PARSONS BRINCKERHOFF

August 2013

RENEWABLE AND LOW CARBON ENERGY CAPACITY STUDY

Fareham Borough Council

3511417O-BEL

FINAL

Renewable and Low Carbon Energy Capacity Study

3511417O-BEL

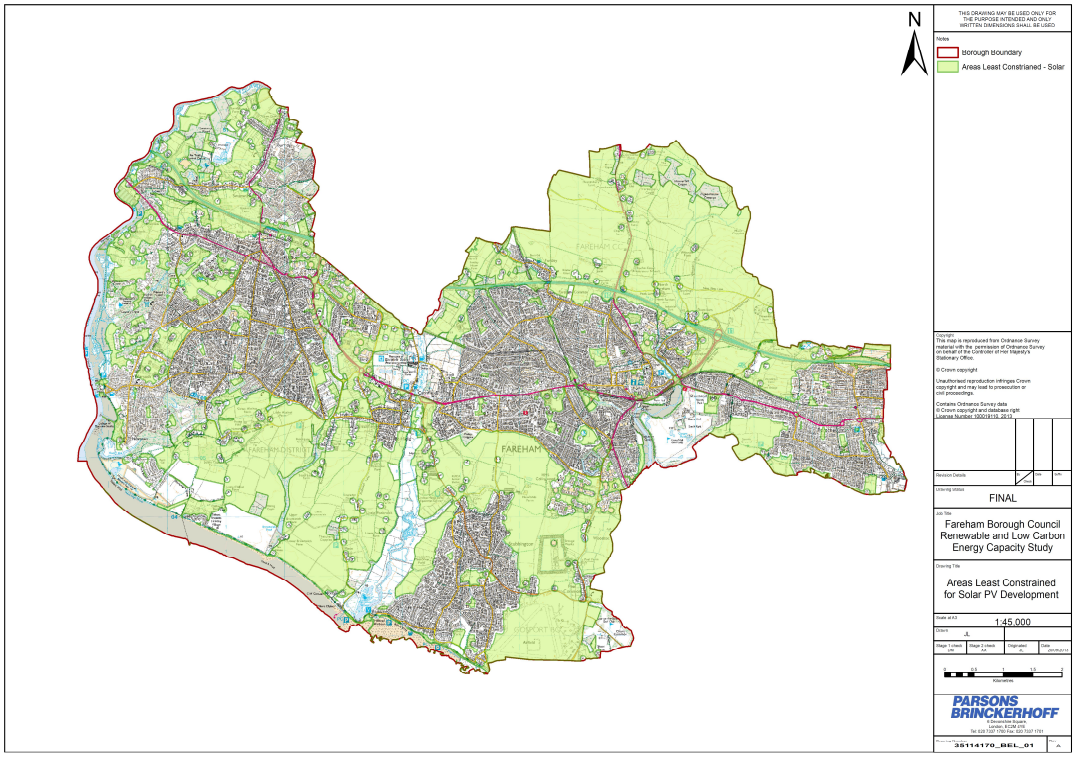
Prepared for
Fareham Borough Council
Civic Offices
Civic Way
Fareham
Hampshire
PO16 7AZ

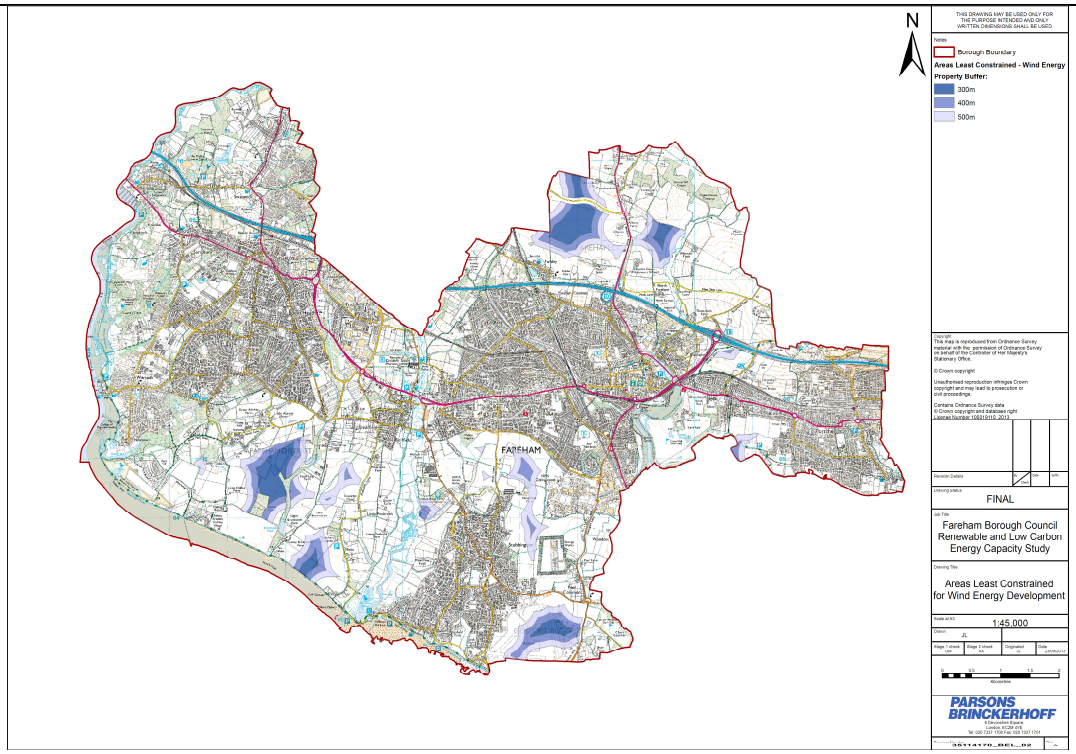
Prepared by
Parsons Brinckerhoff
The Forum
Barnfield Road
Exeter
EX1 1QR

01392 229 700
www.pbworld.com

EXECUTIVE SUMMARY

Context	Fareham Borough Council commissioned Parsons Brinckerhoff Energy Solutions (PB) to perform a Renewable & Low Carbon Energy Capacity Study for the Borough. The e-RFQ stated: *The aim of the study is to identify the potential for all types of renewable and low-carbon energy in the Borough.* *The study will need to provide comprehensive, professional and independent advice on the opportunities that exist in the Borough taking account of all relevant constraints. It should define the potential, and where necessary the most suitable locations, for all relevant types of renewable technology.* *The study should provide recommendations as to whether additional policies are required for the Borough existing policies within the National Planning Policy Framework and the Fareham's Local Plan Part 1: Core Strategy.*
Installed Capacity	A review of previous studies and reports, and public records has identified a conservative estimate of approaching 3.8MW_e and 2.3MW_{th} of installed capacity of renewable and low carbon energy in the Borough. This estimate is conservative since there are many installations for which public records are not available, and a search of the LA planning register has not been conducted. There are no existing district heat networks, biomass power stations or Energy from Waste (including Anaerobic Digestion plants) on the public record; Nor any larger (greater than 5MW) renewable power plants (including wind, solar or hydro).
Resource	The Renewable Energy Resource in Fareham is better than average for the UK, particularly the solar resource. There are higher levels of solar irradiation than most of the rest of the UK. This offers good potential for solar PV development. The annual irradiation in the south of England is between 1000 – 1100kWh/m^2. Fareham receives an average irradiation of 3270Wh/m^2/day annually. Wind resource is generally good, ranging at 45mAGL from 5.8ms^{-1} to 6.9ms^{-1} (NOABL data) and 5.95ms^{-1} to 7.79ms^{-1} Five potential locations for small-scale hydropower have been identified within the Fareham administrative boundary, by the Environment Agency, categorised as 0-20 kW locations. Resource estimates for biomass, sourced from a previous study, estimate available resource within the Borough of 159.5GWh_e and 1.6GWh_{th}. Geothermal and Marine Renewables are discussed and justification presented for not assessing the resource.

Capacity Study	Two maps have been produced which identify areas of Fareham Borough defined as 'least constrained' for solar PV and wind power generation. Major inhibitors to development, including ecological designations and properties, have been identified and 'removed' from the borough area, leaving the less constrained areas. These areas being defined as 'least constrained' are not necessarily suitable for solar PV and wind power development, and a number of studies should be completed by any potential developer prior to submission of a planning application. The resulting maps show that there is 32.74km^2 available land which is least constrained for solar PV development.  The maximum theoretical capacity available within Fareham Borough for solar PV generation is 1664MW, assuming only ground mounted installations The maps show that there is 5.06km^2 available land which is least constrained for wind development (assuming a 300m buffer on properties, which falls to 1.32km^2 assuming a 500m buffer).



The largest least constrained areas are located:

- South-west of Titchfield, stretching south towards the coastline;
- North of Fareham Common and west of Crockerhill; and
- North-east of Stubbington, on land surrounding Peel Common Sewage Treatment Works.

The maximum theoretical capacity of wind energy development that could be installed within Fareham Borough is 72.3 W, based on a 300m property buffer. Using a greater property buffer of 500m reduces maximum theoretical capacity within the Borough to 18.9MW.

The potential biomass fuelled capacities based on estimates of available resource within the Borough, sourced from a previous study, are 37MW_e and 0.9MW_{th}.

This study assesses there to be no hydropower capacity in the Borough. However there are opportunities which may be viable, dependant on further more detailed assessment. Expected power and energy outputs for a potentially viable hydropower station on the River Meon, based on the monthly average flowrates, are 20.5kW in peak season falling to 7.5kW in low season.

Maps have been produced, based on nationally available data, identifying areas of opportunity for District Heat and Combined Heat and Power. Areas with potential should be considered further in feasibility studies, planned developments may want to consider district heating or the potential to integrate with other planned or potential schemes. The results of previous feasibility studies have also been referenced.

The most relevant study indicated the potential for viable networks summing to 11.5MW_{th} of CHP capacity serving a combined heat demand of 107,500MWh.

Policy Recommendations	The Report makes recommendations for the preparation of local planning policy and guidance for renewable and low carbon energy development. The policy recommendations are based upon the evidence and conclusions reached in the Capacity Study and outlined above. The key conclusion from the Study that provides a basis for locally specific policy is the quantification of available capacity and evidence establishing which technologies could contribute most significantly to the Borough's 12MW target. These include (in order of capacity) solar, wind energy, biomass, district heat, and combined heat and power. The policy and guidance recommendations made are intended to be supplementary to Policy CS16 'Natural Resources and Renewable Energy' in the Local Plan Part 1 and to meet the requirements of the NPPF (see Section 2.1), which requires local authorities to *"have a positive strategy to promote energy from renewable and low carbon sources".* The policy recommendations have had regard to planning policy approaches that have been adopted by other Local Planning Authorities (LPA) in England or Wales. In particular, LPA experience elsewhere has been used to help determine suitable criteria against which different types of renewable and low carbon energy development can be assessed. A number of LPA identified by this study have considered identifying 'areas of least constraint' or 'areas of opportunity' for wind and solar development in renewable energy policy. As with this Capacity Study, identifying 'areas of least constraint' relies upon setting buffers around built up areas or environmental constraints, and correlating these with areas where there may be resource capacity. A key outcome of this Study therefore, is whether the 'areas of least constraint' or buffer identified in the Study could be used to inform such a spatial policy in Fareham. This study identifies a number of recent examples where draft policies of this nature have been proposed and then subsequently changed to exclude reference to 'areas of least constraint', or similar such policy devices. In order to avoid the risk of objections such as this, it appears that many LPA which previously included such areas in draft policy have not carried this forward into their adopted plans. Therefore, while the 'areas of least constraint' provide good evidence for establishing the capacity for renewable energy in the Borough, it is not recommended that the Council adopt these areas into planning policy. After examining Fareham's adopted policy, it is clear that the requirement to address most key environmental issues is already set out in policy. Instead of repeating existing policy, or providing overly detailed technical guidance in policy, planning policy adopted by other councils tend to refer applicants to additional Supplementary Planning Document for further detailed technology specific guidance (see Recommendation 2, below). In accordance with the NPPF (para. 97), the Council should encourage developers to progress renewable energy development which has support from, and/or meets the needs of the local community. Community involvement and engagement should be considered as an integral part of any new renewable energy development. Developers should therefore be encouraged to engage with the community throughout all stages of design, ensure local concerns are considered, and where possible addressed before a planning application is submitted.

