Heyford Park

Sustainability and Energy Statement

On behalf of **Dorchester Group**

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Office Address: 10 Queen Square, Bristol, BS1 4NT
T: +44 (0)117 332 7840 E: bristol@peterbrett.com

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	Name	Position	Signature	Date
Prepared by:	D Ulanowsky	Principal Consultant	DU	20/3/18
Reviewed by:	Michael Robinson-Moltke	Consultant	MRM	20/3/18
Approved by:	Jonathan Riggall	Equity Director	JR	21/3/18
For and on behalf of Peter Brett Associates LLP				

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V1	21/3/18	Draft for comment	DU	MRM	JR
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1 Introduction

1.1.1 Peter Brett Associates LLP (PBA) has been commissioned by Dorchester Group (the Client) to produce a Sustainability and Energy Statement, in support of the outline elements of a hybrid planning application for a mixed used development on the former RAF Upper Heyford site, known as Heyford Park, Oxfordshire.

1.1.2 The Site is within the administrative boundary of Cherwell District Council (CDC), and the application site is within CDC's local plan allocation (Policy Villages 5: Former RAF Upper Heyford) for 1,600 homes and 1,500 jobs.

1.2 Background

1.2.1 The Cherwell Local Plan 2011-2031 was adopted in July 2015; it identifies the site as being subject to Policy Villages 5 'Former RAF Upper Heyford'. This adopted policy provides for the implementation of a settlement of approximately 1,600 new dwellings and supporting infrastructure. It includes primary and secondary school provision, community, recreational and employment opportunities for 1,500 new jobs and enabling environmental improvements with the conservation of the existing heritage interests on the site.

1.2.2 It is understood that several applications will be submitted by the Client under this allocation. A full application for approximately 300 dwellings has already been submitted and is awaiting decision (16/02446/F). This outline application will comprise of approximately 1,175 dwellings, care dwellings, employment use, retail, medical centre, school and leisure/tourism facilities.

1.3 Purpose of this Statement

1.3.1 This Energy and Sustainability Statement illustrates how the proposed development will be designed to comply with national and local policies relating to environmental sustainability, energy use and efficiency, and carbon dioxide (CO_2) emissions.

1.3.2 Policies of relevance to the Statement are contained within the Cherwell District Council (CDC) Local Plan Part 1 (2015):

- Policy Villages 5: Former RAF Upper Heyford;
- Policy PSD 1: Presumption in Favour of Sustainable Development;
- ESD1: Mitigating and Adapting to Climate Change;
- ESD2: Energy Hierarchy and Allowable Solutions;
- ESD3: Sustainable Construction;
- ESD4: Decentralised Energy Systems;
- ESD5: Renewable Energy;
- ESD6: Sustainable Flood Risk Management;
- ESD7: Sustainable Drainage Systems (SuDS); and
- ESD8: Water Resources.

1.3.3 In addition, Policy D9 (Energy Efficient Design) of the Non-statutory Cherwell Local Plan 2011 (adopted December 2004) should also be considered.

1.3.4 This Statement will respond to the above policies. A detailed review of the Policy context is provided within **Section 2**.

1.3.5 The Statement is intended to be a high-level document and, as such, does not set out commercially tested options at this stage. Options will be refined and presented as part of each Reserved Matters application.

1.4 Site Location

1.4.1 Heyford Park (the Site) lies in a rural area of Oxfordshire situated approximately 27km north of Oxford.

1.4.2 The Site has the B430 to the east, and the B4030 to the south, with another 'B' class road, Camp Road, running through the centre. The A43 is approximately 1.63km to the east of the Site. The nearest towns to the site are Bicester, approximately 9km to the south east of the site, Brackley approximately 17km to the north east, and Banbury 25km to the north.

1.5 The Proposed Development

1.5.1 The hybrid planning application consists of:

Demolition of buildings and structures as listed in Schedule 1 (of the development description);

Outline planning permission for up to:

- *1,175 new dwellings (Class C3);*
- *60 close care dwellings (Class C2/C3);*
- *929 m2 of retail (Class A1);*
- *670 m2 comprising a new medical centre (Class D1);*
- *35,175 m2 of new employment buildings, (comprising up to 6,330 m2 Class B1a, 13,635 m2 B1b/c, 9,250 m2 Class B2, and 5,960 m2 B8);*
- *2.4 ha site for a new school (Class D1);*
- *925 m2 of community use buildings (Class D2); and 515 m2 of indoor sports, if provided on-site (Class D2);*
- *30m in height observation tower with zip-wire with ancillary visitor facilities of up of 100 m2 (Class D1/A1/A3);*
- *1,000 m2 energy facility/infrastructure with a stack height of up to 24m (sui generis);*
- *2,520 m2 additional education facilities (buildings and associated external infrastructure) at Buildings 73, 74 and 583 for education use (Class D1);*
- *creation of areas of Open Space, Sports Facilities, Public Park and other green infrastructure.*

The change of use of the following buildings and areas:

- *Buildings 357 and 370 for office use (Class B1a);*

- *Buildings 3036, 3037, 3038, 3039, 3040, 3041, and 3042 for employment use (Class B1b/c, B2, B8);*
- *Buildings 217, 3102, 3136, 3052, 3053, 3054, and 3055 for employment use (Class B8);*
- *Buildings 2010, 3008, and 3009 for filming and heritage activities (Sui Generis/Class D1);*
- *Buildings 2004, 2005 and 2006 for education use (Class D1);*
- *Buildings 366, 391, 1368, 1443, 2007, 2008 and 2009 (Class D1/D2 with ancillary A1-A5 use);*
- *Building 340 (Class D1, D2, A3);*
- *20.3ha of hardstanding for car processing (Sui Generis); and*
- *76.6ha for filming activities (Sui Generis).*

The continuation of use of areas, buildings and structures already benefiting from previous planning permissions, as specified in Schedule 2.

Associated infrastructure works, including surface water attenuation provision and upgrading Chilgrove Drive and the junction with Camp Road.

1.5.2 The Application Boundary and Parameter Plans are shown in **Appendix A**.

1.6 Method and Report Structure

1.6.1 The method adopted in this Statement is to review national and local policies that relate to defining a 'sustainable development' in this location (undertaken in **Section 2**), and to use this to establish a Sustainability Framework for the Proposed Development that seeks to achieve both over-arching national sustainability aims and site-specific objectives.

1.6.2 The key local planning document is the Cherwell Local Plan (adopted July 2015), within which the proposed development Site is allocated (Policy Villages 5: Former RAF Upper Heyford).

1.6.3 The key sustainability policies are within Policy ESD1-8 of the Local Plan. Further detail of which is provided within **Section 2.4**.

1.7 Planning Submission and Design Evolution

1.7.1 This Statement presents a pragmatic method of meeting Part L of the Building Regulations 2013, and the anticipated future regulatory changes, as well as local policy requirements. It has been developed and based upon current understanding of the development proposals.

1.7.2 This Statement is designed to be a working document and should be reviewed and updated as necessary if the proposals are revised.

2 Policy Review

2.1 Introduction

2.1.1 This section presents and summarises the key energy and sustainability requirements for CDC, as defined by national and local planning policies. This is in relation to energy, carbon emissions, sustainability, and development design policies where relevant to the development of this Statement.

2.2 National Policy

National Planning Policy Framework 2012

2.2.1 The National Planning Policy Framework (NPPF) 2012 supports the role of the local plan process and introduces the "presumption in favour of sustainable development". Paragraphs 93-98 of the NPPF explain that planning plays a key role in helping shape places to secure reductions in greenhouse gas emissions, and in supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social, and environmental dimensions of sustainable development.

2.2.2 Local planning authorities are advised to adopt proactive strategies to mitigate and adapt to climate change, and local planning authorities should:

- When setting any local requirement for a building's sustainability, do so in a way consistent with nationally prescribed standards;
- In determining planning applications, local planning authorities should expect new development to take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption; and
- Have a positive strategy to promote energy from renewable and low carbon sources.

2.3 National Building Regulations Part L (Conservation of Fuel and Power)

2.3.1 The energy efficiency requirements of the Building Regulations are set out in Part L of Schedule 1, as well as in several specific building regulations. Approved Document L1A sets out the requirements for conservation of fuel and power in dwellings, whilst Approved Document L2A sets out the requirements for conservation of fuel and power in buildings other than dwellings.

2.3.2 The current edition of L1A 2013[1] came into effect on 6 April 2014. This strengthens the requirements of Part L1A to deliver 6% carbon savings across the new homes build mix relative to Part L 2010 and introduces a Fabric Energy Efficiency (FEE) target to ensure a minimum efficiency for building fabric (the longest-lasting part of a dwelling).

2.3.3 In their Productivity Plan[2], the Treasury confirmed that there would be no change in Part L of the Building Regulations in 2016. It does not intend to proceed with the previously proposed

[1] Conservation of fuel and power: Approved Document L, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540326/BR_PDF_AD__L1A__2013_with_2016_amendments.pdf (accessed 05/02/2018).

[2] HM Treasury (July 2015) Fixing the foundations: Creating a more prosperous nation, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/443897/Productivity_Plan_print.pdf (accessed 05/02/2018)

increase in on-site energy efficiency standards, zero carbon homes, or the allowable solutions carbon offsetting scheme.

2.3.4 Therefore, the national energy target for the Proposed Development at the time of the application submission is Part L of the Building Regulations 2013. This is subject to changes in the national Building Regulations.

2.3.5 Government announced their intention to consult on strengthening energy performance standards within the Building Regulations in the Clean Growth Strategy in October 2017. This was further re-iterated in the draft NPPF proposals published in March 2018 which indicated proposals would be put forward later in 2018.[3]

2.4 Local Planning Policy

Cherwell District Council (CDC) Local Plan Part 1

2.4.1 The CDC Local Plan Part 1 was adopted by the council in July 2015, and sets out how the district will grow and change in the period up to 2031. The relevant sustainability policies are noted below.

ESD1 – Mitigating and Adapting to Climate Change

2.4.2 ***ESD1*** says that the following measures will be taken to mitigate the impact of development on climate change. At a strategic level this includes:

- *"Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars;*
- *Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction); and*
- *Promoting the use of decentralised and renewable or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy)."*

2.4.3 Policy ESD 1 also requires new development to incorporate suitable adaption measures to increase resilience to climate change impacts, including:

- *"Taking into account the known physical and environmental constraints when identifying locations for development;*
- *Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling;*
- *Minimising the risk of flooding and making use of sustainable drainage methods, and*
- *Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).*

2.4.4 In addition to the above list, ESD 1 also states that "adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD)."

ESD2: Energy Hierarchy and Allowable Solutions

[3] https://www.gov.uk/government/consultations/draft-revised-national-planning-policy-framework

2.4.5 In seeking to achieve CO_2 emissions reductions, CDC promotes an energy hierarchy in Policy ESD 2 as follows (in order of priority):

"Reducing energy use, in particular by the use of sustainable design and construction measures

Supply energy efficiently and giving priority to decentralised energy supply

Making use of renewable energy

Making use of allowable solutions."

