using a higher level of insulation than required by Building Regulations		
			Other- please state:		

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of new build minor and major development	Has this been addressed in the planning application submission? (Yes/No/Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
	CS.25 (Healthy Communities)	V.4.3 Using renewable energy	Composting and Community composting		
			Renewable energy sources		This measure will be strongly supported and is encouraged.
			Other- please state:		
		V.4.4 Any fossil fuel use to be clean and efficient	Combined Heat & Power (CHP)		
			Other- please state:		
Adapting to higher temperatures	CS.2 (Climate Change and Sustainable Construction) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.5.1 Shade and Ventilation – The Cooling Hierarchy	Adherence to the Cooling Hierarchy with either option 1(passive design) or option 2 (passive/natural cooling) utilised within the proposal		
			Other- please state:		
		V.5.2 Use of Cool Materials	Use of roof and paving materials that minimise heat gain in summer		
			Other- please state:		
		V.5.3 Green Infrastructure	Trees and landscaping in parking areas and open space areas to provide shade		
			Relationship between vegetation and building to maximise natural ventilation		
			Green & blue infrastructure in private outdoor space – e.g. trees, hedges, water, green/brown/blue roofs, vertical climbers and landscaping		
			Other- please state:		
Mitigating flood risk	CS.2 (Climate Change and Sustainable Construction) CS.4 (Water Environment and Flood Risk) CS.6 (Natural Environment)	V.6.1 Sustainable Urban Drainage Systems (SUDS)	SUDs such as raingardens, swales, natural water courses, communal soakaways, filter strips		
			Other- please state:		
		V.6.2 Water Efficiency and Rainwater harvesting	Co-ordinated greywater recycling and reuse systems in apartments and mixed uses		
			Private, and communal where appropriate, rainwater collection and reuse points / water butts		
			Other- please state:		

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of new build minor and major development	Has this been addressed in the planning application submission? (Yes/No/Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
	CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.6.3 Flood Risk Design Principles for New Development	Use of permeable surfaces for roads, car parking areas, hard surfacing and pavements		
			Natural vegetation e.g. green/brown roofs, communal basins and ponds, blue roofs, green spaces within blocks, green verges		
			Using the highest level of climate change allowance for the time period covering the lifetime of the development		
			Other- please state:		
Mitigating biodiversity loss	CS.2 (Climate Change and Sustainable Construction) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.7.1 Bio-enhancing existing green space	Using different varieties of native species for landscaping		
			Other- please state:		
		V.7.2 Background wildlife capacity	Trees incorporated into primary street frontages		
			Restore old hedgerows or plant new hedges and other new planting		
			Green/brown roofs and wall climbers		
			At least one of the following: bird/bat boxes/ amphibian kerbs/ hibernacula/hedgehog holes/ hedgehog homes/garden ponds.		
			Other- please state:		
		V.7.3 Local wildlife nodes and blue / green corridors	Green/brown/blue roofs/walls		
			Private outdoor space		
			Green/blue buffers		
			Wildlife nodes at junctions & street corners		
			Pocket parks		
			Other- please state:		

Appendix 2: Climate Change Checklist for Conversion and Change of Use developments

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of conversion and change of use development	Has this been addressed in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
Increasing accessibility - Reducing the need to travel by private car	CS.2 (Climate Change and Sustainable Construction) CS.9 (Design and Distinctiveness) CS.22 (Economic Development) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.19 (Housing Mix and Type) CS.25 (Healthy Communities) CS.26 (Transport and Communications)	V.3.1 Density and Mixed Uses	Higher densities and mixed uses in sustainable locations and at key transport nodes		
			Design standards to allow for future building adaptation including technological adaptation		
			Horizontal and vertical mix of uses within blocks where appropriate		
			Other- please state:		
		V.3.2 Permeability / Walkability	Active frontages/edges with opportunities for natural surveillance		
			Other- please state:		
		V.3.3 Integrated Active Travel	Education/promotion campaigns to residents		
			Other- please state:		
		V.3.4 Cycling	Covered and well-located cycle storage facilities		
			Shower facilities provided in non-residential developments		
			Other- please state:		
		V.3.5 Planning for the car	Use of electric vehicle/cycle charging points		
			Other- please state:		
Improving energy efficiency	CS.2 (Climate Change and Sustainable Construction) CS.3 (Sustainable Energy) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness)	V.4.1 Reducing the need for energy	Window positioning to maximise solar gain		
			Natural ventilation and easy to regulate ventilation (air tight when needed).		
			Private outdoor space for food growing		
			Other- please state:		