Recommendation 1: Planning policy should be incorporated into a renewable energy policy in 'Local Plan Part 2: Development Sites and Policies'

The Core Strategy (Policy CS16) supports the provision of renewable energy as part of new development. In accordance with the NPPF it is the recommendation of this Study that the Council establishes an additional development management policy which sets out criteria against which stand-alone renewable energy developments can be assessed.

Suggested Renewable and Low Carbon Energy Policy wording

When considering proposals for renewable and low carbon energy development the planning merits at the local level will be balanced with the wider benefits of providing renewable energy. This will include a consideration of the cumulative impact of proposals.

Proposals for renewable and low carbon energy development will be assessed in accordance with the following generic principles:

- the scale and character of the proposed development and the capacity and sensitivity of the landscape to accommodate the development. This includes the cumulative impact of the proposal on the wider landscape;
- the impact of proposals on scheduled monuments, listed buildings, conservation areas or other designated heritage assets . The impact on below ground archaeological features must also be addressed;
- the impact of proposals on other assets of acknowledged importance;
- The extent to which proposals are led by or meet the needs of local communities, or create opportunities for co-location of energy producers with energy users, in particular heat, and facilitate renewable and low carbon energy innovation;
- In all cases the environmental and local amenity impacts of all renewable and low carbon energy schemes, including any infrastructure or buildings must be fully addressed in accordance with other Local Plan Policies, particularly CS4, CS5, CS14, CS15, CS16, CS17 and CS21.

Proposals for Solar Energy, Wind Energy, Combined Heat and Power, and Biomass will be considered as follows:

Solar Energy

In addition to the generic principles set out above, proposals for Solar Energy development will be considered in accordance with the following principles:

- proposals should not be subject to shading by future development or vegetation;
- where the proposal is located on agricultural land, the future agricultural use of the land should be protected. Proposals which enable the continued agricultural use of the land during operation are preferred.

Wind Energy

In addition to the generic principles set out above, proposals for wind energy development will be considered in accordance with the following principles;

- the impact upon the habitats or flight paths of birds and bats should be demonstrated to be acceptable;
- the impact of shadow flicker should be demonstrated to be acceptable when the nearest sensitive receptor is within 10 rotor diameters of the proposed wind turbine(s);
- the impact of noise from the proposed development should be demonstrated to be acceptable. The proposal must be accompanied by an assessment which examines the impact on the proposal on noise sensitive receptors, considering acoustic data for the specific make/model of wind turbine(s) proposed;
- the impact of the proposed development on transport infrastructure and the local highway network should be demonstrated as acceptable.
- for wind turbines greater than 11m tall, or with a rotor diameter of above 2m the MoD, CAA and NATS must be consulted in respect of the proposed development and raise no objection.

Combined Heat and Power

In addition to the generic principles set out above, proposals for Combined Heat and Power development will be considered in accordance with the following principles:

- any impacts on designated biodiversity sites, species and ancient woodland should be addressed;
- the impact on local amenity and on existing residential development should be demonstrated as acceptable;
- the impacts associated with the delivery of fuel, including traffic, air quality, odour, waste and noise associated with transit of fuel should be addressed;
- the long term viability of the scheme, and access to fuel must be addressed. The applicant would need to provide certainty that the proposed fuel source will be secure and accessible for these users in the long term.

Biomass/Anaerobic Digestion

In addition to the generic principles set out above, proposals for Biomass or Anaerobic Digestion development will be considered in accordance with the following principles:

- if the proposal includes tall turbine buildings or a chimney stack the visual impact of these buildings on the setting of landscape designations, or any nationally significant heritage assets should be addressed;
- the impacts associated with the delivery of fuel, including traffic, air quality, odour, waste and noise associated with transit of fuel should be addressed;
- the long term viability of the scheme, and access to fuel should be addressed. For a proposed development to be acceptable there should be certainty that the proposed fuel source will be secure and accessible for the users in the long term;
- measures to limit any impact of any pests likely to be associated with the storage of fuel should be incorporated into the mitigation strategy for the proposed development;
- in the case of an Anaerobic Digestion plant, the use of the end/ waste product should also be addressed. The plant should be located as close as possible to the end/ waste user to reduce traffic movements.

Recommendation 2: Planning guidance to be incorporated into a future 'Renewable and Low Carbon Energy Supplementary Planning Document (SPD)'.

It was not within the scope of this Study to provide detailed guidance on all of the technical and environmental issues surrounding renewable energy development. However, Cornwall Council has produced a series of Renewable Energy Guidance Notes, which it intends to adopt as SPD. The Council's approach to renewable energy development has been recognised as best practice in the British Renewable Energy Industry Awards (2011).

It is therefore recommended that Fareham could produce similar SPD guidance, outlining both detailed technical guidance on its expectations for renewable and low carbon energy development, and also repeating national, and building control standards. This approach would provide a helpful one-stop source of guidance to developers.

CONTENTS

1 SCOPE

1.1.1 The Project Specification, as stated in the e-RFQ for the Provision of Consultancy Services to prepare a Renewable & Low Carbon Energy Capacity Study, is repeated below:

This study will be expected to comprehensively assess the potential for, and capacity for, a wide range of renewable and low-carbon technologies within the Borough. This should include an assessment of all technologies considered suitable and feasible for the Borough including, but not restricted to:

- *Solar (of differing scales)*
- *Wind*
- *Hydro*
- *District Heating*
- *Combined Heat & Power*
- *Ground/Air Source Heat Pumps*
- *Anaerobic Digestion*
- *Biomass*

As well as showing the capacity/potential for each type of technology the report will be expected to clearly demonstrate why certain locations in the Borough may be more suitable for certain types of technology than other areas. This should involve an analysis of the requirements of each type of technology along with a full assessment of ALL potential constraints, including (but not restricted to) any ecological and/or environmental concerns, existing land uses, visual sensitivity of the landscape and economic feasibility.

Comprehensive recommendations on the requirements for each type of renewable and low carbon energy should be included in the study. This should be set out in a way that makes it clear to the Council what requirements are necessary and what are desirable. The study should provide a set of "key planning considerations" for each type of technology. This will allow the Council to make an informed judgement on future planning applications when considering their justification in certain locations.

The study should include clear maps that show the most suitable locations for each type of technology as well as areas that are not suitable for each type of technology due to overriding constraints. If certain types of renewable and low-carbon technologies are not feasible this should be reported with clear explanation as to why this is the case.

The study should include an analysis of the Borough Council's policy position regarding renewable energy taking into account the Core Strategy policy (CS16) and the more recent guidance in the NPPF. Clear recommendations should be made as to whether further wording and/or policies are needed in the upcoming Development Sites & Policies Plan in order to fully meet the requirements of the NPPF and/or to give weight to the findings of the report.

2 PLANNING POLICY BASIS FOR THIS STUDY

2.1 Relationship to National Policy

2.1.1 The National Planning Policy Framework (NPPF) is the basis upon which all local planning policy is formulated. It states:

'17. planning should support the transition to a low carbon future in a changing climate….and encourage the use of renewable resources (for example, by the development of renewable energy)'.

2.1.2 The NPPF includes a section on '*meeting the challenge of climate change, flooding and coastal change*', setting out what is expected of local planning authorities when developing renewable energy policies as follows:

'97. To help increase the use and supply of renewable and low carbon energy, local planning authorities should recognise the responsibility on all communities to contribute to energy generation from renewable and low carbon sources. They should:

- *have a positive strategy to promote energy from renewable and low carbon sources;*
- *design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily, including cumulative landscape and visual impacts;*
- *consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources;*
- *support community-led initiatives for renewable and low carbon energy, including development outside such areas being taken forward through neighbourhood planning; and*
- *identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers'.*

2.1.3 The NPPF aims to ensure that local authorities provide a positive framework for encouraging the delivery of renewable and low carbon energy schemes, stating that the 'need' for schemes should not be questioned.

'98. When determining planning applications, local planning authorities should:

- *not require applicants for energy development to demonstrate the overall need for renewable or low carbon energy and also recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and*
- *approve the application if its impacts are (or can be made) acceptable.*

Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should also expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.'

2.2 Relationship to Local Policy

2.2.1 Future renewable energy development in Fareham will be shaped by the availability of resources and suitable development sites, as well as the economic viability of such

proposals. This should be balanced against the need to protect the existing environment.

2.2.2 The Local Plan comprises the following Parts:

- Local Plan Part 1: Core Strategy (Adopted).
- Local Plan Part 2: Development Sites and Policies (Draft);
- Local Plan Part 3: Welborne Plan (Draft).

2.2.3 The targets for development and priorities for protecting the environment are set out in the Core Strategy Strategic Objectives. The Borough faces significant challenges in meeting its targets for development. The key development targets for the district are summarised below:

- Strategic Objective 6 indicates that the Borough should accommodate the provision of 3,729 dwellings in the period between 2006 and 2026. However, the South Hampshire Strategy subsequently increased the net figure for additional homes by 472 leaving a remaining requirement for 2,200 new homes to be found between 2011 and 2026;
- Strategic Objective 8 also indicates that the Borough will be supporting the development of a new sustainable settlement to the north of Fareham, now known as Welborne. Local Plan Part 3: The Welborne Plan requires 6,500 dwellings and 78,650 sqm of employment floorspace to be provided.

2.2.4 Although the Borough contains areas of attractive countryside and coastal areas, it is relatively urban in character. Protecting and enhancing existing areas of open spaces and environmental assets is therefore identified as a strategic priority for the Borough in Strategic Objectives 9 and 10.

2.2.5 The Core Strategy was adopted by the Council in August 2011. Policy CS16: Natural Resources and Renewable Energy sets out the Council's approach to renewable energy as part of new development. It states:

'Development (1 dwelling or more and 500m2 or more of non-residential floorspace) will be encouraged to contribute to the Fareham target of 12MW of renewable energy by 2020. Major developments (250 dwellings or more or 5,000sq.m of non-residential floorspace) should aim to maximise on-site renewable energy production and resource efficiency. In such cases, the extent of contribution should be demonstrated, taking account of viability. The generation of energy from renewable or low carbon sources will be permitted unless there are judged to be unacceptable social, environmental or economic impacts'.