2.4.6 As noted in paragraph **3.3.3**, the Government did not adopt the allowable solutions mechanism. It is understood that CDC do not have any specific set requirements relating to allowable solutions. Without the legal framework for delivering the above hierarchy, the approach to achieving the policy statement will need to be considered further as the development evolves towards the detailed application stage.

ESD3 – Sustainable Construction

2.4.7 ***ESD3*** states that *"all new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy"*.

2.4.8 As noted in paragraph **2.3.3**, the Government has removed the zero carbon homes standard (including carbon compliance) and allowable solutions.

2.4.9 Policy ESD 3 also states that all development proposals will be encouraged to reflect high quality design and environmental standards, demonstrating sustainable construction methods including:

"Minimising both energy demands and energy loss

Maximising passive solar lighting and natural ventilation

Incorporating energy efficient materials

Reducing the impact on the external environment and maximise opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and

Making use of the embodied energy within buildings wherever possible."

2.4.10 Policy ESD3 also states that *"all development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods …."*

2.4.11 Furthermore, ESD3 comments that as Cherwell District is in an area of water stress the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.

ESD 4 - Decentralised Energy Systems

2.4.12 Policy ESD 4 states:

"The use of decentralised energy systems, providing either heating (District Heating (DH)) or heating and power (Combined Heat and Power (CHP)) will be encouraged in all new developments."

Policy ESD 5: Renewable Energy

2.4.13 Policy ESD 5 states:

"Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

- *Landscape and biodiversity including designations, protected habitats and species, and Conservation Target Areas*
- *Visual impacts on local landscapes*
- *The historic environment including designated and non designated [sic] assets and their settings*
- *The Green Belt, particularly visual impacts on openness*
- *Aviation activities*
- *Highways and access issues, and*
- *Residential amenity."*

2.4.14 Policy ESD 4 and 5 require a feasibility assessment for on-site renewables including district heating / CHP, for all residential developments for 100 dwellings or more, or in off-gas areas, for 50 dwellings or more.

2.4.15 The Proposed Development is for up to 1,175 dwellings whilst the wider Heyford Site allocation is for 1,600 homes. Therefore, district heating and CHP are both considered in **Section 4**.

Flood Risk and Water Management (ESD6: Sustainable Flood Risk Management, ESD7: Sustainable Drainage Systems (SuDS), ESD8: Water Resources)

2.4.16 Policies ESD6-8 contain the following policies of relevance to the proposed development:

- There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100-year storm event with an allowance for climate change
- Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30-year storm even

(Policy ESD 6)

- *All development will be required to use sustainable drainage systems (SuDS)*

(Policy ESD 7)

- *Water quality will be maintained and enhanced by avoiding adverse effects of development on the water environment.*

(Policy ESD 8)

Policy Villages 5: Former RAF Upper Heyford

2.4.17 The proposed site is identified as **Policy Villages 5** in the Plan which includes some further specific policies for the site including:

- Demonstration of climate change mitigation and adaptation measures including exemplary demonstration of compliance with the requirements of policies ESD1–5;
- A requirement to investigate the potential to make connections to and utilise heat from the Ardley Energy Recovery facility, which is located approximately 2.5 km from the site;
- A net gain in biodiversity;
- Recycling and potential reuse of demolition materials where possible;
- Take account of the Council's Strategic Flood Risk Assessment for the site; and
- Provision of sustainable drainage including SuDS in accordance with Policy ESD7: Sustainable Drainage Systems(SuDS).

CDC Local Plan Part 2 – Development Management Policies and Sites

2.4.18 CDC is in the process of preparing part 2 to the Adopted Cherwell Local Plan 2011-2031 (Part 1) which will contain non-strategic site allocations and development management policies. The anticipated adoption date for this document is February 2020 and is therefore not referenced further within this Sustainability Statement.

Cherwell Design Guide Draft SPD (Emerging)

2.4.19 CDC are consulting on a draft Cherwell Design Guide Supplementary Planning Document (SPD). The draft SPD sets out proposed guidance to support the delivery of high quality homes and places across the District. Upon adoption, the SPD will be used to consider design issues in decision making by CDC.

2.4.20 The Design Guide provides further explanation and guidance in relation to Policy ESD15 ('The Character of the Built and Historic Environment') of the Cherwell Local Plan. The Guide provides several design considerations and guidance of relevance to energy and sustainability and related to Policies ESD1-8 described above.

Sustainable Buildings in Cherwell SPD (Emerging)

2.4.21 The latest Local Development Schedule issued by CDC in November 2017 states that this document is "to be prepared" with a commencement date of August 2018 and a proposed adoption date of June 2019. Based on these timescales this SPD is not referenced further within this Sustainability Statement, even though it is contained with Policy ESD 1.

2.5 Key Targets

2.5.1 Based on the existing local and national policies in place the key CDC sustainability and energy targets include:

- Comply with the mandatory requirements of Part L of the Building Regulations (2013) (this is subject to changes in the national Regulations);

- Design development in accordance with the energy hierarchy: reducing energy use, supplying energy efficiently, giving priority to decentralised energy supply, and making use of renewable and low carbon energy where appropriate; and
- Demonstration of climate change mitigation and adaptation;
- Achieve water efficiency target of 110 litres/person/day; and
- A net gain in biodiversity.

2.5.2 The following sections present an outline strategy that considers these targets and the wider policy requirements. The provision of on-site renewable and low carbon energy will be confirmed and subject to development feasibility and viability testing at detailed design.

3 Energy Demand Management

3.1 Introduction

3.1.1 In line with Policies ESD 1 to 3, this section demonstrates how the Proposed Development will seek to reduce energy demands and associated CO_2 emissions using sustainable design and construction measures. Development should also demonstrate measures to adapt to climate change, including tackling overheating.

3.1.2 The ambition for the Proposed Development is to adopt a "fabric-first" approach to building design (enhancing the performance of components and materials that make up a building fabric itself, before considering the use of mechanical or electrical building services systems). This approach can help reduce capital and operational costs, improve energy efficiency, reduce CO_2 emissions, and reduce the need for maintenance during a building's lifetime.

3.1.3 The section also considers the relevant sustainable design considerations provided in CDC's Draft Design Guide.

3.2 Energy Hierarchy

3.2.1 The Proposed Development will adopt the nationally and locally (policy ESD 2) recognised energy hierarchy of reducing energy demands in the first instance, using energy efficiently and, only then, providing renewable and low carbon energy generation on site where it is appropriate to do so. The energy hierarchy for new development is illustrated in **Figure 3.1**.

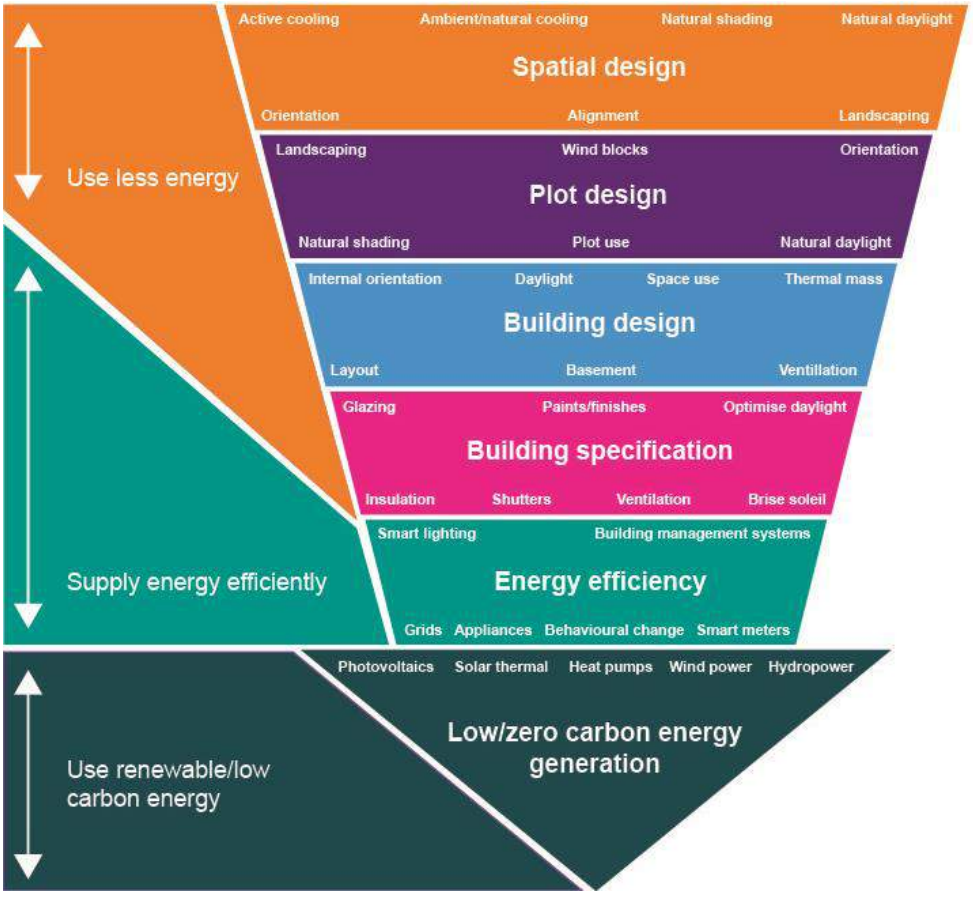


Figure 3.1: The Energy Hierarchy for New Development

3.2.2 To meet the first principles of the hierarchy (i.e. passive demand reduction), it is important to consider passive design principles through spatial planning, green infrastructure provision and development context. These items do not contribute to CO_2 reduction calculations under Part L of the Building Regulations, but can be significant in reducing the energy demands of a building.

3.2.3 The following sections demonstrates how the Heyford Park development will seek to enhance energy efficiency through the scheme layout, building orientation and building design.

3.3 Masterplan Design Principles to Reduce Energy Demands

3.3.1 This section presents the principles that have been considered within the proposed masterplan, and will continue to be considered as detailed design progresses following outline consent, to passively reduce energy demands. **Figure 3.2** illustrates potential masterplan design principles to reduce energy demands.

Figure 3.2: Masterplan Design Principles to Reduce Energy Demands

3.3.2 The Proposed Development is to be set within a comprehensive green infrastructure network including landscape, trees, amenity open space, formal playing pitches and children's play areas.

3.3.3 Green open spaces such as these provide evaporative cooling at night, helping to reduce the heat island effect[4]. The permeability of green spaces throughout the development, as well as the selection of plot layout and building location, will help to facilitate air movement and enhance natural ventilation.

3.3.4 Existing tree and hedgerow planting will be retained and supplemented with tree planting where appropriate which may help to locally reduce wind speeds and ameliorate the microclimate.

[4] The term 'heat island' describes built up areas that are hotter than nearby rural areas. This is partly caused by the replacement of natural surface by built surfaces, which absorb a higher proportion of incident radiation, which is then released as heat.

3.3.5 Where appropriate, the following will be incorporated into the scheme as the design progresses through a series of Reserved Matters applications:

- Street-scene tree planting to provide naturally shaded areas and corridors connecting different land parcels; and
- Optimisation of building orientation to take advantage of south-facing aspects for passive solar gains and roof-mounted renewable technologies.