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of conversion and change of use development	Has this been addressed in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
	CS.19 (Housing Mix and Type) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.4.2 Using energy more efficiently	Solar/low energy internal and external lighting (e.g. LED lightbulbs)		
			Using a higher level of insulation than required by Building Regulations		
			Other- please state:		
		V.4.3 Using renewable energy	Renewable energy sources		This measure will be strongly supported and is encouraged.
			Other- please state:		
		V.4.4 Any fossil fuel use to be clean and efficient	Combined Heat & Power (CHP)		
			Other- please state:		
Adapting to higher temperatures	CS.2 (Climate Change and Sustainable Construction) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.5.1 Shade and Ventilation – The Cooling Hierarchy	Adherence to the Cooling Hierarchy with either option 1(passive design) or option 2 (passive/natural cooling) utilised within the proposal		
			Other- please state:		
		V.5.2 Use of Cool Materials	Use of roof and paving materials that minimise heat gain in summer		
			Other- please state:		
		V.5.3 Green Infrastructure	Trees and landscaping in parking areas and open space areas to provide shade		
			Relationship between vegetation and building to maximise natural ventilation		
			Green & blue infrastructure in private outdoor space – e.g. trees, hedges, water, green/brown/blue roofs, vertical climbers and landscaping		
			Other- please state:		

Principle	Relevant Core Strategy Policies	Objective	Measures expected based on type and scale of conversion and change of use development	Has this been addressed in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Design and Access Statement, Layout Plans, Planning Statement with paragraph/page/plan reference) If No or Not Applicable (N/A) please state justification for this.
Mitigating flood risk	CS.2 (Climate Change and Sustainable Construction) CS.4 (Water Environment and Flood Risk) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.6.1 Sustainable Urban Drainage Systems (SUDS)	SUDs such as raingardens, swales, natural water courses, communal soakaways, filter strips		
			Other- please state:		
		V.6.2 Water Efficiency and Rainwater harvesting	Co-ordinated greywater recycling and reuse systems in apartments and mixed uses		
			Private, and communal where appropriate, rainwater collection and reuse points / water butts		
			Other- please state:		
		V.6.3 Flood Risk Design Principles for New Development	Use of permeable surfaces for roads, car parking areas, hard surfacing and pavements		
			Natural vegetation e.g. green/brown roofs, communal basins and ponds, blue roofs, green spaces within blocks, green verges		
			Using the highest level of climate change allowance for the time period covering the lifetime of the development		
			Other- please state:		
Mitigating biodiversity loss	CS.2 (Climate Change and Sustainable Construction) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) AS.11 (Large Rural Brownfield Sites) CS.25 (Healthy Communities)	V.7.1 Bio-enhancing existing green space	Using different varieties of native species for landscaping		
			Other- please state:		
		V.7.2 Background wildlife capacity	Green/brown roofs and wall climbers		
			At least one of the following: bird/bat boxes/ amphibian kerbs/ hibernacula/ hedgehog holes/ hedgehog homes/garden ponds.		
			Other- please state:		
		V.7.3 Local wildlife nodes and blue / green corridors	Green/brown/blue roofs or walls		
			Private outdoor space		
			Other- please state:		

Appendix 3: Climate Change Checklist for Householder Developments where over 20 square metres of additional floorspace is proposed (external area measurement)

Principle	Relevant Core Strategy Policies	Objective	Expected Measures	Has this been considered in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Layout Plans, Planning Statement with paragraph/page/ plan reference) If No or Not Applicable (N/A) please state justification for this
Increasing accessibility - Reducing the need to travel by private car	CS.2 (Climate Change and Sustainable Construction) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside & Villages) CS.19 (Housing Mix and Type) CS.25 (Healthy Communities) CS.26 (Transport & Communications)	V.3.1 Density and Mixed Uses	Design to allow for future adaptation of buildings / extensions including technological adaptation		
			Other:		
		V.3.2 Permeability / Walkability	Provision of habitable rooms facing the street at ground floor level with appropriate windows and doors to provide activity and allow for natural surveillance		
			Other:		
		V.3.3 Integrated Active Travel	Not applicable		
		V.3.4 Cycling	Cycle parking / storage		
			Other:		
		V.3.5 Planning for the car	Use of electric vehicle/cycle charging points		
			Other:		