2.2.6 The 12MW target contained within Local Plan Part 1: Core Strategy Policy CS16 was taken from a sub-regional study commissioned by Havant Borough Council and undertaken by Ove Arup & Partners Ltd on behalf of the Partnership for Urban South Hampshire. It considered the feasibility of an energy and climate change strategy for urban South Hampshire (PUSH)[1]. This study apportioned a sub-regional 100MW target between the relevant authorities based on housing and employment targets. Whilst Local Plan Part 1: Core Strategy committed Fareham to meeting this target, it has been difficult to monitor how much capacity has been/is being delivered. Many of the small scale, household renewable energy schemes do not require planning

[1] Havant Borough Council - Feasibility of an energy and climate change strategy for Urban South Hampshire (2008) http://www.push.gov.uk/issue_to_client_final_push_report_09.09.2008.pdf

permission and are therefore not monitored (section 3 below covers installed capacity).

2.2.7 Part 2 of the Local Plan will provide Development Control Policies and allocate sites; the document is currently at Issues and Options stage. This Study provides evidence and recommendations to support and inform Part 2 of the Local Plan. The recommendations and evidence provided contributes to the proposals consulted on at Issues and Options stage.

2.2.8 Part 3 of the Local Plan relates to Welborne. The draft of this part of the Local Plan includes a policy (WEL30) on energy which states:

'Planning applications for Welborne must be supported by an Energy Strategy which must demonstrate how the development will:

i. Optimise energy efficiency by minimising the use of energy through design, layout, orientation, landscaping and materials;

ii. Utilise low or zero carbon technologies to generate energy;

iii. Include a CHP or district heating network to serve the District Centre and other parts of the Welborne development; and

iv. Incorporate a proportion of dwellings built to 'Passivhaus' standard within each residential phase.

Public buildings at Welborne, including the main community building, will demonstrate best practice in energy efficiency and low carbon energy generation.

Smart meters will be installed in tall new buildings and, where possible, in existing buildings within Welborne.'

2.2.9 This policy is the most detailed energy policy in the Local Plan as it stands and includes some site-specific recommendations.

2.3 Review of other local planning authority policies

2.3.1 The policy recommendations set out in this report (Section 7.3.1) are based upon examples of best practice used by local authorities elsewhere in the UK. Existing local authority guidance reviewed include those from Cornwall Council, Northumberland County Council and Havant Borough Council.

2.3.2 Cornwall Council has determined a significant number of planning applications for renewable energy, as the county is considered to be the best location in the UK for a number of technologies (such as solar). It was therefore important for it to establish workable guidance to shape future development. Cornwall Council has produced a series of guidance notes for key renewable energy technologies. It is intended that these guidance notes will be adopted as Supplementary Planning Documents, once the Council's Core Strategy has been adopted. This guidance is now viewed as best practice by central Government and is the primary basis for the recommendations on stand alone renewable energy schemes.

2.3.3 Northumberland County Council Renewable, Low-Carbon Energy Generation and Energy Efficiency Study (February 2011) considers the different approaches for encouraging renewable energy. This approach is reflected in the alternatives presented in Section 6.6, where separate policies are created for stand alone renewable energy schemes (proposals of larger than a certain threshold), or

renewable energy which is delivered as part of proposed new residential or commercial development.

2.3.4 The Havant Borough Council Report, considering the Feasibility of an Energy and Climate Change Strategy for Urban South Hampshire, forms the basis for the types of stand alone renewable energy which are considered in Section 6.6. Where renewable energy types are not locally feasible (e.g. Tidal), these were not considered.

2.4 Relationship to Non-planning policies

Energy in the Code for Sustainable Homes and BREEAM Standards

2.4.1 There is a mandatory requirement for the improvement of the Target Emission Rate above Building Regulations in both the Code for Sustainable Homes and BREEAM. This reduction in carbon dioxide emissions can be achieved through both energy efficiency and low and zero carbon energy supplies.

2.4.2 Ene 1 of BREEAM outlines:

> *BREEAM Excellent requires a minimum EPRNC of 0.36 (6 credits) and a 25% reduction in CO_2 emissions arising from regulated building energy consumption*
>
> *BREEAM Outstanding requires a minimum EPRNC of 0.60 (10 credits) and a 40% reduction in CO_2 emissions arising from regulated building energy consumption.*

2.4.3 These targets are referenced to 2010 Building Regulations.

2.4.4 The Code for Sustainable Homes Ene 1 outlines:

Criteria	
% Improvement 2010 DER/TER	Mandatory Requirements
≥ 25%	Level 4
≥ 100%	Level 5
Zero Net CO2 Emissions	Level 6

Building Regulations 2013 consultation proposals

2.4.5 The 2012 consultation on changes to the building regulations in England ran from February to April 2012. The consultation documents outlined a timetable for introducing new building regulations. The proposal was for them to be laid in Parliament in April 2013 and come into force in October 2013.

2.4.6 The Government's preferred option is a CO2 target equivalent to the 'FEES plus efficient services' option. This provides an aggregate (across a range of house types) **8%** reduction in regulated CO2 emissions over the TER for a building regulations 2010 compliant home. The second option considered results in a 26% aggregate reduction.

2.4.7 The Government's preferred option for non-domestic buildings is an aggregate improvement on Part L 2010 of **20%**.

3 INSTALLED CAPACITY

3.1 Small to Medium scale Renewable Power

3.1.1 The Department of Energy & Climate Change publishes statistics on numbers of renewable energy installations registered for the Feed-in Tariff at a sub-regional level. The Feed-in Tariff has only been in operation since 1st April 2010 and installations prior to that date were not allowed to be 'grandfathered' so they are not accounted for in these statistics. The Local Authority planning register may also contain details of smaller renewable energy installations that required planning permission. However, since solar and wind installations on or near buildings became Permitted Development within some constraints (discussed elsewhere in this report) this will be limited to those installations granted consent prior these rights being granted (18 June 2012). A search of the planning register was not conducted for this report.

3.1.2 The DECC statistics published at the end of March 2013 show that there are no wind, hydro-power or anaerobic digestion plants registered under FIT in Fareham. Of the 47,000[2] dwellings in Fareham, 1,047 have a registered solar panel installation whilst there are only a further 8 registered non-domestic installations. There are also two registered Micro CHP installations. The Ofgem Renewables Register provides the capacity associated with these installations:

Table 3-1: Installed microgeneration Capacity in 2013 in MWe

	Domestic		Commercial		Community		Total	
Technology	No	Capacity (MW)	No	Capacity (MW)	No	Capacity (MW)	No	Capacity (MW)
Micro CHP	2	0.002	0	0	0	0	**2**	**0.002**
Photovoltaic	1072	3.267	7	0.187	1	0.002	**1080**	**3.457**
Total Installed Capacity (MW)		3.269		0.187		0.002		**3.459**
Total Installations	1074		7		1		**1082**	

3.1.3 This shows a total capacity of 3.25MW_e installed since April 2010.

3.2 Larger scale Renewable Power

3.2.1 Larger schemes (over 5MW) are not eligible for the Feed-in Tariff. A search of the Ofgem Renewable Obligation Register returned no generating station accredited in the Borough of Fareham. However this data is not collated regionally and some address data is omitted for data protection reasons.

3.3 Small and Medium scale Biomass and Renewable Heat

3.3.1 The Renewable Heat Incentive (RHI) and Renewable Heat Premium Payment (RHPP) are incentive schemes for renewable heat generation. Statistics for accreditation under these schemes are only available on a regional scale. Previous

[2] Household estimates are from CERT Report on Homes Energy Efficiency Database (HEED). Further information can be found at: https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/energy-efficiency-statistics

grant schemes such as the Low Carbon Buildings Programme (across all renewable technologies) and Bioenergy Capital Grants (specific to bioenergy) do not provide[3] statistics at a sub-regional level.

3.4 Larger Combustion Plants

3.4.1 A search of the Environment Agency Environmental Permits Register returned no industrial installation permits in the Borough.

3.4.2 The DECC CHP Public Database reveals a 600kW$_e$ gas engine CHP at HMS Collingwood but no others in the Borough. However this data, collated from the CHPQA accreditation scheme, only provides details for sites which gave their permission to be published. The DECC UK CHP Development Map provides details of the total heat capacity of the CHP at HMS Collingwood: 2,260kW$_{th}$. It also shows no Waste to Energy plants or Thermal Power Stations.

3.4.3 A study[4] published in 2010 established the installed electricity or heat plant capacity categorised by the forms of biomass for which a resource assessment was conducted (discussed in section 4.4). The installed capacity data was only available at the south east regional level.

Table 3-2: Installed Electricity Capacity in 2010 in MWe

Fuel		South East	Comment
Wood	Managed Woodland	35	Installed capacity driven by plants including Slough Heat and Power
	Waste Wood	12	
	Energy Crops	0	No plants consuming energy crops.
Straw	Agricultural Arisings	0	No straw fired power stations in the region.
Waste	Municipal Solid Waste	40.6	Installed capacity driven by Portsmouth 14MWe, Marchwood 16MWe, and Chineham 8MWe.
	Gas - Wet Organic Waste	14.7	Installed capacity driven by sewage gas.
	Gas - Sewage		

3.4.4 In Fareham there are no existing electricity generating stations using biomass fuels.

Table 3-3: Installed Heat Capacity in 2010 in MWth

Fuel		South East	Comment
Wood	Managed Woodland	33	Installed capacity driven by sub 1MWth installations.
	Waste Wood	6.9	
	Energy Crops	0	No heat installations consuming energy crops.
Straw	Agricultural Arisings	No Data	Study did not include straw combusted for heat to supply farm buildings.

[3] These programmes will have collected data on an individual installation level. It may be that direct approaches to DECC (who oversaw these schemes) could result in more detailed statistics for Fareham. This was outside the scope of the study.
[4] 2010, Land Use Consultants & TV Energy, Review of Renewable and Decentralised Energy in South East England

3.4.5 There is likely to be a proportion of the biomass fuelled installed heat capacity in the south east, installed in the Borough of Fareham.

3.4.6 However, DECC Sub-national total final energy consumption 2005-2010 (revised March 2013) shows 1.1GWh of Bioenergy and waste consumed in Fareham in 2010, up from 0.7GWh in 2005. This would be in line with an installed capacity in the region of just 200kW (based on a typical load factor).

3.5 District Heat

3.5.1 The DECC UK CHP Development Map does not hold records for any existing District Heat networks in the Borough.

3.6 Summary

3.6.1 This review of previous studies and reports, and public records has identified approaching 3.8MW_e and 2.3MW_{th} of installed capacity of renewable and low carbon energy in the Borough.

3.6.2 This estimate is conservative since there are many installations for which public records are not available, and a search of the LA planning register has not been conducted

3.6.3 There are no existing district heat networks, biomass power stations or Energy from Waste (including Anaerobic Digestion plants) on the public record; Nor any larger (greater than 5MW) renewable power plants (including wind, solar or hydro).

4 RESOURCE

4.1 Solar

4.1.1 Generally, the closer to the equator, the greater the irradiation at a site per year will be. In this regard, Fareham Borough offers good potential for solar PV development. Solar irradiation at a given site can be estimated using the Photovoltaic Geographical Information System (PVGIS) software available online. Developed by the EU Joint Research Centre, the software provides a map-based inventory of solar energy resource across Europe.