3.3.6 Continued consideration of the spatial layout and plot design in this manner could provide significant CO_2 savings.

3.4 Building Design Principles to Reduce Energy Demands and Use Energy More Efficiently

3.4.1 The Energy Hierarchy requires that measures are adopted in building design to reduce energy demand requirements from the use of buildings. These measures can be split into two categories as 'passive' and 'active' measures.

3.4.2 Passive measures are design features, which can include building orientation, appropriate internal layouts and building fabric selection, that inherently reduce the buildings' energy requirements. Active measures are building services design features that will increase the efficiency of the energy used, and therefore also reduce the energy demand requirements.

Passive Measures

3.4.3 In line with Policies ESD2 and ESD3 and CDC's Design Guide Draft SPD (November 2017), the following passive design measures will be considered in the design of the buildings to reduce energy requirements:

- Optimising the U-values[5] of the external fabric to reduce energy loss (e.g. by providing additional insulation);
- Reducing the air permeability and thermal bridging coefficient[6] of the building envelope;
- Enlarging window areas to maximise the use of natural day-lighting and to enhance passive solar gains, whilst managing overheating; and
- Installing windows on two or more aspects (preferably opposite each other) to allow the through-flow of air and provide effective cross ventilation.

Active Measures

3.4.4 The following active design measures will be considered in the mechanical and electrical elements of the buildings:

- Controls to optimise and compensate for heating variations;
- Zonal heating controls (e.g. through the use of Building Management Systems (BMS) where appropriate);

[5] U-Values– otherwise known as thermal transmittance- measures the thermal performance of a building fabric in terms of heat loss. The better-insulated a structure is, the lower the U-value will be.

[6] The thermal bridging coefficient is a collective measure of heat loss that occurs at a break in insulation at abutting elements in a building e.g. walls and ceilings.

- Time and thermostat control of hot water;
- High efficiency lighting;
- Installing energy display devices to promote user behavioural change;
- Using energy-efficient lighting systems (e.g. daylight cut-off and Passive Infra-Red (PIR) lights); and
- Ensuring that white goods, achieve a high rating in the EU Energy Efficiency Labelling Scheme.

3.5 Predicative Energy Demand assessment

3.5.1 An assessment has been made of the predicted energy demand and carbon emissions associated with the proposed development.

3.5.2 The Government-approved methodologies for assessing CO_2 emissions in order to demonstrate compliance with Part L of the Building Regulations in England are:

- The Standard Assessment Procedure (SAP) for the energy rating of dwellings; and
- The National Calculation Methodology (NCM), implemented through the Simplified Building Energy Model (SBEM) for buildings other than dwellings.

3.5.3 At this stage in the development process it is not possible to undertake SAP or SBEM calculations because sufficient detailed design information is not available.

3.5.4 Instead, a predicted energy demand (PED) model has been developed using the development schedule. The model uses BSRIA benchmark data and the Building Research Establishment's (BRE) Domestic Energy Model (BREDEM) to establish broad demand profiles.

3.5.5 Energy demand is split into regulated and unregulated demand where:

- Regulated energy is heat or power for hot water, space heating/cooling, lighting and associated pumps and fans (this energy is regulated through Part L); and
- Unregulated energy is all other energy uses such as cooking, electrical appliances and other small power.

3.5.6 The PED model predicts the regulated and unregulated energy demands of the site by month of year and hour of day, as well as the associated CO_2 emissions.

3.5.7 The predicted energy demands are based on all buildings being built to Part L 2013 standards and the proposed energy demand management measures presented above.

3.5.8 The methodology and results of PED are provided in full in **Appendix B** and summarised in the sections below. In the context of energy masterplanning, it is necessary to consider the predicted energy demands of the proposed development.

3.6 Predicted Energy Demand

3.6.1 The predicted energy demand of the development is approximately 2,743 MWh of regulated electricity, 6,758 MWh of unregulated electricity, and 13,626 MWh of heat (space heating and hot water).

3.6.2 The total annual CO_2 emissions associated with the predicted energy demand are approximately 7,874 tonnes, of which 4,367 tonnes are associated with regulated use.

3.6.3 Opportunities to incorporate on site low carbon and renewable energy are explored in **Section 4**.

4 Renewable and Decentralised Energy

4.1 Introduction

4.1.1 CDC promotes the use of decentralised and renewable or low carbon energy, where appropriate, in new developments. This section provides a preliminary assessment of the opportunities for building-integrated technologies (**Section 4.2**), and the feasibility of adopting a district heating / combined heat and power (CHP) approach (**Section 4.3**). The final energy strategy adopted will be subject to further detailed assessment, which will be presented in the reserved matters application. For reference, further background information on each technology is presented in **Appendix C**.

4.2 Building-integrated Technologies

4.2.1 **Table 4.1** presents an overview of building-integrated renewable and low carbon energy technology opportunities at the Site. Those highlighted in green are preferred options for further investigation, those in orange have some potential which should be explored once further detail is available, and those in red are considered to be least appropriate for the Proposed Development.

Table 4.1: Overview of Building-integrated Renewable and Low Carbon Energy Opportunities

Technology	Technology risk	Energy availability	Appropriate?	Comment
Photovoltaic solar panels (PV)	Low	Intermittent	Most suitable	Could be installed on south-facing pitched roofs. Frame-mounted systems could be used on any flat roofs to optimise performance.
Solar water heating (solar thermal)	Low	Intermittent	Most suitable	Could be installed on south-facing roof spaces to supply a portion of the buildings' heating demands.
Air source heat pumps	Low	Baseload	Most suitable	Could be installed on suitable buildings to supply a portion of heating demands. External condensers need careful positioning to avoid visual/noise disturbance (e.g. on rear/side walls of buildings, and away from noise-sensitive uses). Widespread use throughout the Site is only suitable with spare electrical network capacity.
Ground source heat pumps	Medium	Baseload	Potential to be explored further	May be opportunities to install small-scale systems with horizontal collector loops in private gardens and localised areas of green open space.

Technology	Technology risk	Energy availability	Appropriate?	Comment
				Subject to investigation of geological suitability in specific areas and the mechanical and electrical (M&E) design of buildings at detailed design.
Water source heat pumps	Medium	Baseload	Potential to be explored further	Further investigation into potential subterranean water sources required. Subject to obtaining appropriate water extraction and discharge consents.
Wood burning stoves	Low	As required	Limited potential	Certain houses could be adaptable should end-users wish to install wood burning stoves once purchased. The Site is outside all four of CDC's Air Quality Management Areas (AQMAs)[7]. However, feasibility would be subject to further air quality assessment at detailed design.
Hydropower	Low	Baseload	No	Nearby water courses are unlikely to have an appropriate head or flow regime to support a hydropower scheme.
Water source heat pump	High	Baseload	Limited potential	The River Cherwell is approximately 800m from the site boundary. Whilst it could provide a source of low carbon heat through water source heat pump, the distances are likely to be cost prohibitive.
Building-mounted wind energy (micro)	Low	Intermittent	No	Challenges securing long-term reliable performance. Potential structural vibration issues.

4.2.2 There is a selection of building-integrated renewable and low carbon technologies that could be employed at the Site in order to achieve the policy requirements. Based upon the current masterplan, the most suitable technologies are considered to be photovoltaic solar panels (PV), solar water heating systems, and air source heat pumps. Subject to further investigation, there may be potential for small-scale ground / water source heating solutions.

[7] CDC (no date) Air Quality Management, available online: https://www.cherwell.gov.uk/downloads/download/1069/air-quality-management (accessed 08/02/2018).

Furthermore, certain houses could be adaptable should end-users wish to install wood burning stoves.

4.2.3 These opportunities are based on current planning requirements and Building Regulations. As this is an outline planning application, with limited information available, the energy strategy needs to be flexible and able to respond to further detailed assessment, regulatory and market changes, and technological advances.

4.2.4 These potential technologies should continue to be reviewed as the design progresses, to support compatibility with detailed building designs and the M&E strategy. The reserved matters application will include further detail of the proposed renewable and low carbon energy approach, and the associated CO_2 offset. This will require detailed SAP/SBEM[8] calculations.

4.3 District Heating and CHP

4.3.1 District heating is a means of providing heat to multiple buildings via a network of insulated pipes. The heat source may be from an existing (waste) heat source, or from heat raising plant specifically designed to provide the heat, usually housed within an 'energy centre'. The energy centre houses the heating plant, which can include a range of technologies and fuels such as gas boilers, biomass boilers, and CHP. Hot water from the energy centre is pumped through a pipe network to the individual buildings (see **Figure 4.1**). In each building, heat is conveyed via a Hydraulic Interface Unit (HIU) to the central heating system and/or to the hot water taps.

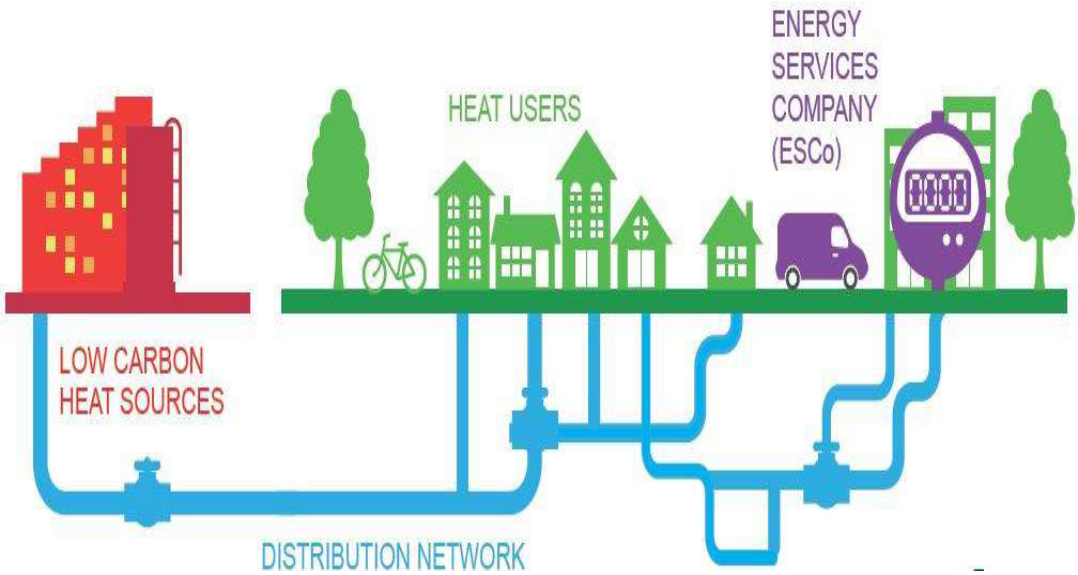


Figure 4.1 Basic components of a district heat network (the low carbon heat source may be a waste heat source such an Energy from Waste plant or a centralised heating plant/energy centre, designed for purposes of supply heat to DH network

4.3.2 Policy ESD 4 encourages the use of decentralised energy systems, providing either district heating or heating and power (CHP) in all new developments. **Policy Villages 5** in the Local Plan also includes a specific requirement to investigate the potential to make connections to and utilise heat from the Ardley Energy Recovery facility, which is located approximately 2.5 km from the site.