Principle	Relevant Core Strategy Policies	Objective	Expected Measures	Has this been considered in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Layout Plans, Planning Statement with paragraph/page/ plan reference) If No or Not Applicable (N/A) please state justification for this
Improving energy efficiency	CS.2 (Climate Change and Sustainable Construction) CS.3 (Sustainable Energy) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) CS.19 (Housing Mix and Type) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) CS.25 (Healthy Communities)	V.4.1 Reducing the need for energy	Window positioning		
			Use of planting to provide shade in summer		
			Natural ventilation and easy to regulate ventilation (air tight when needed)		
			Private outdoor space for food growing		
			Other:		
		V.4.2 Using energy more efficiently	Using a higher level of insulation than required by Building Regulations		
			Solar/low energy internal and external lighting (e.g. LED lightbulbs)		
			Other:		
		V.4.3 Using renewable energy	Renewable energy sources such as solar panels or heat pumps		This measure will be strongly supported and is encouraged.
			Other:		

Principle	Relevant Core Strategy Policies	Objective	Expected Measures	Has this been considered in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Layout Plans, Planning Statement with paragraph/page/ plan reference) If No or Not Applicable (N/A) please state justification for this
		V.4.4 Any fossil fuel use to be clean and efficient	Combined Heat & Power (CHP)		
			Other:		
Adapting to higher temperatures	CS.2 (Climate Change and Sustainable Construction) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside and Villages) CS.25 (Healthy Communities)	V.5.1 Shade and Ventilation – The Cooling Hierarchy	Glazing designed for natural ventilation and reducing heat gain		
			Other:		
		V.5.2 Use of Cool Materials	Exterior materials that minimise heat gain in summer		
			Other:		
		V.5.3 Greenspace Infrastructure	Relationship between landscaping and building to maximise natural ventilation		
			Planting and water features in private outdoor space – e.g. trees, hedges, ponds, green/brown/blue roofs, vertical climbers and landscaping		
			Other:		

Principle	Relevant Core Strategy Policies	Objective	Expected Measures	Has this been considered in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Layout Plans, Planning Statement with paragraph/page/ plan reference) If No or Not Applicable (N/A) please state justification for this
Mitigating flood risk	CS.2 (Climate Change and Sustainable Construction) CS.4 (Water Environment & Flood Risk) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside & Villages) CS.25 (Healthy Communities)	V.6.1 Sustainable Urban Drainage Systems (SUDS)	SUDs such as raingardens		
			Other:		
		V.6.2 Water Efficiency and Rainwater harvesting	Rainwater collection such as water butts		
			Other:		
		V.6.3 Flood Risk Design Principles for New Development	Use of permeable surfaces for hard surfacing and car parking areas		
			Planting e.g. green/brown roofs, walls and green verges, blue roofs		
			Other:		

Principle	Relevant Core Strategy Policies	Objective	Expected Measures	Has this been considered in the planning application submission? (Yes/No/ Not Applicable)	If Yes please signpost to relevant information within planning application submission (e.g. Layout Plans, Planning Statement with paragraph/page/ plan reference) If No or Not Applicable (N/A) please state justification for this
Mitigating biodiversity loss	CS.2 (Climate Change and Sustainable Construction) CS.6 (Natural Environment) CS.7 (Green Infrastructure) CS.9 (Design and Distinctiveness) AS.1-9 (Area Strategies) AS.10 (Countryside & Villages) CS.25 (Healthy Communities)	V.7.1 Bio-enhancing existing green space	Using different varieties of native species for landscaping		
			Other:		
		V.7.2 Background wildlife capacity	Green/brown roofs and wall climbers		
			At least one of the following: bird/bat boxes/ amphibian kerbs/ hibernacula/ hedgehog holes/ hedgehog homes/garden ponds.		
			Other:		
		V.7.3 Local wildlife nodes and blue / green corridors	Green/brown/blue roofs or walls		
			Private outdoor space		
			Other:		