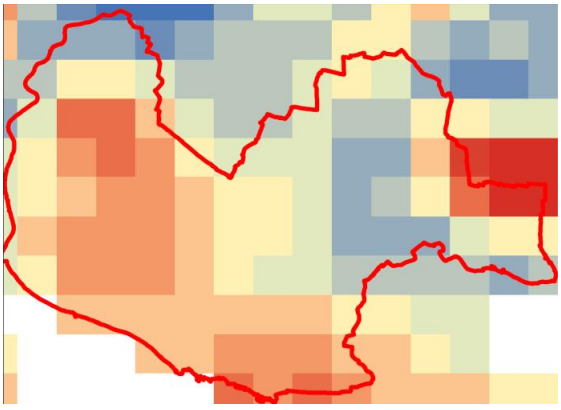
4.1.2 PVGIS estimates that Fareham town centre receives an average irradiation of 3270Wh/m^2/day annually. This estimate assumes a completely open site, and does not make allowances for housing, forestry or any other sources of shade. In contrast, the land south of Titchfield has been calculated to have an annual irradiation of 3140Wh/m^2/day and land south of Wickham has an annual irradiation of 3260Wh/m^2/day. More general maps produced by PVGIS state that annual irradiation in the south of England is between 1000 – 1100kWh/m^2.

4.2 Wind

4.2.1 The wind resource across Fareham Borough has been assessed using the Numerical Objective Analysis Boundary Layer (NOABL) database available from the Department of Energy and Climate Change. The database provides estimates of wind speeds at height above the ground of 10, 20 and 45 metres at grid points 1km apart.

4.2.2 The National Climate Information Centre (NCIC) database produced by the Met Office has also been applied across the district to determine wind speed. The two databases often differ in their predictions, and in the case of Fareham, the NCIC database predicts higher wind speed values than the NOABL database.

4.2.3 It is important to note that neither database accounts for obstacles to wind flow, including trees or buildings and that the information given below is a very high level assessment. Potential developers should seek to complete a wind resource assessment for any potential site identified and site any turbines accordingly.



4.2.4 Wind resource across Fareham Borough is generally good, ranging at 45mAGL from 5.8ms^{-1} [dark red] to 6.9ms^{-1} [dark blue] (NOABL data) and 5.95ms^{-1} to 7.79ms^{-1} (NCIC data), with the highest average wind speeds in the north-east and south-east of the borough. The west of the borough has generally higher wind speeds than the east, and the south of the borough has a higher resource than the north.

4.3 Hydro

4.3.1 Opportunities for hydropower in the UK were investigated in a study commissioned on behalf of the Environment Agency in 2010[5]. The study provides a high level national assessment of the potential for small-scale, run of river (RoR) hydropower schemes. Potential for RoR hydropower scheme is recognised at the site of an existing 'barrier' in a water course – in most cases this is an existing weir structure. The Environment Agency data states that the data should not be used for specific site identification at this stage and is instead aimed at giving a regional level picture of the location and size of opportunity.

4.3.2 The potential energy of water at a higher level may be allowed to fall to a lower level. The kinetic energy formed may be extracted by running the water through a turbine through penstock pipes generating hydropower.

4.3.3 The Environment Agency report identified five potential locations for small-scale hydropower within the Fareham administrative boundary. These five potential sites are shown in Figure 4.1 below. The Meon River runs directly down the centre of the Fareham borough and the two potential sites on this river are categorised by the Environment Agency as 10-20 kW locations. We have included the northern most site on the River Meon, despite it potentially falling outside the Fareham boundary, because it would be appropriate to assume that opportunities (which fall within the borough boundary) may exist in the vicinity of the identified site. An enquiry to the Environment Agency to provide the exact location would not add any further value to this study since the data has not been prepared for specific site identification purposes.

4.3.4 The other three sites - two on a tributary running to the River Hamble and one in the Locks Heath area fall into the 0-10 kW power category. The Environment Agency power category sites are indicated in Figure 4.2.

[5] Mapping Hydropower Opportunities and Sensitivities in England and Wales Technical Report, Environment Agency, February 2010

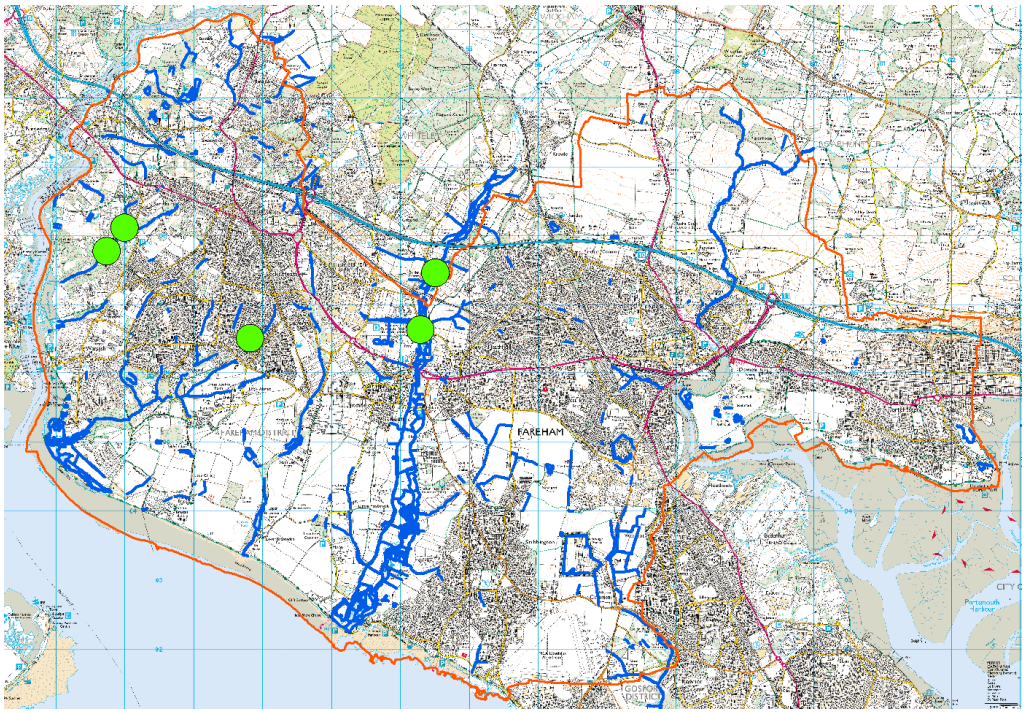


Figure 4.1 – Environment Agency potential sites for hydropower in Fareham

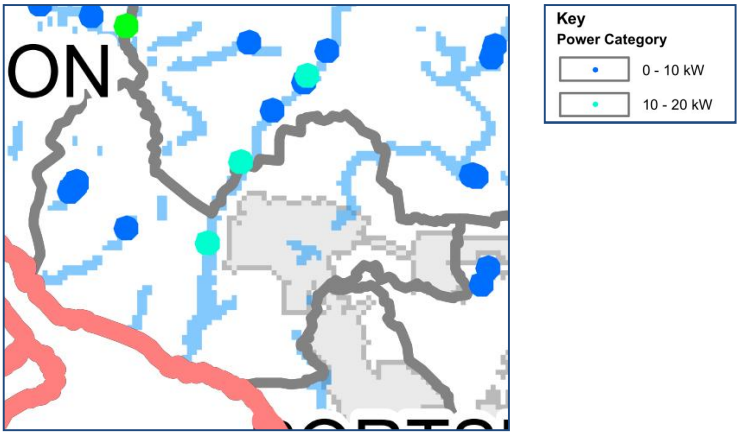


Figure 4.2 – Environment Agency potential sites for hydropower in Fareham (power categories)

4.4 Biomass

4.4.1 This section provides an overview of the electricity and heat resource potential from the different forms of biomass available in Fareham, Hampshire and the South East from four types of 'clean' plant biomass and three types of 'waste' biomass.

4.4.2 The 'clean' types of biomass are managed woodland, dedicated energy crops, waste wood and agricultural arisings (straw). Arboricultural arisings from the pruning of trees are a potential fifth source of plant biomass which is not directly covered in this methodology as the quantity may be difficult to assess (especially from private estates) and also logistically may be difficult to source. The 'waste' types of biomass are municipal solid waste, wet organic waste and sewage waste.

4.4.3 The resource potential for poultry litter, biomass co-firing and landfill gas are not presented in this review because there is no potential within Fareham and little potential within Hampshire.

Resource Overview

4.4.4 A study published in 2010 presented the results of a resource assessment conducted on the potential for different types of biomass. This study disaggregated the results down to the borough level where data is available.[6]

4.4.5 The following two tables present the resource assessment in terms of Gigawatt-hours of potential electricity production or heat production.

Table 4-1: Potential Electricity Resource in GWh_e

Fuel		Fareham	Hampshire	South East	Resource Comment
Wood	Managed Woodland	n/a	126	609	Results only disaggregated to country level
	Waste Wood	n/a	46	478	
	Energy Crops	0.5	94	478	Assumes all abandoned land and pasture are planted with energy crops
Straw	Agricultural Arisings	11.6	613	3,171	DEFRA survey – wheat and oil rapeseed straw.
Waste	Municipal Solid Waste	89.0	5,746	28,537	Based on collated forecasts.
	Gas - Wet Organic Waste	55.8	3,805	21,538	Cattle & pig manure and commercial & MSW food waste.
	Gas - Sewage	2.6	32	209	Based on population.

Table 4-2: Potential Heat Resource in GWh_{th}

Fuel		Fareham	Hampshire	South East	Resource Comment
Wood	Managed Woodland	n/a	494	2322	Results only disaggregated to county level
	Waste Wood	n/a	161	1451	
	Energy Crops	1.6	286	1451	Assumes all abandoned land and pasture are planted with energy crops
Straw	Agricultural Arisings	When burned for heat tends to be on small farm holdings.			
Waste	Municipal Solid Waste	Combusted primarily to incinerate waste and produce electricity. Utilisation of waste heat depends on location of plant relative to potential heat users.			
	Gas - Wet Organic Waste	Combusted using a gas engine – Waste heat used to support process.			
	Gas - Sewage				

[6] 2010, Land Use Consultants & TV Energy, Review of Renewable and Decentralised Energy in South East England

4.5 Geothermal

4.5.1 Broadly, there are two forms of geothermal application, high temperature for production of steam for power generation, and lower temperature (10 – 60ºC) suitable for low carbon heating and cooling applications.

4.5.2 With the exception of shallow (< 200m deep) groundwater systems, geothermal resource capable of temperature of 40 – 60ºC for heating applications is limited to a very specific set of conditions. The Borough of Fareham meets one of these, which is the possibility of discharge to the sea, similar to the only working system of this type in the UK at Southampton. However, the main condition is the existence of a deep sedimentary reservoir capable of producing water at a viable temperature and flow rate and this is currently unproven.

4.5.3 Identification of such a resource is not within the scope of this study since it requires a specialist, site specific, resource assessment. A potentially viable resource could be identified through a desk based study but proving the reliability of such a resource would involve considerable expenditure in exploration with no guarantee of success. The existence of an operational scheme nearby (in Southampton) is not a basis on which to assume the existence of a similar resource in Fareham. The installation in Southampton is the only such commercial scheme in the UK sourced at 1500m below the surface and discharging to the sea.