[8] Standard Assessment Procedure (SAP) for the energy rating of dwellings; Simplified Building Energy Model (SBEM) for buildings other than dwellings.

4.3.3 It is noted that a previous study has investigated the potential to supply heat from Ardley EfW to the Upper Heyford site which showed that such a connection would not be financially viable.[9] Therefore the option to supply heat from the EfW to the development is not considered further here.

4.3.4 There are no other significant sources of waste heat within the proximity of the proposed development, however, the potential for on-site CHP/district heating at Heyford Park could be explored in a feasibility study as the development progresses.

4.3.5 However, in order to ensure that the future Heyford Park Masterplan can accommodate a potential on site energy centre, provision has been made within the environmental assessments as part of the application. This includes a potential location identified within the commercial area of Parcel 22 within the Application Parameter Plan (see **Appendix A**) and stack height assessment as part of landscape and visual assessment.

4.3.6 The ES which accompanies the planning application has noted the need to assess the environmental effects of any such facility, including potentially new generation plant once the type and scale of the potential energy facility is known. For example, it is also noted within the Air Quality Assessment that the future development may include an energy facility, however given the heat generating technology is not yet defined, it is recommended that detailed air quality modelling of any impact is assessed at reserved matters (following and subject to the completion of the aforementioned CHP/district heating feasibility study).

[9] Finctner (2014) Ardley EFW Plant CHP Feasibility Review Report for Viridor. Accessed 19th March 2018 via: http://myeplanning.oxfordshire.gov.uk/swiftlg/MediaTemp/205197-19989.pdf

5 Water

5.1 Introduction

5.1.1 CDC Local Plan policy outlines the importance of water management in new developments within Cherwell and requires residential developments to achieve a water efficiency of no greater than 110 litres per person per day. **Policy Villages 5** (Former RAF Upper Heyford) also includes specific water management requirements for the development.

5.1.2 This chapter summarises the development's approach to sustainable water management in accordance with CDC's policies.

5.1.3 A Flood Risk Assessment and Drainage Strategy/Hydrology Assessment[10] has been prepared as part of the planning application. This should be referred to for further details of the proposed water management strategy for the development.

5.2 Internal Potable Water Consumption

5.2.1 The proposed development will aim to significantly reduce mains water usage through several demand reduction measures, including:

- Flow restrictors to reduce the flow rate of kitchen sink and bathroom basin taps;
- Dual flush toilets;
- Low capacity baths; and
- Water efficient kitchen appliances.

5.2.2 A typical water fitting specification that could achieve the 110 litres per person per day requirement, based on the 'Water Efficiency Calculator for New Dwellings'[11] is contained within **Table 5.1**.

Table 5.1: Example specification to meet 110 litres per person per day requirement

Fitting	Water Usage		Units
WC (dual flush)	6 (full)	4 (part)	Effective flush volume
Basin Taps	6		Litres per minute
Bath	175		Litres (capacity excluding displacement)
Shower	8		Litres per minute
Kitchen Taps	6		Litres per minute
Dishwasher	1.2		Litres per place setting
Washing Machine	8.2		Litres per kilogram

[10] Hydrock 2018

[11] Department for Communities and Local Government, 2009

Fitting	Water Usage	Units
Total	**109.7**	**Litres per person per day**

5.3 Flood Risk

5.3.1 A Flood Risk Assessment has been prepared by Hydrock to support the planning application.

5.3.2 The FRA confirms that the Environment Agency's (EA's) Flood Zone Mapping shows that the site is entirely within Flood Zone 1 which comprises land assessed as having a less than 1 in 1,000 annual probability of fluvial or tidal flooding (<0.1%) in any year.

5.3.3 There are adjacent water courses on the southeast and southwest which are within Flood Zones 2 and 3, however no development is proposed in these locations.

5.3.4 The EA's flooding from surface water mapping shows that the site is predominantly classified as being at 'very low' risk from this source of flooding.

5.4 Surface Water Strategy

5.4.1 ESD1 also requires developments to consider measures which minimise the risk of flooding (ESD6) and make use of sustainable drainage methods (ESD7).

5.4.2 According to the Hydrock FRA, the existing site is served by a traditional gravity surface water network discharging to local watercourses. However, the underlying soils suggests that surface water may be able to discharge via infiltration, where ground water levels would allow. In the absence of infiltration information, and confirmation of any possible contamination requiring the potential for remediation, it is therefore proposed to demonstrate that surface water runoff can be reduced.

5.4.3 The surface water discharge from the individual parcels will be connected to a swale and attenuation basin network with a restricted flow to the adjacent water courses. The surface water discharge rate will be restricted to the Mean Annual Flood (QBAR) rate.

5.4.4 The proposed surface water strategy utilises Sustainable Drainage Systems (SuDS), in the form of permeable paving and a detention basin to store runoff generated by the development up to and including a '1 in 100 year' event (as required by Policy ESD 6), plus a 40% allowance for climate change in line with Defra guidance.

5.4.5 The permeable paving will principally be used in parking areas, with use of petrol interceptors as required in larger car parking areas.

5.4.6 These SuDS also mitigate for the increase in discharge volume resulting from the development by restricting the 1 in 100-year peak discharge rate from the proposed development to a best practice minimum controlled discharge rate of 5 litres per second.

5.4.7 Further details of the strategy can be found in the Flood Risk Assessment and Drainage Strategy which accompanies the planning application.

5.5 Water Quality

5.5.1 ESD8 (Water Resources) seeks to maintain water quality, ensure adequate water resources and promote sustainability in water use.

5.5.2 The proposed scheme will be designed to satisfy the best practice guidance and to comply with advice from the Lead Local Flood Authority (Oxfordshire County Council) and to do so it is recommended that measures are put in place to improve water discharge quality.

5.5.3 Such measures would include the provision of swales alongside proposed highway networks for carriageway run-off to convey water to attenuation storage features, rather than traditional gully systems.

5.5.4 In addition to this, permeable paving on private drives and tree-pits can be used. Consideration will also need to be given to the future maintenance and adoption of any green SuDS features proposed.

5.5.5 Further details of the strategy can be found in the Flood Risk Assessment and Drainage Strategy which accompanies the planning application.

6 Transport

6.1 Introduction

6.1.1 CDC Local Plan policy ESD1 outlines the importance of locating development to reduce the need to travel, and to encourage the use of sustainable transport methods including walking, cycling and public transport.

6.1.2 A Transport Assessment and Travel Plan has been prepared[12] to support the planning application, and should be referred to for full details of the sustainable transport strategy.

6.1.3 This chapter summarises findings of the Transport Assessment and the measures proposed within the development to encourage sustainable transport options.

6.2 Existing Infrastructure

6.2.1 Camp Road forms the arterial route through former RAF Upper Heyford and connects the site to Upper Heyford village, and Somerton Road / Station Road to the west, and to the B340 in the east.

Walking / Cycling

6.2.2 Camp Road provides walk and cycle access from the proposed development to commuting, education and leisure opportunities on site and towards Upper Heyford and Heyford Station to the west.

6.2.3 There are a number of existing Public Rights of Way (PRoWs) criss-crossing the local area and these existing rural links are made up of the following:

- A network of public footpaths and bridleways to the south and east of the site linking Camp Road to Caulcott to the south, and Ardley at the northeast of the site;
- A network of public footpaths and bridleways to the northern perimeter of Heyford Park linking Fritwell with Somerton; and
- A network of public footpaths and bridleways to the south and west of the site linking Upper Heyford, Lower Heyford and Steeple Aston.

6.2.4 There are no dedicated cycle paths or cycleways in the local area, other than that proposed along the north side of Camp Road as part of the consented scheme. The closest National Cycle Network (NCN) route is NCN 5, the West Midlands Cycle Route which connects Reading to Bangor through Oxford. The route can be accessed off A4260 Banbury Road, about 7.5km west of Heyford Park. However, being a rural area, traffic is light and therefore most cyclists use the local road network.

Bus Services

6.2.5 Heyford Park is currently served by one bus service, the 25A, which runs between Oxford and Bicester, via Heyford Park along Camp Road. There are currently 3 pairs of bus stops on Camp Road. One bus stop is located on the small loop to the south of Camp Road, to the west of the Main Gate access and serves buses operating in either direction. There is another bus stop located on the northern side of Camp approximately 150m to the east of Main Gate. The third pair of bus stops are located close to the junction with Station Road.

[12] Peter Brett Associates Transport Assessment (2018)

6.2.6 As part of the Section 106 for the consented 1,075 home scheme, Dorchester Group funded an hourly bus service to compliment and augment the then-existing hourly service operated by Thames Travel, thereby providing a half-hourly bus service. Subsequently funding for the existing service was withdrawn, leaving an hourly 25A service funded wholly by Dorchester Group. The bus service number 25A is operated by Thames Travel.

Rail Services

6.2.7 The nearest railway stations to the development are Heyford Station which is located approximately 3.3km south west of the site, and Bicester North and Bicester Village Stations which are located approximately 8km south east of the site.

6.2.8 Great Western Railways operate the line from Heyford Railway Station which runs from Banbury to Oxford. Services are provided approximately every 90-120 minutes with reduced services on Sundays. From Oxford, there are onward direct connections to London Paddington. The journey time from Heyford to Banbury is approximately 18 minutes and to Oxford is approximately 16 minutes.

6.2.9 Chiltern Railways operate both Bicester North and Bicester Village stations. Bicester North provides a service between London Marylebone and Banbury approximately every 60 minutes and a service between London Marylebone and Birmingham Snow Hill approximately every 60 minutes. Bicester Village Station provides a service between London Marylebone and Oxford approximately every 30 minutes.

6.3 Proposed Sustainable Infrastructure

Vehicular Parking

6.3.1 Vehicular parking will be provided in accordance with the latest OCC parking standards (maximum) which were provided to PBA by OCC in January 2018.

6.3.2 The parking strategy for the site will encourage vehicles which are associated with the development to park in suitable locations on site.

Cycle Parking

6.3.3 Cycle parking will be provided in accordance with the latest OCC cycle parking standards (minimum).

Walk / Cycle Access

6.3.4 Pedestrian and cycle accessibility is given a high priority in the proposed access strategy and this is reflected in the standard of provision. The proposed internal network is based on a combination of low speed zones and clear, convenient and safe connections and adjoining footways and footpaths. The walking and cycling strategy is illustrated on **Figure 6.1**.

6.3.5 A secondary cycle and pedestrian route is provided throughout the plots of the development, with on road cycling and footways alongside the carriageway that connect back onto Camp Road providing a permeable network of walking and cycling routes throughout the wider site.

6.3.6 Heyford Park includes several existing footpaths and bridleways that extend to the far north and south of the site. Historically, sections of these footpaths and bridleways have been closed. It is proposed to introduce bridleway/footpath connections as well as potential links with PRoW to complete routes that were previously dead ends and provide access to the wider neighbourhood and surrounding villages including Somerton, Ardley, Fritwell and Kirtlington.