Appendix 4: Glossary

Word	Definition
Albedo	The amount of solar radiation that is reflected from an object or surface. It is usually expressed as a percentage, and the higher the albedo, the more solar radiation is reflected back into the atmosphere. Light surfaces have a higher albedo than dark surfaces.
Amphibian Kerbs	Small grooves in the curb that allow amphibians to go around drains rather than in them. They work on the basis that amphibians like to travel alongside vertical surfaces, and by creating an indent in the curb it acts as a bypass around the drain.
Attenuation	Attenuation is the process of slowing and storing water and then discharging it at a specified maximum rate to a suitable outfall, this is often achieved through the use of Sustainable Drainage Systems.
Biodiversity	A term commonly used to describe the variety of life on earth. It encompasses the whole of the natural world and all living things including plants, animals, and other organisms which, together, interact in complex ways with the inanimate environment to create living ecosystems.
Bio-liquids	Bio liquids are a type of fuel derived from organic matter (such as vegetable and seed oils) that are used for energy purposes other than transport.
Blue Infrastructure	Infrastructure involving water, for example canals, ponds, wetlands, streams, rivers
BREEAM	Building Research Establishment Environmental Assessment Method: An assessment method used to improve measure and certify the social, environmental and economic sustainability of new buildings, particularly non-domestic buildings.
Carbon Neutral Targets	In June 2019 a pledge was made by the UK government to cut greenhouse gas emissions to almost zero. The UK is the first country to propose such a target.
Carbon Storage	Carbon Dioxide is naturally captured from the atmosphere through a number of biological, chemical and physical processes. Many habitat areas contain large amounts of stored carbon dioxide in the form of plants, and the removal of these habitats would release the carbon dioxide back into the atmosphere.
CCHP/Combined Cooling Heat and	CCHP also sometimes known as Trigeneration, is when a power plant simultaneously creates heat and electricity, as well as

Word	Definition
Power	chilled water for air conditioning and refrigeration.
CHP/ Combined heat and Power	CHP is the generation of both usable heat and power (electricity) in a single, highly efficient process. CHP can use renewables or fossil fuels.
Climate Change Adaptation	Adjustments made to natural or human systems in response to the actual or anticipated impacts of climate change, to mitigate harm or exploit beneficial opportunities.
Climate Change Mitigation	Action to reduce the impact of human activity on the climate system, primarily through reducing greenhouse gas emissions.
Decentralised Energy	The term broadly refers to energy that is generated off the main grid, including micro (small scale) renewables, heating and cooling. It can refer to energy from waste plants, combined heat and power, district heating and cooling, as well as geothermal, biomass and solar energy. Schemes can serve a single building or a while settlement.
Detention Basins	Detention Basins are large surface depressions that are usually dry, but following heavy rain periods can collect and store water, before slowly filtering it on to other areas. By collecting water, they reduce the risk of flooding. Whilst not being used to store water they can be used for recreational or wildlife purposes.
Energy Hierarchy	The Energy Hierarchy is a classification of energy options that prioritises a sustainable approach. The top of the energy hierarchy aims to reduce the need for energy, and the bottom falls back on using conventional fossil fuels. The middle tiers look at using renewable energy sources and being efficient with the energy created to reduce waste.
Evapotranspiration	The process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.
Fenestration	The arrangement, proportioning, and design of windows, vents and doors in a building that allows for the correct amount of light and ventilation into a building.
Filter Drains	Gravel filled trenches that collect water after heavy rain periods. The presence of gravel acts as a filtering system that slows down the water flow, as well as removing sediment and other particulates. Once collected, the water flows to another point where appropriate measures are in place to deal with excess water. They are often used on roads and in car parks