4.5.4 Identification of geothermal resource for power generation also requires a site specific resource assessment. Furthermore, as ground water temperatures need to be approaching or exceeding 100ºC, again at sustainable, commercially viable volumes the physical conditions required for a viable resource are even more limited. No such resource has yet been commercially exploited in the UK despite a number of trials and pilots, those in Cornwall being one example. A viable resource cannot be assumed from a desk based study.

4.5.5 A capacity study has therefore not been performed for geothermal heat or power generation in Fareham.

4.6 Marine Renewables

4.6.1 Navigation in the Solent renders offshore wind very unlikely with a viable site already allocated by the Crown Estate at Navitus Bay. The landfall locations for the export cables for this site are currently proposed to the west of Lymington meaning this generation is unlikely to be attributable to Fareham.

4.6.2 The Fareham coastline is protected by the Isle of Wight from offshore wave heights so is unlikely to be a viable location for wave power. The significant tidal currents in the Solent make this option worth investigating. The Isle of Wight Council has established the Solent Ocean Energy Centre to investigate tidal opportunities but is focusing efforts outside the Solent.

4.6.3 On this basis this study has not assessed the potential for marine technologies.

5 ENVIRONMENTAL CONSTRAINTS AND POLICIES

5.1.1 This section assesses the local environmental features, issues and policies which will constrain the development of technologies assessed in this study. Environmental constraints and policies were identified solely from a desk-based exercise. No site visits have been carried out. No data has been purchased (including, local record centre ecological record data).

5.2 Landscape Constraints, Policies and Designations

National landscape

5.2.1 A desk-based search (using information publicly available on magic.defra.gov.uk and digital mapping provided by Fareham BC) has been carried out to identify the following local, national and international statutory and non-statutory designations for the Borough. Although the Borough does not contain international and national landscape designations, it is close to some important landscape areas. When considering potential landscape and visual amenity effects it is therefore important to not be tightly restricted to administrative boundaries. In particular, when considering the potential effects of wind energy developments the following designations should be considered.

a. Although there are no National Parks within the Borough, the New Forest National Park lies across Southampton Water. The South Downs National Park lies to the north and north east. The Western Weald (lying within the South Downs NP area) is an area of undulating countryside to the north of Fareham and contains a patchwork of farmland, woodland and commons with many hedgerows. The area has changed little since the Middle Ages.

b. There are no AONB's within the Borough. However, Chichester Harbour AONB lies to the east. Backed by the South Downs, the harbour is a series of tidal inlets, with salt marsh punctuated by areas of fertile farmland. Being a flat landscape the vertical elements of church spires and old mills are an important part of its character.

5.2.2 Core planning principles in the NPPF require that the intrinsic character and beauty of the countryside be recognised; and that planning should contribute to conserving and enhancing the natural environment and reducing pollution.

Local landscape

5.2.3 Open countryside in Fareham is situated in relatively narrow areas, between the main settlements and along the coast. The coastline between the Hamble River and Stubbington, and along the Wallington, Meon and Hamble rivers, provides most opportunities for informal countryside recreation for the local population.

5.2.4 Fareham Borough does not have an areas designated as Green Belt. However, the Borough has the following policies that seek to protect landscape character.

- CS6 The Development Strategy (LP 1)
- CS14 Development Outside Settlements (LP 1)
- CS22 Development in Strategic Gaps (LP 1)

5.2.5 Core Strategy Policy CS14 states *"Built development on land outside the defined settlements will be strictly controlled to protect the countryside and coastline from development which would adversely affect its landscape character, appearance and function. Acceptable forms of development will include that essential for agriculture, forestry, horticulture and required infrastructure".*

5.2.6 Core Strategy Policy CS22, which designates a Strategic Gap between settlements, helps define and maintain the separate identity of individual settlements. Strategic Gaps are important in maintaining the settlement pattern in the Borough, keeping individual settlements separate and providing opportunities for green infrastructure / corridors. Gap designations increase the level of restraint on development over and above the level of restraint which is imposed by normal countryside policies. Policy CS22 states that the detailed boundaries of Strategic Gaps will be reviewed in accordance with the following criteria:

i. The open nature / sense of separation between settlements cannot be retained by other policy designations;

ii. The land to be included within the gap performs an important role in defining the settlement character of the area and separating settlements at risk of coalescence;

iii. In defining the extent of a gap, no more land than is necessary to prevent the coalescence of settlements should be included having regard to maintaining their physical and visual separation.

5.2.7 The Fareham Borough Gap Review[7] recommends that, with the exception of the gap between Lower Swanwick and Sarisbury, the local gaps are no longer required and will be deleted as a planning policy designation through the Plan. With regards to the gap at Lower Swanwick and Sarisbury, the report recommends that this particular gap be retained as it was deemed to meet the gap review criteria as set out in Core Strategy Policy CS22. However, Core Strategy Policy CS22 does not provide a policy basis for the designation of this new gap as it falls outside of the two strategic gap areas between Stubbington/Fareham and Western Wards/Whiteley (the Meon gap) and; Stubbington/Lee on Solent and Fareham/Gosport. Therefore, the gap between Lower Swanwick and Sarisbury will not be carried forward in the plan.

5.2.8 The strategic gap boundary will continue to follow the edge of existing settlements with the exception of the area to the west of Stubbington & Hill Head where the gap has been amended in line with the recommendations of the Fareham Borough Gap Review.

Historic landscape character and cultural heritage assets

5.2.9 Potential impacts on the setting of designated historic features are important. The Council has a duty in the Planning (Listed Buildings and Conservation Areas) Act 1990 in determining applications to have special regard to the desirability of preserving the character and appearance of a listed building or its setting or any features of special architectural or historic interest which it possesses.

5.2.10 Conservation Areas are *'areas of special architectural or historic interest the character of which it is desirable to preserve or enhance*'. The Council has a duty to pay special attention to the desirability of preserving or enhancing their character and appearance. In considering the impact of proposals that affect the borough's heritage

[7] Fareham Borough Gap Review (2012) David Hares Landscape Architecture

assets the Council will [Local Plan Part 2 - Development Sites & Policies October 2012]:

i. give great weight to the conservation of designated heritage assets;

ii. have special regard to the desirability of preserving a listed building or its setting or any features of special architectural or historic interest which it possesses;

iii. pay special attention to the desirability of preserving or enhancing the character, appearance, and setting of Conservation Areas; and

iv. take into account the desirability of sustaining and enhancing sites of archaeological interest and their settings, historic parks and gardens of regional or local importance and buildings of local architectural or historic interest and their settings.

5.2.11 A desk-based search (using information publicly available) has been carried out to identify the following designated features within the Borough:

- Scheduled Monuments
- Listed Buildings
- Conservation Areas.

5.2.12 The Hampshire Register of Historic Parks and Gardens lists 32 sites within the Borough and of these 8 have been identified as of particular local importance. Nationally important Scheduled Monuments include Titchfield Abbey, Fareham Fort, Portchester Castle and Monument Farm.

5.2.13 There are numerous listed buildings scattered across the Borough. There are large clusters in Titchfield, Fareham (mainly High Street and Osborn Road), Portchester (Castle Street), Stubbington, Swanwick and Lower Swanwick.

5.2.14 The Borough has designated 13 Conservation Areas to protect the character and appearance of some of the older settlements in the Borough. The character of each area is derived from aspects such as the age and style of individual buildings, the way groups of buildings are arranged, the spaces between them, their historical significance in the development of an area and also their use. Other factors such as: open spaces, landscaping, trees and important views all interact to form the overall character of an area. The Conservation Areas include: Warsash, Hook, Swanwick, Sarisbury Green, Titchfield, Catisfield and surrounding Titchfield Abbey. Fareham Osborn Road, High Street and Town Quay, Wallington, Cams Hall, and Portchester Castle Street.

5.2.15 Direct impact on these designated features should be avoided as far as possible. Potential impacts on the setting of these features should also be considered. The areas which are least constrained in terms of cultural heritage constraints are:

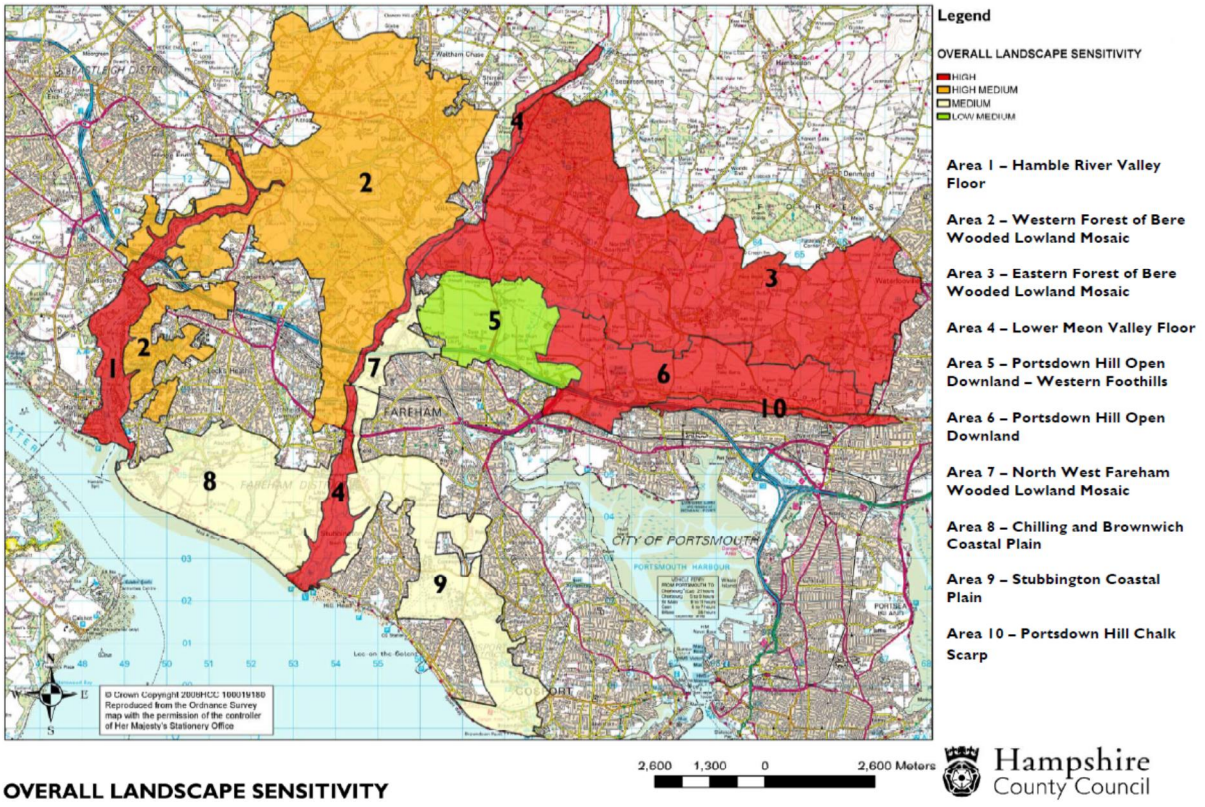
- The area north of North Fareham Farm;
- The area between the M27, Kingsway, the railway line and the crematorium;
- South of the A27 between Portchester and Downend;
- The countryside surrounding Stubbington; and
- The area west of Stubbington and Fareham, excluding Titchfield, Catisfield, Hook, Swanwick and Lower Swanwick.