6.3.7 In addition to these hard measures the following proposals will support and encourage sustainable travel by walking and cycling by residents and employees at the development. More details on these measures are provided within the Travel Plan(s):

- Cycle Parking: Cycle parking will be secure, covered, convenient and visible. Cycle parking will be provided to OCC standards or better;
- Bike Hire / Bike Pool Scheme: To facilitate travel through the development for those without a bike or who have travelled to the site on the bus for example;
- Bicycle User Group;
- Cycle Repair Scheme such as Dr Bike; and
- Adult Cycle Training Sessions.

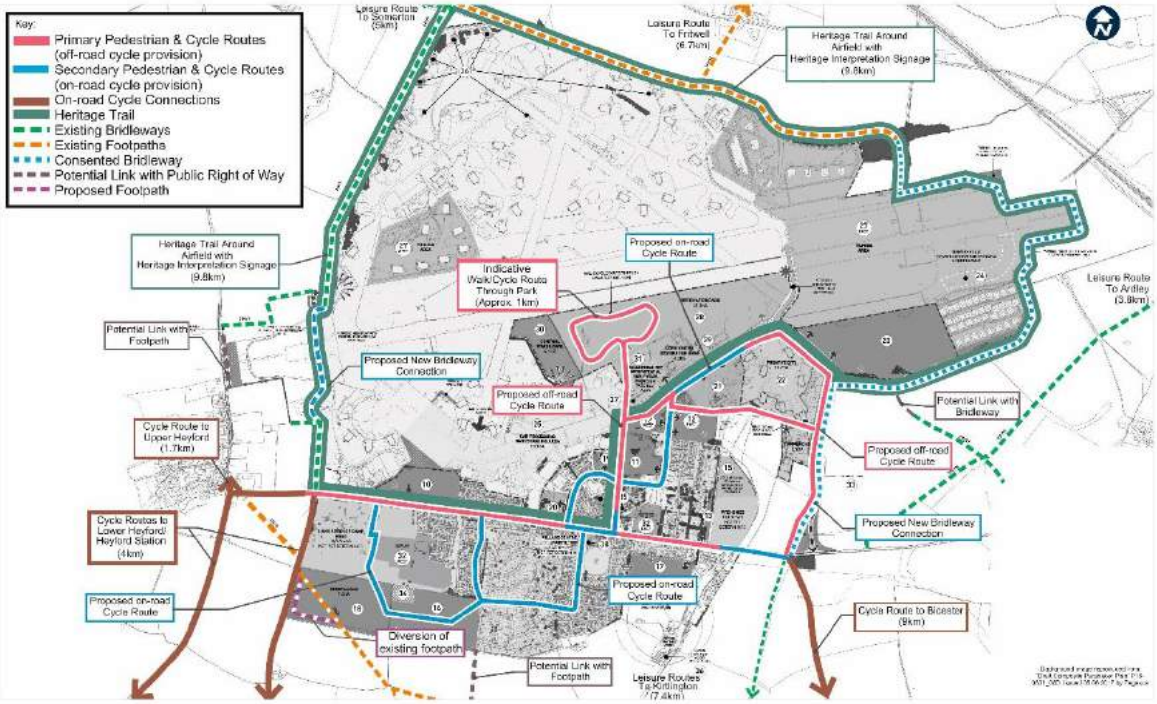


Figure 6.1 Heyford Park walking and cycling strategy (extracted from PBA Transport Assessment)

Public Transport Access

Bus

6.3.8 A number of meetings have been held with OCC and the operators to discuss the public transport strategy for the development and a strategy has been agreed in principle as follows.

6.3.9 The focus for the bus service strategy should be Bicester where significant growth is planned, with 18,500 new jobs, 10,000 new homes and regeneration of the town centre in the period of the Cherwell Local Plan to 2031.

6.3.10 It has also been agreed that there should continue to be a regular service to Oxford, as the regional centre and where major growth is also planned.

6.3.11 Consideration has been given to a service to Banbury, but the level of demand, and consequently revenue, compared to the cost of operation means that the service would not be commercially sustainable. Instead, it is proposed to provide opportunities to access Banbury via the rail network at Bicester and Heyford.

6.3.12 For Bicester, it is proposed to operate a frequent daytime service on Monday to Saturday with operating hours that facilitate commuting to and from London by rail. It is also proposed to operate a lower frequency Sunday service. The Monday to Saturday daytime frequency of the service is likely to start with a half hourly service that is increased to a 20 minute, and potentially 15 minute service as the development is built out and patronage increases.

6.3.13 In Heyford, the Bicester service would be routed via Chilgrove Drive and through the new development to the north of Camp Road, re-joining Camp Road at the Village Centre. This would give access from the majority of the new development to bus stops within 400 metres walk distance.

Rail

6.3.14 Phase 2 of the East West Rail project covers the western section comprising the route from Bicester Village to Bedford via Bletchley, Woburn Sands and Ridgmont which is due to open in 2022.

6.3.15 The central and eastern sections of the project will provide connections to Cambridge, Ipswich and Norwich. Previously these areas were only accessible via London but the project will enable direct connection cross-country. The central section of the project is anticipated to be in operation by 2030. A study has been undertaken to identify future rail enhancement schemes as options for investment and delivery for the eastern section, it is not yet known when the eastern section will be in operation. The project will afford greater connectivity and the opportunity to reach further destinations from Bicester Village.

Vehicle Access

6.3.16 Access to the proposed residential element of the development will be provided via a series of junctions from Camp Road which will form a permeable network of roads throughout the site and connect with existing infrastructure. The majority of these junctions will be simple priority junctions with Camp Road forming the major carriageway.

Local Facilities

6.3.17 There are a variety of local facilities, either consented or proposed, as part of the Heyford Park masterplan. For further details of these and of the proposed sustainable transport strategy for Heyford Park, please refer to the Transport Assessment and Travel Plans which accompany the application.

7 Biodiversity

7.1 Introduction

7.1.1 CDC Local Plan policy ESD3 requires development proposals to demonstrate that they are reducing their effect on the external environment and include opportunities for open space and planting.

7.1.2 This chapter outlines the current ecological setting and the measures proposed within the development to provide an ecological betterment between pre and post development.

7.2 Existing Ecological Setting

7.2.1 An Ecological Appraisal been prepared for the Application by BSG Ecology. The Appraisal was informed by a desk study and an extended Phase 1 Habitat survey, the results of which have been used to identify potential impacts of the development proposals and their associated effects on ecological features.

7.2.2 Overall the Application Site is dominated by neutral and calcareous grassland, interspersed with areas of hard standing. The majority of the Application Site is dominated by poor semi-improved neutral grassland. In the central and eastern sections of the Site unimproved neutral and calcareous grasslands are present (much of which is located within the Upper Heyford Airfield Local Wildlife Site (LWS). Standing water is present within concrete water tanks. These are predominately located in the south and east of the Application Site. Three parcels of disconnected land are present to the south the Application Site. These are occupied by arable and amenity grassland.

7.2.3 These habitats have the potential to be used by foraging and commuting bats, badgers, nesting birds, reptiles, mammals and invertebrates.

7.3 Proposed Strategy

7.3.1 A number of important ecological features have been identified for further consideration. Firstly, features have been identified for further consideration based on their value. Further features have been carried forward for further consideration despite their relatively low value as a result of the potential legal of policy implications of adverse effects. For instance, a single badger sett may be of Site value, but its removal in the absence of mitigation and a licence from Natural England would result in a breach of legislation, therefore a negative effect.

7.3.2 The features thus selected are:

- Ardley Cutting and Quarry SSSI
- Upper Heyford Airfield LWS
- Rush Spinney LWS
- Habitats (Species poor semi-improved, semi-improved neutral, semi-improved calcareous, unimproved neutral, unimproved calcareous, standing water, hedgerows)
- Bats (roosting, foraging and commuting)
- Badger
- Other SPI mammals (European hare, hedgehog, polecat)

- Reptiles
- Great crested newts and amphibians
- Birds (breeding and wintering)
- Terrestrial invertebrates (including Open Mosaic of Habitat mosaics)

7.3.3 In order to assess the impact on the biodiversity value of the Application Site as a result of the Proposed Development, 'biodiversity value' is also brought forward for further consideration.

7.3.4 To compensate for the grassland habitat losses within the Proposed Development, a number of mitigation measures will be implemented both during construction and upon occupation / operation of the site. These are summarised below.

7.3.5 In addition the proposed strategy would be supported by the preparation and delivery of two key documents: a Construction Environmental Management Plan (CEMP) and a Landscape and Ecology Management Plan (LEMP). The preparation and implementation of both of these documents would be a condition of planning consent for the Proposed Development.

7.3.6 For further details please refer to the Ecology Appraisal which accompanies the planning application.

During construction

7.3.7 The creation of up 30.82 ha of unimproved calcareous grassland on land which currently supports arable land. This habitat creation would more than compensate for the loss of this habitat type (10.97 ha) from the Application Site. This grassland creation contiguous with the airfield will benefit a range of taxa such as reptiles, breeding birds (including skylark and potentially curlew), invertebrates, bats and other SPI mammals.

7.3.8 To ensure good quality calcareous grassland is created within 10 years, various restoration techniques will be applied depending on existing soil conditions. These will be set out in a grassland restoration / creation works programme within the LEMP and will include, but will not be limited to, soil nutrient reduction measures, use of green hay from the LWS and additional sowing of suitable native wildflower seed mixes. Development of the grassland will be monitored and assessed against defined creation objectives and targets.

During Operation

7.3.9 Existing retained grasslands habitats will be monitored in order to ensure that proposed measures are successful in maintaining the habitat in its current condition. This will be carried out by a suitably experienced ecologist during yearly visits in July, to carry out botanical surveys and condition assessment. This will be reported on annually to the LPA.

7.3.10 To reduce the risk of additional predation by domestic cats affecting reptiles, great crested newts and breeding birds, permanent cat-proof fencing will be installed. This will be associated with already proposed security fencing.

7.3.11 In order to mitigate for potential effects arising from disturbance on breeding curlew from the proposed use, prescriptions will be set out in the LEMP, which will dictate the types of activities to be avoided and periods when no activity on the filming area will be allowed. The impact to this species as a result of each new filming project will also be assessed through Environmental Risk Assessments that will be completed for each filming project.

8 Pollution

8.1 Introduction

8.1.1 CDC Local Plan policy ESD3 requires development proposals to reduce pollution and the impact on the external environment.

8.1.2 This chapter summarises the potential air, noise and light pollution issues that may arise as a result of the proposed development during both the construction and operational phases and suggests potential mitigation measures to reduce the impact.

8.2 Air Quality

8.2.1 An Air Quality Assessment has been prepared by PBA which will accompany the planning application.

8.2.2 This report describes existing air quality within the study area, considers the suitability of the site for residential development, and assesses the impact of the construction and operation of the development on air quality in the surrounding area.

8.2.3 The proposed site is not located within an Air Quality Management Area (AQMA).

Construction

8.2.4 During construction, the main potential effects are from dust annoyance and locally elevated concentrations of particulate matter. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.

8.2.5 To mitigate these effects, a range of measures are proposed to be implemented during the construction stage:

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Ensure all vehicles switch off engines when stationary;
- Only use cutting, grinding and sawing equipment with dust suppression equipment;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate;
- Use water assisted dust sweepers on the site access and local roads;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials; and
- Install a wheel wash with a hard-surfaced road to the site exit where site layout permits.