Word	Definition
	to reduce the risks of flooding.
Filter Strips	Gently sloping areas of vegetated land that are designed to accept runoff following heavy rain periods. They generally sit between a hard-surfaced area (such as a road) and a small stream that is able to carry the water to a more suitable location.
Fuel Poverty	The state of being unable to heat one's home adequately.
Good Homes Alliance	A body that aims to promote and encourage the building of quality sustainable homes and communities.
Green Infrastructure	A network of high quality, multi-functional green spaces and other environmental features, urban and rural. The greatest benefits will be gained when it is designed and managed as a multifunctional resource which is capable of delivering a wide range of environmental and quality of life benefits for local communities.
Green Walls	A vertical surface that is partially or completely covered in plants and other vegetation. Installations might be supported on a framework and might include drainage and irrigation systems. They work to reduce air pollution and to increase biodiversity.
'Heat Island' effect	A term often used when discussing the high temperatures of built up areas in comparison to the surrounding rural areas.
Infiltration Basins and Trenches	Vegetated depressions that hold water after heavy rain periods and slowly release it into the below soil and ground water
Local Wildlife Nodes	Areas where underutilised land is developed to encourage biodiversity.
Louvres	A window blind or shutter that consists of angled horizontal slats that let in light and air, but prevent direct sunlight and rain entering. They can be used to keep rooms cool.
Low-e Glass	A type of glass that reduces the amount of heat that can escape through the window. For this reason it is very energy efficient.
LPG/ Liquefied Petroleum Gas	Liquefied mixes of hydrocarbon gas that can be used as fuel. It is highly efficient and usually stored in pressurised steel canisters.
Natural Filtering	Toxins can be taken out of the atmosphere and removed from water sources, in a number of natural ways. One such way is through photosynthesis, where carbon dioxide is removed from the atmosphere by plants and turned into oxygen.

Word	Definition
Night Purging	At night the air cools, and night purging is the passive movement of this cool air into buildings to replace any stale hot air.
Offsetting	In relation to the planning system, offsetting is a system to fully compensate for the impacts resulting from a development. A common example of this is biodiversity offsetting.
Passivhaus	A standard for energy efficiency that focuses on air quality and comfort. It aims to reduce the requirements for space heating by looking at insulation, window sizes and orientations, and junction details.
Passive Solar Design	Passive Solar Design aims to utilise the suns energy for both heating and cooling effects. When designing the buildings architects look at the orientation, materials and any nearby buildings that may block sunlight. They take into consideration the suns changes throughout the year and aim to provide comfortable environments that require less generated energy for heating and cooling.
Permeable Surfaces	Surfaces that allow water to penetrate through.
Permeability	The level of permeability refers to the ease in which something can travel through.
Photovoltaic	Otherwise known as solar panels, photovoltaic systems convert solar energy into electrical energy.
Rainwater Gardens	Small depressions that collect rainwater run-off. They are planted up with species that can handle occasional flooding.
Receptor Sites	New sites that allow wildlife to spread and biodiversity to increase.
Renewable Energy	Includes energy for heating and cooling as well as generating electricity. Renewable energy covers those energy flows that occur naturally and repeatedly in the environment – from the wind, the fall of water, the movement of the oceans, from the sun and also from biomass and deep geothermal heat.
Retention Ponds	Permanent ponds or pools of water that are designed to act as additional storage following a heavy rainfall period. They do not transport the water elsewhere and instead naturally treat the water and remove pollutants, therefore improving the water quality.
Sedum Blanket	A layer of living plants on top of a waterproof roof surface.

Word	Definition
Smart Glass	Glass that alters its light transmission properties if voltage, light or heat are applied. The glass can change from transparent to translucent and can block certain wavelengths.
Soakaway	A drainage feature that collects and allows water to seep down. It is an efficient way to deal with surface water in a way that has little environmental impact.
Solar Water Heating	Systems that use solar energy to heat up water. The energy is converted using a solar collector
Sun Orientation	The alignment of a building in relation to the movement of the sun across the sky.
Sustainable Development	Sustainable development should meet the needs of the present without compromising the ability of future generations meeting their own needs.
Sustainable Urban Drainage System (SuDS)	The SuDS approach involves slowing down and reducing the quantity of surface water run off for a developed area to manage flood risk downstream, and reduce the risk of run off causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating run off on site. SuDS allow water to become a more visible and tangible part of the built environment, which can be enjoyed by everyone.
Sustainable modes of transport	Any efficient, safe and accessible means of transport, other than the private car, which has an overall low impact on the environment, including walking and cycling, low and ultra-low emission vehicles, car sharing and public transport.
Swales	Broad vegetated channels that can store and transport water following heavy rain periods.
Topography	The arrangement of the visible natural and artificial features of an area.
Thermal Stores	A way of storing heat until required, often in the form or well insulated water tanks.
Wildlife Capacity	The amount of wildlife that an area can sustainably withstand.