Hampshire County Council's Landscape Sensitivity Assessment

5.2.16 Hampshire County Council has undertaken a detailed analysis of the landscape sensitivity[8] of the location of the Fareham Strategic Development Area (SDA) and the rest of South East Hampshire. The study did not consider the capacity of the landscape to accommodate development. However, it sought to draw out the inherent sensitivity of the landscape. This was achieved through integrating information on the physical landscape, its perceptual qualities, biodiversity, historic environment and visibility.

5.2.17 The report concludes that the landscape of South Hampshire is complex and diverse. This derives from the varied geology which has produced strongly contrasting landforms and soils, which in turn have resulted in highly varied types of human activity, leading to strong semi-natural and cultural distinctiveness. It is these assets that the analysis seeks to recognise, describe and evaluate. It should be noted that the evaluation does not compare levels of sensitivity in South Hampshire relative to Hampshire as a whole. It is possible that, when looked at on a County or regional scale, the judgements of sensitivity may change.

5.2.18 The analysis concludes that five areas stand out as being of high inherent landscape sensitivity: Portsdown Hill Open Downland, Portsdown Hill Scarp, Eastern Forest of Bere Wooded Lowland Mosaic, the Meon Valley and the Hamble Valley. At the other end of the scale, one area is identified as being of medium-low sensitivity: Portsdown Hill Western Foothills (the proposed location for the Fareham SDA). There are no areas of low sensitivity.



[8] Landscape Sensitivity Analysis for the Fareham Strategic Development Area, Hampshire County Council, 2006

5.2.19 It is important to note that landscape sensitivity is not uniform throughout these areas. For example, sensitivity increases in the eastern part of the study area, near the Wallington River Valley and Portsdown Hill escarpment. Some development to the east of the A32 can be accommodated but is likely to give rise to increasing concern over potential environmental impacts as one travels progressively eastwards towards Portsdown Hill.

Fareham Borough Landscape Assessment

5.2.20 The Fareham Borough Landscape Assessment[9] was the basis for the Areas of Special Landscape Character used in the previous Local Plan. Although these areas are not proposed for designation in the emerging Local Plan, these remain a relevant consideration when identifying the most sensitive landscape areas in the Borough. These areas were previously recommended for designation due to their high scenic quality, strong sense of place, unspoilt character, and Borough wide significance. The Assessment put forward the following areas to be designated:

- Upper and Lower Hamble Valleys
- Hook Valley
- Meon Valley
- Forest of Bere
- Portsdown Hill

5.2.21 As should be apparent, apart from the Hook Valley, these areas are consistent with those recommended as being particularly sensitive in the more recent 2006 Analysis by Hampshire County Council.

5.3 Technology Specific Landscape Effects

5.3.1 General landscape and visual amenity effects that the NPPF requires Local Authorities and developers to address satisfactorily include:

- Variations in landscape character and quality in Fareham are unlikely to adhere to administrative boundaries.
- Large scale energy developments, in particular wind and field scale solar PV development proposals, have the potential to harm the intrinsic landscape character and visual amenity of an area and the effects are not restricted to administrative boundaries.
- Significant cumulative effects can occur when existing or planned developments of a similar nature or scale occur in the area or in neighbouring administrative areas.

5.3.2 In addition, there are further landscape constraints which are specific to each of the technologies, as listed below.

[9] Fareham Borough Character Assessment, Scott Wilson Resource Consultants, 1996

Solar

5.3.3 Solar PV energy development may affect the landscape (and people in the landscape) in the following ways:

- Although solar PV structures are generally no more than 2 - 2.5m in height, they can occupy substantial areas of ground which may be visible from some distance away, especially if located on slopes.
- Single panels or small rows will have less impact than field scale developments.
- Land use in and around the development will be altered (even if the area under the panels is kept as pasture and grazed), leading to a change in the appearance and character of the local area.
- Important boundary features such as hedgerows and walls may be removed to accommodate the development, significantly impacting on local distinctiveness.
- The perceived urban/ industrial character of large scale solar developments and associated infrastructure can have a negative effect on the perception of the landscape character and setting of historical features.
- Visibility on sloping topography and in open landscape can result in visibility over long distances and direct effects on landscape and visual amenity.
- In landscape where the character is derived from irregular field patterns and natural forms, the regularity of the fenced edges of solar developments can be conspicuously different. Screen planting can add a further discordant element if not carefully designed with the local distinctive characteristics in mind.
- Ancillary buildings and security features can appear out of place in a rural setting and may introduce an urban/ industrial character.
- Although through careful selection of materials, solar developments can reduce light reflection, large scale developments of solar panels may still have issues of glare.
- Free standing solar PV developments are often located as close to grid connection points as possible and this can lead to clusters of developments and associated cumulative effects. Field scale developments can significantly change the character of rural areas and multiple proposals may be inappropriate in some locations where the protection of countryside or of distinct rural character is important.

Wind

5.3.4 Wind energy development may affect the landscape (and people in the landscape) in the following ways:

- Construction of turbines and associated infrastructure can lead to a direct loss of landscape features (for example, boundary features such as hedgerows or walls or landscape pattern determined by land use). Distinctive rural features can be destroyed through highway works to provide improved access to sites.
- The turbines may be considered by some as an industrial structure in the rural scene (or increased human influence on the landscape in areas deemed important for their natural features).
- The scale of the turbine maybe perceived as out of scale in relation to other features in the landscape.

- The movement of the turbine blades draws the eye towards them and therefore increases their visibility in the view. This may affect the characteristics of stillness, remoteness and solitude.
- The effects of turbines on the skyline may increase their prominence in the landscape and compete with local landmark features characteristic of the area.
- Cumulative issues can be significant with turbines being viewed over long distances. Multiple developments in an area can create a 'wind farm landscape'.
- Effects beyond the immediate site and local authority planning area are particularly relevant to wind energy developments due to the larger area of visual influence.
- Associated infrastructure (e.g. buildings, access roads, lighting, grid connections) may have further landscape and visual amenity effects beyond the turbine site.

Hydropower

5.3.5 Hydro power projects may have an effect on both the inherent landscape character and the local visual amenity. However, it will very much depend on the location of the development and the scale of the proposed infrastructure. Early scoping of issues should ensure that landscape and visual amenity issues are considered and agreement reached as to the potential for significant effects. Effects on landscape may arise from modern built structures (including access routes) in sensitive locations (such as river valleys) and impacting on distinct local landscape characteristics. Visual amenity issues may arise where local or recreational users experience a deterioration in the quality of local views or the setting of historical features.

Combined Heat and Power and District Heat

5.3.6 Combined Heat and Power and District Heat projects may have an effect on both the inherent landscape character and the local visual amenity. However, it will very much depend on the location of the development and the scale of the proposed infrastructure. Early scoping of issues should ensure that landscape and visual amenity issues are considered and agreement reached as to the potential for significant effects. Effects on landscape may arise from built structures (including access routes) impacting on distinctive landscape characteristics. Visual amenity issues may arise where locals experience a deterioration in the quality of local views or the setting of historical features.

Biomass and Energy from Waste (EfW)

5.3.7 Biomass and EfW projects may have an effect on both the inherent landscape character and the visual amenity over quite a wide area depending on the size and scale of the development.

5.3.8 The site area for a biomass power station is approximately 40,000sq.m for a 25MWe station and 51,000sq.m for a 50MW$_e$ station.[10]

5.3.9 Early scoping of issues should ensure that landscape and visual amenity issues are considered and agreement reached as to the potential for significant effects. Effects on landscape may arise from built structures (in particular, any proposed chimneys) distinctive landscape characteristics and visual amenity issues may arise where locals

[10] Example dimensions; 25MW – 175m x 230m, 50MW – 170m x 300m

experience a deterioration in the quality of local views or the setting of historical features.

Geothermal

5.3.10 Geothermal projects may have an effect on both the inherent landscape character and the local visual amenity. However, it will very much depend on the location of the development and the scale of the proposed infrastructure. Early scoping of issues should ensure that landscape and visual amenity issues are considered and agreement reached as to the potential for significant effects. Effects on landscape and visual amenity may arise from the impact of temporary drilling operations, including lighting and more permanent effects arising from surface infrastructure.

Landscape constraints references:

Fareham Greenspace Study (May 2007) and the 2010 addendum; Playing Pitch Study, 2012, Ashley Godfrey Associates
Fareham Borough Council Fareham Borough Gap Review, (September 2012), David Hares Landscape Architecture
Fareham Borough Landscape Assessment (May 1996) Scott Wilson Resource Consultants
Hampshire County Council South East River Basin Management Plan, 2009
National Planning Policy Framework, 27 March 2012, Communities and Local Government
National Planning Policy Framework, paragraphs 76-78 (Green Space)
Regional and Sub-Regional Landscape Checklist for New Development in Hampshire and the Isle of Wight, 2009, Hampshire Local Government Landscape Group PUSH

5.4 Open Space and Green Infrastructure Constraints

5.4.1 The NPPF generally provides protection for open space, sports and recreational buildings and land, including playing fields, which should not be built on unless very special circumstances arise. The NPPF also introduced the potential designation of land for Local Green Space. It specifies that local communities through Local Plans (such as the Site Allocations & Development Management Plan) should be able to identify green areas of particular importance to them for special protection.

5.4.2 Core Strategy policies relating to open space and green infrastructure (CS4 and CS21 respectively) seek to safeguard and enhance existing open spaces and established networks of green infrastructure in the Borough. This will ensure that any loss of open space is replaced by a better quality site which is equivalent in terms of accessibility and size, and set the standards for public open space provision for new residential development where existing provision is insufficient for the additional population.

5.4.3 Various studies and assessments have examined the quantity and quality of open spaces in the urban area of the Borough, including: playing pitches, parks, amenity open space, young persons' provision (including both children's play areas and youth related provision), allotments and 'accessible natural green spaces' such as woodlands and natural grasslands. The location of features identified in these studies and assessment have been considered as part of this assessment. These studies form the basis for Local Green Space designations identified in local policy, and include:

- Fareham Green Space Study (May 2007) & Addendum (December 2010);
- PUSH Green Infrastructure Strategy (June 2010).

5.4.4 As sites that have an open space, sport or recreation function that already have an open space designation are protected under Core Strategy Policy CS21 (shown on the Proposals Map), the Site Allocations Plan has not designated Local Green Space. Fareham BC has provided further local advice on new designations of Local Green Space in draft Local Plan Policy CF3, listed below.

5.4.5 *CF3 Local Green* Space

Development in Local Green Space designations will only be considered in very special circumstances such as [Local Plan Part 2 - Development Sites & Policies October 2012]:

i. Buildings for agricultural and forestry; and

ii. Limited affordable housing for local community needs as required in the Local Plan.

Local Green Space designations will be positively enhanced for beneficial use of the community by: improving / providing access; providing opportunities for outdoor sport and recreation; retaining and enhancing landscapes, visual amenity and biodiversity; and improving damaged and derelict land.

5.5 Air Quality Constraints

5.5.1 There are two Air Quality Management Areas (AQMA) within the Borough. These are the Gosport Road and Portland Street AQMAs in Fareham. Any renewable energy facility would ideally be located so that it did not create additional traffic to pass through this AQMA, for example from the delivery of fuel for a Biomass or Energy from Waste plant.

5.5.2 Proposed development for Biomass, Energy from Waste, Anaerobic Digestion and Combined Heat and Power plants need to consider the AQMA. These technologies should also be sited away from residential areas due to the potential odour and emissions.