Operational

8.2.6 In terms of operational air quality impacts these are likely to arise from road traffic, emissions from heating systems and paints/varnishes and glues used within the final fit out of the dwellings.

8.2.7 To mitigate the impact of these, some potential measures which can be explored at the detail design stage include:

- Using mechanical ventilation rather than openable windows to provide ventilation;
- Selecting boilers or other heating systems which have low NOx emissions; and
- Selecting finishes and fittings which have low levels of Volatile Organic Compounds (VOC).

8.3 Noise

8.3.1 A Noise Impact Assessment has been prepared by PBA to accompany the planning application.

8.3.2 The purpose of this report is to describe the existing noise and vibration climate at the proposed development site to determine its suitability for residential development.

Construction

8.3.3 It is inevitable that noise will arise as a result of construction works, in order to mitigate the impact of construction noise the following measures could be implemented:

- Appropriate working hours, likely to exclude work during the night-time and during Sundays and public holidays
- Considerate working hours for excessively noisy activities;
- Screening plant to reduce noise which cannot be reduced by increasing the distance between the source and the receiver (i.e. by installing noisy plant and equipment behind large site buildings;
- Orienting plant that is known to emit noise strongly in one direction so that the noise is directed away from dwellings, where possible; and
- Work to keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern.

Operational

8.3.4 The dominant noise associated with the site is from traffic noise and vehicular movements on the surrounding roads.

8.3.5 An acoustic model has been constructed using the survey data and proposed plans in order to determine the likely internal noise levels within notional dwellings on the site.

8.3.6 The modelled noise levels are within the tolerance permitted by the lowest-observed-adverse-effect level (LOAEL) therefore indicating that the site is suitable for residential development without the need for specific acoustic mitigation measures.

9 Sustainable Materials & Construction

9.1 Introduction

9.1.1 CDC Local Plan policy ESD3 requires development proposals to incorporate locally sourced, recycled or re-used building materials where feasible.

9.1.2 This chapter summarises the potential options to promote the use of sustainable materials and construction methods, including promoting use of secondary materials, new building materials, sustainable transport of materials and waste.

9.2 Managing Material Extraction

9.2.1 Responsible Sourcing of Construction products, published and updated by the Building Research Establishment (BRE) provides a holistic approach to the management of materials for sustainability. Materials for the construction of the new homes should be sourced to consider indirect carbon emissions, such as: materials involved in the extraction, manufacture and transfer processes, and subsequent in-life emissions resulting from the use of those materials in the development.

9.3 Promoting Use of Secondary Materials

9.3.1 In line with the Cherwell Design Guide SPD, the proposed development will look to maximise recycling or reuse of waste products arising from demolition and construction on site and in excess of the UK wide target of 70%.

9.4 New Building Materials

9.4.1 The Building Research Establishment (BRE) publishes and updates a Green Guide to Specification, which aims at providing a simple guide to the environmental impact of building materials.

9.4.2 To do this BRE created an Environmental Profiles Methodology, which is used to assess the relative environmental impacts of construction materials commonly used in buildings based on several factors including climate change, mineral extraction, toxicity, fossil fuel depletion and waste disposal.

9.4.3 Using this method, materials are given an overall rating of between A+ to E (**Figure 9.1**), with those rated A+ representing the best environmental performance/least environmental impact, whereas those which are rated E have the worst environmental performance/most environmental impact.

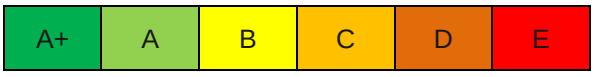


Figure 9.1: Green Guide to Specification Materials Ratings

9.5 Sustainable Materials

9.5.1 The exact specifications and materials of the proposed development is not yet known, but careful consideration should be given to ensure the building materials minimise environmental impacts. Appropriate choice of materials is important in every aspect of the building process to ensure minimal environmental impact of the development.

9.5.2 It is advised that materials are sourced in line with BRE's BES 6001 – The Framework Standard for Responsible Sourcing. Utilising recycled materials where possible is the most

sustainable approach, whilst consideration should also be given to using materials that go through less energy intensive processes such as timber, clay bricks and slate tiles.

9.6 Sustainable Transport of Minerals

9.6.1 Where possible, the transport of materials to the site during the construction period will be managed to minimise the impacts on the local road network. However, due to the relatively rural location, Heavy Goods Vehicle (HGV) is expected to be the most likely transport mode to transport materials.

9.6.2 Construction Environmental Management Plans (CEMP) will be prepared in advance of construction that set out measures to manage the construction works. The CEMP will be progressed by the principal contractor(s) based on the proposed working practices.

9.7 Construction Waste Management

9.7.1 During the construction process and the occupation of the development, the waste strategy should follow the principles of the waste hierarchy – "eliminate, reduce, reuse and recycle" – to minimise waste sent to landfill and to ensure that the environmental, social and economic risks from waste are minimised and, where possible, turned into opportunities.

9.7.2 The principal contractor will be charged with responsibility for the management and coordination of all waste streams during each stage of the construction of the houses.

9.7.3 To facilitate this a Site Waste Management Plan (SWMP) could be prepared.

9.7.4 The legal requirement to prepare a SWMP was removed in 2013, however, preparation of a SWMP is still considered important to ensure that building materials are managed efficiently; waste is disposed of legally, fly tipping is reduced; and materials reuse, recovery and recycling is maximised.

9.7.5 A SWMP typically has three stages:

- Pre-Construction - development of the SWMP;
- Construction Phase - managing and updating the SWMP process; and
- Post-Construction - verifying and reporting the SWMP actions.

9.7.6 The SWMP contains an assessment of the likely composition and quantity of waste arisings and a target for sustainable waste disposal (i.e. diversion from landfill).

9.7.7 Materials recovered from any site works may be suitable for reuse on site, reducing costs of transportation and procurement of virgin materials. This, combined with considerate design practices, such as seeking a materials cut-and-fill balance, will help to minimise construction waste in line with the waste hierarchy.

9.8 Operational Waste

9.8.1 The detailed operational waste strategy will be managed at reserved matters stage. The strategy should demonstrate alignment to CDC's requirements for all new developments to incorporate practical measures to facilitate the efficient use of resources and to maximise waste minimisation, sorting, re-use, recycling and recovery.

9.8.2 The development will ensure waste is managed in line with CDC's Waste and Recycling Storage and Collection Guidance, by providing adequate space for the following refuse bin types which are all collected on a fortnightly basis:

- Green bin for domestic waste;
- Blue bin for recycling (including paper, tins, plastic bottles, foil, cartons and aerosols);
- Internal kitchen caddy and external brown bin for garden and food waste.

9.8.3 Space will be provided for the storage of the refuse bin types outlined above within each residential dwelling so that responsible waste disposal is encouraged from the outset.

9.8.4 Furthermore, accessibility to bins should also be in accordance with local highways guidance, so that waste collection vehicles can safely access all the dwellings that comprise the development.

9.8.5 Once the whole development reaches the detailed design stage, sufficient access should be provided within the internal roads to allow for the manoeuvring and turning heads of refuse and delivery vehicles to safely access and exit the development without blocking any of the housing.

10 Summary

10.1.1 Dorchester Group is submitting an Outline planning application for a mixed used development on the former RAF Upper Heyford site, known as Heyford Park, Oxfordshire.

10.1.2 This Sustainability & Energy Statement demonstrates how the proposed development aligns with the range of local sustainability objectives, as defined by CDC's Core Strategy Policy and Policy Village 5 including:

- Optimising energy demand where possible, through using the nationally recognised energy hierarchy principles, and through masterplan design principles such as orientation of buildings and incorporation of open spaces;
- Providing a proportion of the development's energy supply by potentially using low carbon and renewable energy sources that are feasible at the Site, such as Solar PV panels, solar water heating, or air source heat pumps;
- Making provision for an energy facility within the masterplan to facilitate future potential on site energy generation, subject to feasibility;
- Appropriate surface water management to protect the receiving waters from pollution and reduce the risk of flooding, including the use of permeable paving SuDS;
- Protecting local air quality and limiting noise and lighting pollution, by providing mitigation measures to minimise potential polluting effects across the construction and operational phases of the development;
- Appropriate management of construction and operational waste by managing material extraction, sustainable transport of materials, managing construction waste through a potential SWMP, and managing operational waste in line with CDC's waste collection requirements;
- Retaining, enhancing and creating new habitats to preserve the ecological setting of the Site, through several measures including the creation of up 30 ha of grassland habitat to support a range of taxa such as reptiles, breeding birds (including skylark and potentially curlew), invertebrates, bats and other mammals;
- Reducing the consumption of natural resources and greenhouse gas emissions through sustainable energy, water and materials procurement strategies, as well as considerate construction practices; and
- Promoting sustainable travel modes (including walking, cycling and public transport) as an alternative to private car use and enhancing existing services, such as new bus services and shared footways/cycle ways to promote active travel.