5.6 Noise Constraints

5.6.1 Noise is a particular issue when considering wind development. Installations should be located away from noise sensitive receptors such as residential, schools, hospitals and places of worship.

5.6.2 Typically, the buffer distance between wind energy developments and properties is proportional to the noise levels generated by the turbine(s) and a suitable buffer distance should be decided by the developer using the noise limits defined under ETSU-R-97 and suitable noise modelling. The results of the modelling should be submitted alongside any planning application as supplementary evidence.

5.6.3 To a lesser extent noise needs to be a consideration for combined heat and power and thermal power plant.

5.7 Ground and Surface Water Constraints

5.7.1 The Environment Agency What's in Your Backyard website (http://www.environment-agency.gov.uk/wiyby) has been used to identify watercourses, groundwater protection zones and areas at risk of flooding, either fluvial or coastal.

5.7.2 The main rivers and water features in the Borough include the Hamble, the Meon, the Wallington, Hook Lake and their tributaries.

5.7.3 Areas most at risk of flooding are the coastline near Hook Lake, the River Meon and the Wallington River south of the M27.

5.7.4 There is a Groundwater Source Protection Zone Centred around the M27 north of Wallington and extending north to the Borough boundary (see below screenshot from EA website).

5.7.5 Geothermal and borehole Ground Source Heat Pump development in particular would need to avoid this zone.

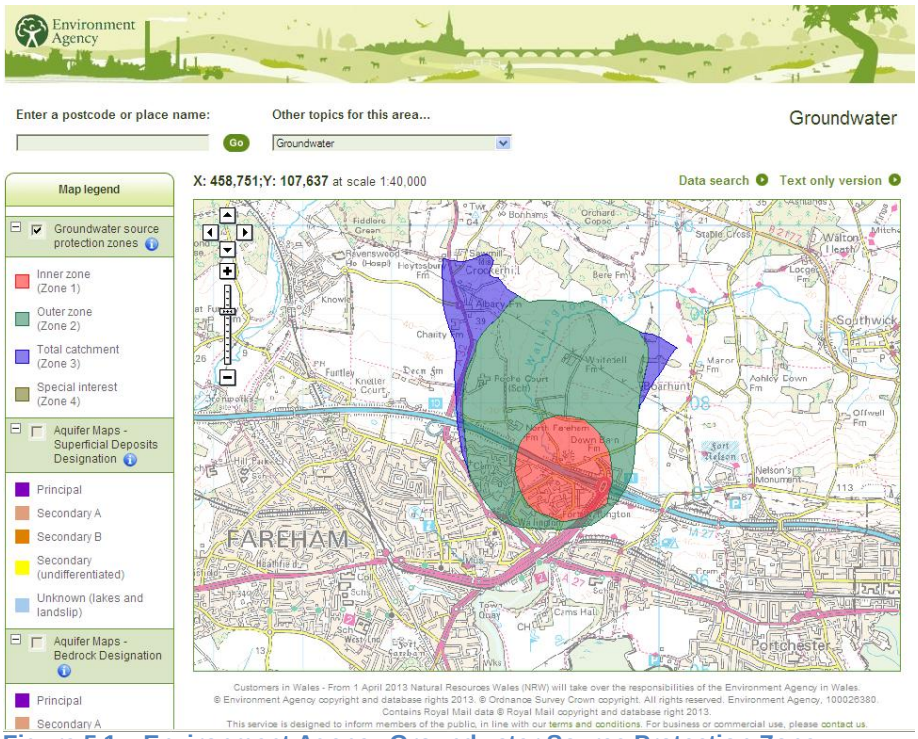


Figure 5.1 – Environment Agency Groundwater Source Protection Zone

5.8 Ecological Constraints

5.8.1 A desk-based search (using information publicly available on magic.defra.gov.uk) has been carried out to identify the following local, national and international statutory and non-statutory designations for the Borough including:

- Local Nature Reserves
- National Nature Reserves
- Ramsar Sites
- Sites of Special Scientific Interest (SSSI)
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Sites of Importance for Nature Conservation (SINC)

5.8.2 Key designations include the Solent Maritime SAC, the Solent and Southampton and Portsmouth Harbour RAMSAR sites and SPAs, Titchfield Haven National Nature Reserve and SSSI, and Lee-on-the-Solent to Itchen Estuary SSSI.

5.8.3 These statutory designations protect much of the River Hamble, the Solent and its coastline, Hook Lake, and Titchfield Haven.

5.8.4 There are also numerous Local Nature Reserves and SINCs scattered across the Borough.

5.8.5 The areas which are least constrained in terms of ecological constraints are:

- The area north of the M27 and Funtley, as far north as the woodland SINCs in the north of the Borough;
- The area between the M27, Kingsway, the railway line and the crematorium, excluding Downend Chalk Pit SSSI in the centre;
- The area to the west of HMS Collingwood; and
- The area to the West of the River Meon and Fleetend, north east of Little Chilling Farm.

5.8.6 No site visits or species data purchase has been carried out as part of the study. It should be noted that ecological impacts cannot be fully assessed without purchasing protected species data or without a Phase 1 site walkover to identify sensitive habitats and the potential for protected species.

5.8.7 No assessment has been made of the potential constraints caused by bird flight and bat commuting routes (particularly for wind development). This level of study was not within the scope of this report.

6 TECHNOLOGY CAPACITY ASSESSMENTS

6.1 Solar

6.1.1 Due to the location of the borough in the south of the United Kingdom, Fareham district offers a good location for solar PV development. As discussed in paragraph 4.1.2, irradiance levels are high and the following analysis concludes that a large area of the borough remains least constrained for development.

6.1.2 Parsons Brinckerhoff has produced a map which aims to direct both Fareham Borough Council and any potential developers to areas of land most suitable for solar PV development.

6.1.3 The map produced aims to identify areas of Fareham Borough defined as 'least constrained' for solar PV generation. Major inhibitors to development, including ecological designations and properties, have been identified and 'removed' from the borough area, leaving behind areas less constrained and more suitable for development.

6.1.4 The areas defined as 'least constrained' are not necessarily suitable for solar PV energy generation, and a number of studies should be completed by any potential developer prior to submission of a planning application including, but not limited to the following:

- Landscape and visual impact assessment;
- Consultation with aviation bodies;
- Archaeology and cultural heritage studies;
- Ecology studies; and
- Transport and access studies.

6.1.5 In much the same way, areas defined as 'constrained' could be suitable for the right project and justification for a project located outside of the 'least constrained' area defined should be given in the supporting documentation for any planning application made to the Council.

6.1.6 For the purposes of identifying areas within Fareham Borough defined as 'least constrained', the following areas were labelled 'constrained for solar PV development' and removed from the study area:

- National Designations, including SSSIs, national parks and national scenic areas
- National Ecological Designations
- Local Nature Reserves and SINCS
- Areas of Special Landscape Character[11] and open space
- Conservation Areas
- Properties, with a buffer zone of 50m; and
- Roads, with a buffer distance of 50m.

6.1.7 The proximity of the Fareham Borough to Southampton Airport is discussed in more detail in paragraph 6.2.6 below; however, we recommend that any developers approaching the Council with solar PV proposals are advised to consult with the airport, and that during the consultation period for any planning applications, the Council also consults with Southampton Airport.

[11] Fareham Borough Landscape Assessment (1996) Scott Wilson Resource Consultants

6.1.8 Solar installations have successfully been installed at airports across the world and it is not believed that an operating airfield site constitutes a constrained area for renewable energy developments. Solar panels can be installed on land surrounding airport runways. In the capacity study, the runways belonging to Daedalus/Lee on Solent Airfield have not been identified as constrained.

6.1.9 The resulting map shows that there is 32.74km^2 available land which is least constrained for solar PV development.

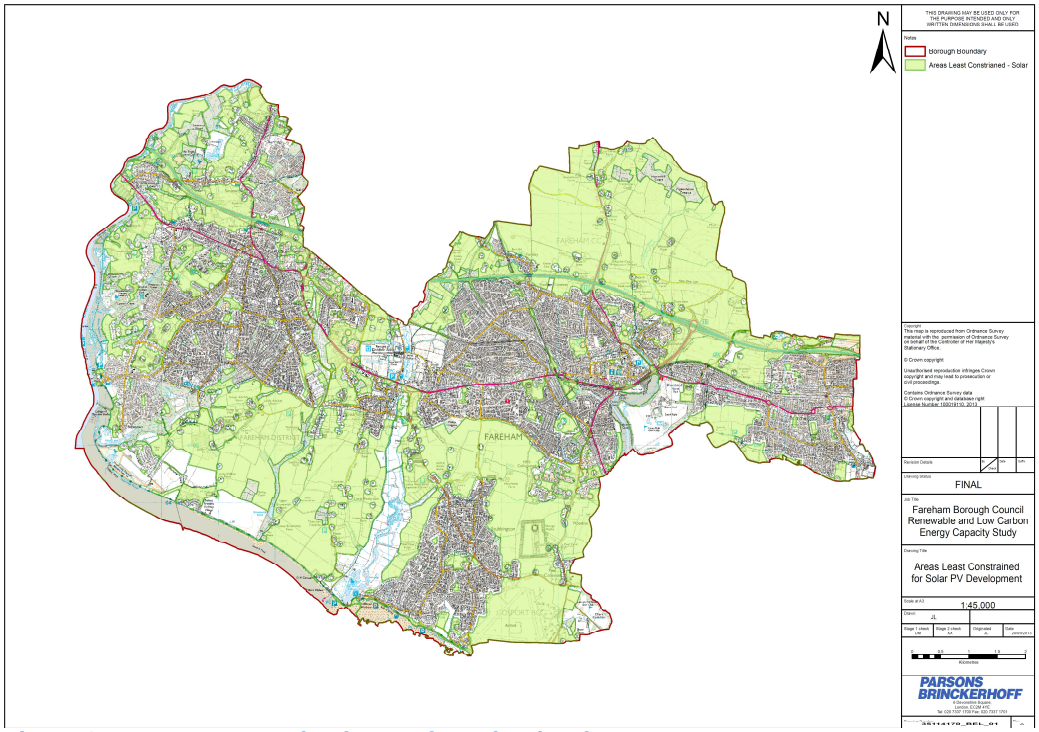


Figure 6.1 – Least constrained areas for solar development

6.1.10 The total capacity available within Fareham Borough for ground mounted solar PV generation is 1664MW.

Landscape considerations

6.1.11 The main areas emerging as least constrained areas for solar coincide with the areas identified in the Hampshire CC Landscape Sensitivity study. They appear within and around settlements as well as in the countryside. However, many of these sites will be constrained by local characteristics and/ or planning constraints. The Hampshire CC Landscape Sensitivity study Areas 5 and 8 emerge as least constrained in terms of technology criteria and key planning restrictions, however, the appropriateness of large scale solar in these areas will depend on local characteristics. Area 5 for example is gently rising ground at the foothills of Portsdown Hill and forms the northern landscape backdrop to Fareham. Field scale developments on these slopes are likely to generate significant landscape and visual amenity effects. Down on the coast (Area 8), the area maybe flatter and less visible from a distance, however issues of change of land use and the potential effect on the coastal landscape would need to be carefully considered.