Appendix A Application Boundary and Parameter Plans

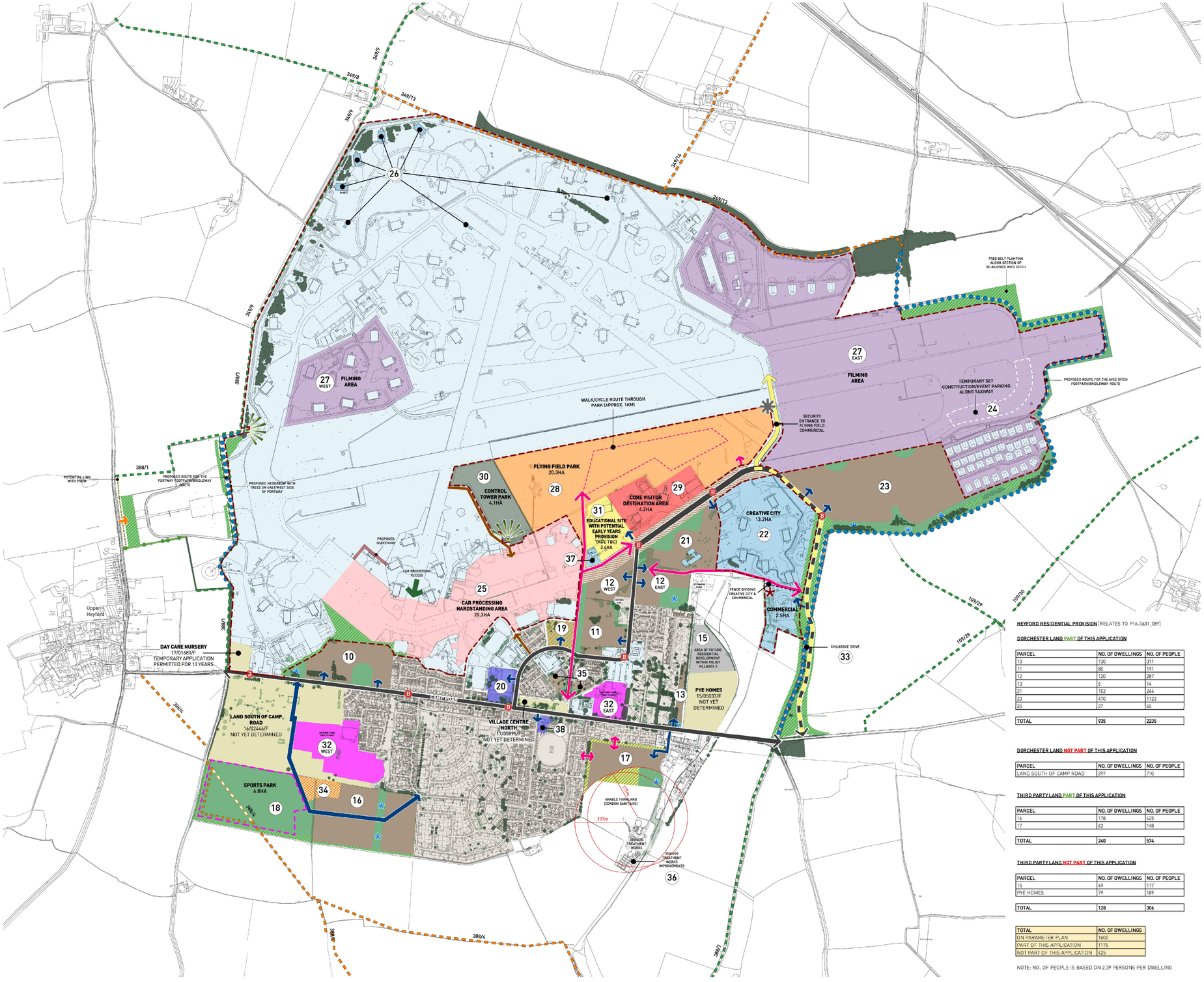
KEY

APPLICATION BOUNDARY (457.37HA)

HEYFORD PARK - **APPLICATION BOUNDARY**

Pegasus Design

PLANNING I DESIGN I ENVIRONMENT I ECONOMICS | WWW.PEGASUSPG.CO.UK | TEAM/DRAWN BY MCC/KM | APPROVED BY P.M: MCC | DATE: 01/02/2018 | SCALE: 1:5000 @ A0 | DRWG: **P16-0631**_33 SHEET NO: _ REV: K | CLIENT: **DORCHESTER GROUP** |



PROPOSALS KEY

LAND USE

- EXISTING BUILT DEVELOPMENT/PROPOSALS
- EXISTING COMMERCIAL AREAS
- EXISTING APPLICATIONS WITHIN MASTERPLAN AREA
  LAND SOUTH OF CAMP ROAD, VILLAGE CENTRE NORTH, DAY NURSERY & PYE HOMES
- RESIDENTIAL
- CREATIVE CITY / COMMERCIAL
- CAR PROCESSING
- MIXED USE
- FLYING FIELD PARK
- CORE VISITOR DESTINATION AREA
- EDUCATIONAL SITE WITH POTENTIAL EARLY YEARS PROVISION
  AGE TBC
- ANCILLARY OPEN ACTIVITY SUCH AS PARKING
- FILMING ACTIVITY AREA
- HEYFORD FREE SCHOOL SITES
  TO BE EXTENDED/EXPANDED
- UP TO 60 EXTRA CARE DWELLINGS (CLASS C2/C3)
  0.9HA
- AREA FOR COMMUNITY USES
- CONTROL TOWER PARK
- GREEN INFRASTRUCTURE
  INCLUDING CHILDREN'S PLAY AREAS

GREEN INFRASTRUCTURE

- STRATEGIC LANDSCAPE BUFFER
- COMMUNITY ORCHARD / ALLOTMENTS
- SPORTS PARK
- APPROXIMATE LOCATION OF ATTENUATION AREAS
- PROPOSED SCREENING
- VIEWPOINT ACROSS SITE
- EXISTING VEGETATION
  SUBJECT TO DETAILED TREE SURVEY (CLASS 'C' HATCHED GREEN)

HEYFORD RESIDENTIAL PROVISION (RELATES TO P16-0631_08Y)

DORCHESTER LAND PART OF THIS APPLICATION

PARCEL	NO. OF DWELLINGS	NO. OF PEOPLE
10	130	311
11	80	191
12	120	287
13	6	14
21	102	244
23	470	1123
35	27	65
TOTAL	935	2235

DORCHESTER LAND NOT PART OF THIS APPLICATION

PARCEL	NO. OF DWELLINGS	NO. OF PEOPLE
LAND SOUTH OF CAMP ROAD	297	710

THIRD PARTY LAND PART OF THIS APPLICATION

PARCEL	NO. OF DWELLINGS	NO. OF PEOPLE
16	178	425
17	62	148
TOTAL	240	574

THIRD PARTY LAND NOT PART OF THIS APPLICATION

PARCEL	NO. OF DWELLINGS	NO. OF PEOPLE
15	49	117
PYE HOMES	79	189
TOTAL	128	306

TOTAL	NO. OF DWELLINGS
ON PARAMETER PLAN	1600
PART OF THIS APPLICATION	1175
NOT PART OF THIS APPLICATION	425

NOTE: NO. OF PEOPLE IS BASED ON 2.39 PERSONS PER DWELLING

ACCESS & MOVEMENT

- BUS ROUTE, VEHICLE ACCESS & FOOTWAYS
- PRIMARY VEHICULAR ACCESS
- PRIMARY HGV ACCESS
- MAINTENANCE ACCESS
- PRIMARY PEDESTRIAN / CYCLE ROUTES
  WHERE NOT IN ASSOCIATION WITH VEHICLE ACCESS
- PRIMARY CAR PROCESSING ACCESS
- SECONDARY COMMERCIAL ACCESS
- POTENTIAL BUS STOP LOCATIONS
- FOOTPATH/BRIDLEWAY ROUTE
- POTENTIAL LINK WITH PROW
- EXISTING FOOTPATHS
- CLOSURE OF EXISTING FOOTPATH
- DIVERTED FOOTPATH
- EXISTING BRIDLEWAY

OTHER

- SECURITY FENCE
- 10 PARCEL NUMBER
- OBSERVATION TOWER & ZIPWIRE
- CORDON SANITARE EXCLUSION ZONES
  177M RADIUS
- APPROXIMATE LOCATION OF ENERGY INFRASTRUCTURE / FACILITY

HEYFORD PARK - **COMPOSITE PARAMETER PLAN**

Pegasus Design

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | WWW.PEGASUSPG.CO.UK | TEAM/DRAWN BY MCC/KM | APPROVED BY P.M. MCC | DATE: 11/04/2018 | SCALE: 1:5000 @ A0 | DRWG: **P16-0631_08** SHEET NO: 01 REV: Y | CLIENT: **DORCHESTER GROUP** |

Appendix B Predicted Energy Demand Model

Project Name: Heyford Park
Project Number: 39304
Consultant: D Ulanowsky

Masterplan Energy Model: Data Report

This data report provides a summary of the masterplan energy model and its results. These results are provided in line with the recommendations presented in the main body of the report and the limitations provided below.

Key Performance Indicators and Assumptions

Commercial and Industrial Use Class

Data References

Energy Efficiency in Buildings CIBSE Guide F 2004
BSRIA Rules of Thumb Fourth Edition 2003
Peter Brett Associates Industry Experience 2010
BCO Guide to Specification 2009

Methodology

The benchmark data from the above references have been adjusted to reflect a 44% reduction in carbon emissions over the 2002 Building Regulations, in order to represent Building Regulations 2010. The majority of this 44% reduction has been achieved through applying a standard reduction in regulated electricity demand of 55% and a 25% reduction in hot water demand (although this reduction changes slightly depending on use class). The remaining carbon emission reductions required in order to meet the 2013 Building Regulations were then achieved through space heating reductions.

Additional carbon emission reductions required to meet standards for Building Regulations 2013 have been established through PBA's knowledge of M&E and Structural Engineering and guidance presented by the BCO.

Unregulated energy demand has not been adjusted to reflect changes in demand use since 2002. Our assumption is that whilst appliances contributing to the unregulated demand continue to have improved efficiencies and lower energy requirements, more appliances and technologies are being bought and used, hence displacing the carbon emission savings achieved.

Each commercial use class has been subdivided into a use typology to provide a range of different use scenarios. High street and local centres have taken data from a range of end uses to provide an average energy demand for the use class.

Domestic Use Classes

Data References

The Government's Standard Assessment Procedure for Energy Rating of Dwellings 2009 edition with correction, May 2010
Energy Savings Trust Information : "Energy Efficiency and the Code for Sustainable Homes" - Level 3, Level 4 and Level 6 2009
BSRIA Rules of Thumb Fourth Edition 2003
Energy Efficiency in Buildings CIBSE Guide F 2004
BRE Domestic Energy Model (BREDEM 8 &12)
Zero Carbon Hub establishing a fabric energy efficiency standard 2012

Methodology

The baseline regulated energy demands for domestic use classes were primarily calculated using the methodology as set out in The Government's Standard Assessment Procedure (SAP). The baseline unregulated energy demand however was calculated using the methodology set out in the Code for Sustainable Homes. These methodologies enabled a 2013 baseline to be calculated for domestic units directly.

In order to calculate the predicted energy demand for 2013 and PassivHaus the percentage reduction in space heating, hot water heating and electricity that could be achieved was estimated using information set out in the Zero Carbon Hubs "Fabric Energy Efficiency Standard for Zero Carbon Homes". The information in this document enabled sample SAP calculations to be carried out on Flats, Terrace, Semi Detached and Detached Houses and thus the percentage savings in electricity, space heating and hot water heating that could be achieved through base build alone were found.

The unregulated energy demand for residential units was assumed to remain the same as the baseline for the reasons stated above, which follows the BREDEM approach to calculating unregulated supply.

RESULTS: The predicted energy demand

Description	Quantity	Total Area (m2)	Total Predicted Energy Demand (MWh)					Total CO2 Emissions (Tonnes)			
			Hot Water	Space HTG	Reg Elec	Unreg Elec	Total	Gas	Reg. Electric	Unreg. Electric	Total
Residential											
	1,175	111,625	1,985	6,693	1,222	3,786	13,687	1,874	634	1,965	4,474
Subtotal	**1,175**	**111,625**	**1,985**	**6,693**	**1,222**	**3,786**	**13,687**	**1,874**	**634**	**1,965**	**4,474**
Non- Residential											
	83	66,754	1,110	3,838	1,521	2,972	9,440	1,069	789	1,542	3,400
Subtotal	**83**	**66,754**	**1,110**	**3,838**	**1,521**	**2,972**	**9,440**	**1,069**	**789**	**1,542**	**3,400**
GRAND TOTAL	**1,258**	**178,379**	**3,095**	**10,531**	**2,743**	**6,758**	**23,127**	**2,943**	**1,424**	**3,508**	**7,874**

Residential	**kg CO2 / m2 (regulated):**	**22.475**
Non-Residential	**kg CO2 / m2 (regulated):**	**27.832**

Daily Maximum and Minimum Peak Demands for January and June

	January		June	
	Heat (kW)	Electricity (kW)	Heat (kW)	Electricity (kW)
Max.	6,763	1,743	1,346	1,353
Min.	680	535	34	385

Energy Efficiency % reduction for Space Heating over 2010 baseline

House Type	2010	2013	PassivHaus
Detached	0%	8%	19%
Semi Detached	0%	8%	19%
Terrace	0%	10%	31%
Flat	0%	10%	31%

Energy Efficiency % reduction for Hot water* over 2010 baseline

House Type	2010	2013	PassivHaus
Detached	0%	0%	3%
Semi Detached	0%	0%	3%
Terrace	0%	0%	3%
Flat	0%	0%	3%

**2016 Reduction for Flats has been taken to be the same as 2013 reduction, as 2016 reduction using SAPs was found to be less than 2013 reduction*

Energy Efficiency % reduction for Electricity over 2010 baseline

House Type	2010	2013	PassivHaus
Detached	0%	0%	5%
Semi Detached	0%	0%	5%
Terrace	0%	0%	5%
Flat	0%	0%	5%

Assumptions and Limitations

1. The masterplan energy model is based on published benchmark data. PBA are not responsible for the benchmark data and its quality of collation or quality assurance.

2. The applications of rules of thumb have been used to adjust benchmark data to represent likely changes in the Building Regulations. Adjustments have been made through the use of industry guides and PBA's experience in structural engineering and M&E engineering. It is recognised that through adjustments such as these a generic approach to energy demand modelling has been created.

3. The masterplan energy model is a generic model and not building specific. The development of detailed energy infrastructure or plant should not be based on high level assessment figures.

4. The domestic energy demand is aligned to the Office of the Communities and Local Government Standard Assessment Procedure. This masterplan energy model is therefore limited by the assumption, number and calculations presented within the SAP.

5. Domestic energy demand reductions are based on Energy Saving Trust guidance as benchmark reductions. The application of energy demand reductions are therefore limited to the standards set by the Energy Savings Trust.

6. The masterplan energy model is limited by the nature of information that is present at the outline planning stage. In this respect the model is based on the masterplan development schedule broken down as use classes where available. Where use classes are not available assumptions have been made to estimate the typology.

7. Use of the Homes and Community Agency's benchmark data for occupation has been utilised to assess the likely water consumption per person within each dwelling.

8. It has been assumed that 33% of water used within a dwelling will be for hot water. Water reduction targets are taken from the CLG Code for sustainable homes standard.

9. A wide variety of factors will influence the final energy demand of a development. Many of these factors cannot be incorporated within a model without significant conjecture. It is recommended that more detailed energy demand modelling is undertaken for the development once more detailed designs are available. Detailed modelling should use both the SAP and Simplified Building Energy Model.

10. Demand profiles have been normalised to enable them to be representative of the likely total energy demand. As such these profiles provide an indication of the energy profile.

Appendix C Additional Information on Renewable and Low Carbon Energy Technologies

C.1 Photovoltaic Solar Panels

C.1.1 Photovoltaic (PV) solar panels offset grid electricity and therefore provide a CO_2 saving (currently 0.519 kg CO_2/kWh). Payback periods for PV are now commercially attractive due to the Feed-in Tariff (FiT) mechanism and a significantly increased supply base.

C.1.2 PV arrays are connected to the electrical system of a building via inverters. The electricity generated by PV can be used on-site and, when not required, can be exported to the National Grid. This process requires no user intervention.

C.1.3 Sunshine is intermittent and often unreliable in England, which can significantly impact PV performance. PV also only operates in daylight hours, so cannot generate electricity continuously. PV is generally most efficient when it is positioned as south-facing at a pitch of about 30-35° from horizontal, and in areas free from shading.

C.1.4 Use of PV arrays is subject to detailed visual impact appraisal and structural engineering assessments.

C.2 Solar Water Heating (or Solar Thermal)

C.2.1 Solar water heating systems could be used to offset a portion of the hot water demand in both the domestic and non-residential buildings at the Proposed Development. In well-designed buildings, solar water heating can reduce the fuel consumption associated with hot water by 60-70% and the associated CO_2 emissions.

C.2.2 As with PV, solar water heating systems rely on solar energy and therefore the most effective heat production occurs during the daytime and sunny periods, and efficiencies are greatly reduced in winter. Therefore, their output for the 'whole year' is relatively low.

C.2.3 To accommodate solar water heating systems, buildings must be designed to allow space for hot water cylinders and flow/return pipework. As with PV, solar water heating operates most efficiently when installed on south-facing (or almost south-facing) roof space.

C.2.4 Use of solar thermal technologies is also subject to detailed visual impact appraisal and structural engineering assessments.

C.3 Air Source Heat Pumps

C.3.1 Air source heat pumps absorb heat from the outside air, which can then be used to heat radiators, underfloor heating systems, or warm air convectors and hot water in a building. Heat pumps have some impact on the environment as they need electricity to run the fans for air extraction and compressors (typically more than 2 kW).

C.3.2 Air source heat pumps require the installation of external condensers, which are usually mounted on roofs or rear/side walls. They also feature moving parts (an electrically driven fan) and therefore make noise when they operate.

C.3.3 Air source heat pumps are generally installed on individual homes, apartment blocks or commercial buildings. The use of numerous air source heat pump systems would have an impact on electrical loads and grid reinforcements.

C.4 Ground Source Heat Pumps

C.4.1 Ground source heat pumps draw heat energy from the ground, concentrate it and then release it into a property. Some heat pumps can reverse this process in the summer, thereby providing cooling in buildings.

C.4.2 Ground source heat pumps can be either 'open loop' or 'closed loop'. Closed loop systems are typical in the UK and consist of laying a series of coiled pipes in shallow trenches (horizontal collector loops) – which requires considerable land area - or down boreholes (vertical collector loops). In open loop systems, groundwater is abstracted at ambient temperature from the ground, passed through a heat pump before being reinjected back into the ground or discharged at the surface. Open loop systems have the advantage of limited underground infrastructure, but require an environmental permit to extract and discharge water.

C.4.3 For systems to operate effectively, buildings must achieve a high standard of fabric energy efficiency and, where appropriate, an underfloor heating system (wet system) could be incorporated to optimise system performance.

C.4.4 The efficiency and cost-effectiveness of a ground source heat pump system is affected by underlying ground conditions and the thermal conductivity of the geology.

C.5 Water Source Heat Pumps

C.5.1 Water source heat pumps work on a similar principle to ground source heat pumps. Instead of taking advantage of the heat in the ground, they take advantage of the relatively consistent temperatures found in a body of water.

C.5.2 A series of flexible pipework is submerged in a body of water, like a lake, river, or stream. A heat pump pushes working fluid through the network of piping, and this fluid absorbs the heat from the surrounding water as it goes.

C.5.3 This working fluid is then compressed by an electric compressor, in a similar fashion to the other types of heat pump, which raises the temperature. A heat exchanger can then be used to remove the heat entirely from this working fluid, providing a building with hot water that can be used for space heating (in radiators or under floor heating). It can also be plumbed into a building's hot water system, where a boiler can just provide the small amount of additional heat needed to bring it up to the required temperature, so it can be used for showers and baths.

C.5.4 Once the heat has been removed from the working fluid via the heat exchanger, it is once again pumped back through the pipework, thereby completing a continuous cycle.

C.5.5 An environmental permit is required to extract and discharge water.

C.6 Biomass

C.6.1 Biomass can be used as a fuel source for heat, power and Combined Heat and Power (CHP) applications. Energy is typically derived from burning biomass in biomass boilers. Other potential technologies include gasification and pyrolysis, but these are yet to be commercially proven.

C.6.2 Biomass plants can be scaled to meet the needs of the development and to reflect the availability of biomass in the area. Large biomass plants can be used to supply heat (and power) to multiple buildings via a heat network. Smaller systems can be used to heat a single building (e.g. wood-burning stoves).

C.6.3 The lifecycle costs of biomass systems are typically greater than tradition fossil fuel heating systems. However, incentive schemes such as the Renewable Heat Incentive (RHI) can reduce the costs and provide financial returns.

C.6.4 The use of biomass technologies is subject to the availability of long-term contracts to support security of supply and sufficient generation for the site. In addition, biomass is a bulky product that requires additional space for infrastructure (including storage and delivery space).

C.7 Hydropower

C.7.1 Hydropower is a form of renewable energy that uses the water stored, for example in dams as well as flowing in rivers, to create electricity in hydropower plants.

C.8 Wind Energy

C.8.1 Wind is a well-established energy source. The expertise and skills to undertake a range of wind turbine installations is extensive and the good supply base for wind energy means there is strong market competition. With this experience and knowledge behind wind energy generation, the financial risks are relatively low. A detailed assessment of the on-site wind regime would be needed before committing to a wind power strategy.

C.8.2 Building-mounted turbines (kW-scale) are yet to be proven commercially viable, due to a combination of challenges securing long-term reliable performance and structural vibration issues.

C.9 District Energy

C.9.1 Heating and / or cooling can be provided to multiple buildings from a central energy centre via a district heating and / or cooling network. The energy centre can use a variety of fuels and this therefore enables the use of low and zero carbon energy sources. The role of district heating and cooling as a means of achieving carbon reduction targets for land development projects is increasingly being considered in the UK.

C.9.2 There are three basic elements in a district heating system:

- Production – An energy centre containing the heat sources;
- Delivery – A Hydraulic Interface Unit (HIU) for each end-user; and
- Distribution – An insulated pipe network connecting the energy centre with the end-users' HIUs.

C.9.3 The energy centre houses the heating plant, which can include a range of technologies and fuels such as gas boilers, biomass boilers and CHP. Hot water from the energy centre is pumped through the pipe network to the individual buildings. In each building, heat is conveyed via the HIU to the central heating system and to the hot water taps. Sometimes an Energy Services Company (ESCo) is established to manage the distribution and sale of heat.

C.9.4 When considering a district heating approach, it is important to consider the balance between building energy-efficient buildings (with a very low heat demand), and establishing a utility that is dependent on selling high volumes of heat in order to be viable.

C.9.5 District heating is most resource-efficient in developments with high baseload heat demands. Typically, this means residential developments of very high densities or other heat-intensive uses such as industrial manufacturing, hospital or swimming pools. Modern, energy-efficient and low density developments built to Part L 2013 standards usually have a very limited heat demands.

C.9.6 Heat losses from distribution pipes are also an important environmental consideration (heat losses tend to be higher in low density developments with longer heat main runs).

C.9.7 Establishing a district heating network requires major capital investment, but the costs vary considerably depending on the project. A major driver of the high costs of district heating is the network of hot water pipes – this is quoted as up to £510 per metre[13]. This is another reason why district heating is best suited to high density developments with shorter heat main runs.

C.9.8 Heat network viability is established through the relationship of capital infrastructure costs and returns from heat sales (including standing charges and a price per kWh of heat). District heat networks are not regulated by the Office of Gas and Electricity Markets (OFGEM). Therefore, there is a risk of end-users experiencing higher prices compared to a standard gas boiler approach, in order for the developer to recover the high capital costs of installation. However, it is the intention of the emerging Heat Trust to establish a framework to protect consumers connected to heat networks.

[13] DECC (2015) Assessment of the costs, performance, and characteristics of UK heat networks.