6.2 Wind

6.2.1 As discussed in paragraph 4.2.4, Fareham Borough offers a good wind resource, particularly in the south of the district. The permanent footprint of a wind turbine is small and potential sites can be agricultural or industrial in nature. Careful siting is necessary though to minimise impacts on local residents, ecology and aviation/telecommunication bodies.

6.2.2 Parsons Brinckerhoff has produced a map which aims to direct both Fareham Borough Council and any potential developers to areas of land most suitable for wind energy development The map produced aims to identify areas of Fareham Borough defined as 'least constrained'. Major inhibitors to development, including ecological designations and properties, have been identified and 'removed' from the borough area, leaving behind areas less constrained and more suitable for development.

6.2.3 The areas defined as 'least constrained' are not necessarily suitable for wind energy generation, and a number of studies should be completed by any potential developer prior to submission of a planning application including, but not limited to the following:

- Landscape and visual impact assessment;
- Consultation with aviation bodies;
- Consultation with telecommunication bodies;
- Monitoring of on-site wind speeds;
- Ecology and ornithology studies;
- Noise monitoring;
- Shadow flicker assessment; and
- Transport and access studies.

6.2.4 In much the same way, areas defined as 'constrained' could be suitable for the right project and justification for a project located outside of the 'least constrained' area defined should be given in the supporting documentation for any planning application made to the Council.

6.2.5 For the purposes of identifying areas within Fareham Borough defined as 'least constrained', the following areas were labelled 'constrained for wind development' and removed from the study area:

- National Designations, including SSSIs, national parks and national scenic areas;
- National Ecological Designations;
- Local Nature Reserves and SINCS
- Areas of Special Landscape Character and open space;
- Conservation Areas
- Properties and buffer zones of 300m, 400m and 500m around these properties;
- Roads, with a buffer distance of 50m; and
- Transmission lines, with a buffer distance of 100m.

6.2.6 The entire area of Fareham Borough is constrained by its proximity to Southampton Airport and is within the 30km consultation buffer zone implemented for safeguarding reasons. It is recommended that any developers proposing wind energy developments within the Fareham Borough consult with Southampton Airport prior to submitting an application and Fareham Borough Council must consult with the airport on all wind energy development planning applications received.

6.2.7 Wind energy installations have successfully been installed at airports across the world and it is not believed that an operating airfield site constitutes a constrained area for renewable energy developments. Wind turbines can be installed within airport grounds. The East Midlands airport has two wind turbines installed at the site and mitigation measures to address radar interference are relatively simple to put into action. In the capacity study, the runways belonging to Daedalus/Lee on Solent Airfield have not been identified as constrained.

6.2.8 All properties within Fareham Borough were buffered by three distances – 300m, 400m and 500m. These buffer distances represent noise ranges for the different scales of wind energy developments that could be proposed in the area.

6.2.9 The resulting map shows that there is 5.06km^2 available (assuming a 300m buffer on properties, which falls to 1.32km^2 assuming a 500m buffer), identifying as land which is least constrained for development. The largest least constrained areas are located:

- South-west of Titchfield, stretching south towards the coastline;
- North of Fareham Common and west of Crockerhill; and
- North-east of Stubbington, on land surrounding Peel Common Sewage Treatment Works.

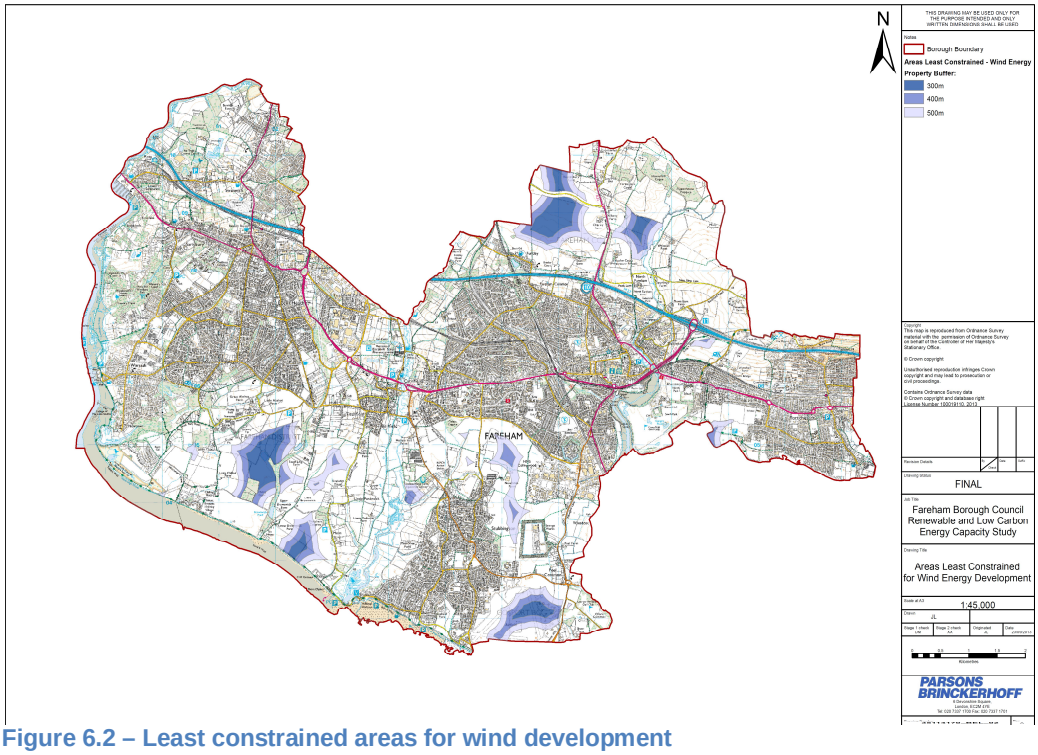


Figure 6.2 – Least constrained areas for wind development

6.2.10 A benchmark assumption that 7 ha of land is required per MW of installed capacity, has been used. The maximum theoretical capacity of wind energy development that could be installed within Fareham Borough is 72.3MW, based on a 300m property buffer.

6.2.11 Using a greater property buffer of 500m reduces maximum theoretical capacity within Fareham Borough to 18.9MW.

Landscape considerations

6.2.12 The Hampshire CC Landscape Sensitivity Study Area 8 – Chilling and Brownwich Coastal Plain was identified as being of Medium Sensitivity and Area 5 – Portsdown Hill Open Downland – Western Foothills was identified as being of Low – Medium Sensitivity. With wind energy developments their effects may be felt some distance away. Turbine development along the coast may have effects on the New Forest National Park across the water. Likewise, wind turbines in the Portsdown Hill area, could have potential landscape and visual amenity effects across administrative boundaries and affect the special qualities of the South Downs National Park and Chichester Harbour AONB. The local recreational resource of Portsdown Hill would also need to be considered as a wind energy development in this area is likely to have direct effects on the local open access areas, footpaths and bridleways.

6.3 Hydropower

6.3.1 The Environment Agency report identified five potential locations for small-scale hydropower within the Fareham administrative boundary. These five potential sites are shown in Figure 6.3 below.

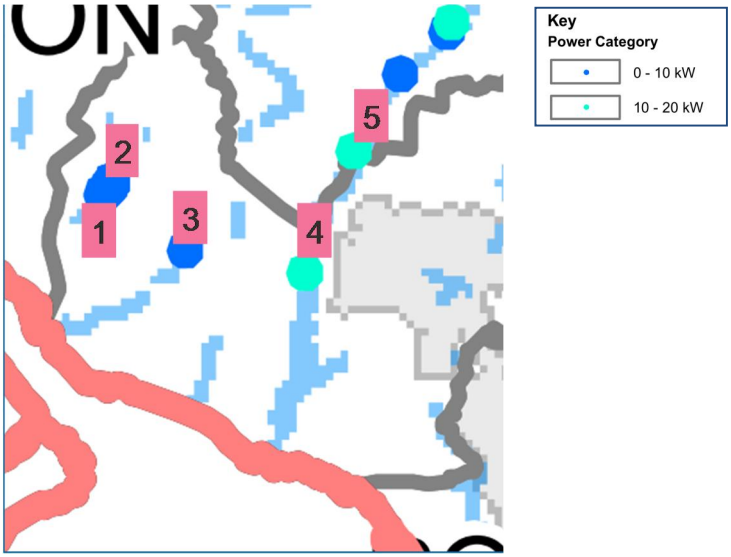


Figure 6.3 – Environment Agency potential sites for hydropower in Fareham (power categories)

6.3.2 Figure 6.4 below shows environmentally constrained areas of Fareham. The constrained areas map includes landscape, visual and ecological constraints.

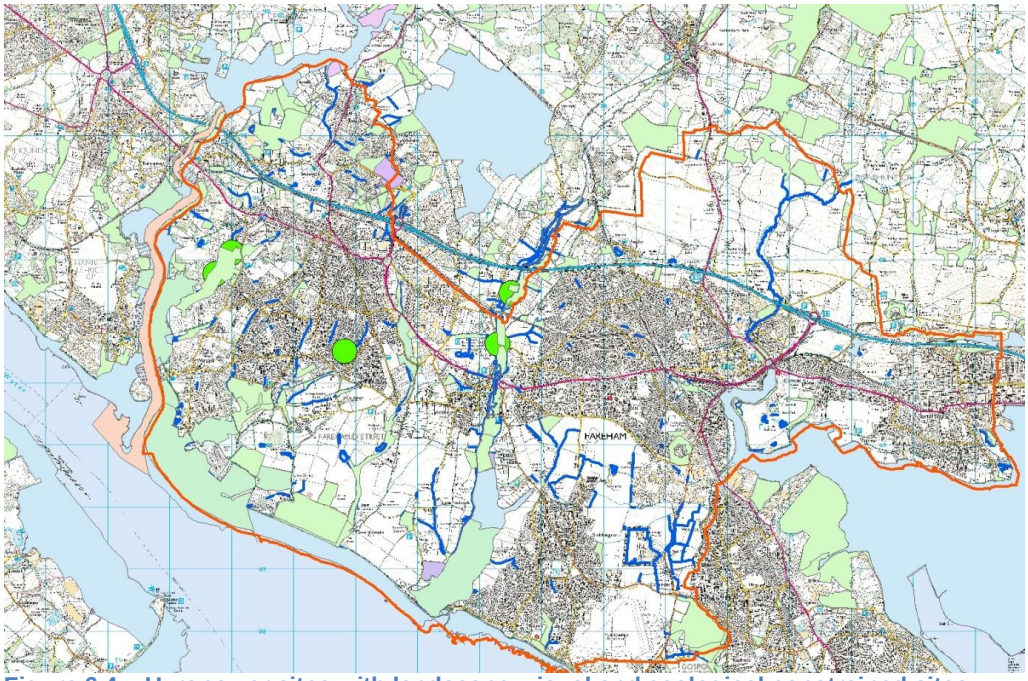


Figure 6.4 – Hyropower sites with landscape, visual and ecological constrained sites Fareham

6.3.3 Sites in the 0-10 kW category are not considered to attract an economic return on investment in order to be feasible for the installation of a RoR scheme and are discounted from the analysis.

6.3.4 The Hamble River forms the administrative border for the Fareham Borough to the west. Despite being a major watercourse in the region, the Environment Agency study did not indicate any sites with hydropower potential on the River Hamble. The Hamble is also particularly environmentally constrained. All things considered, there is no potential for hydropower on the River Hamble in Fareham.

6.3.5 The sites located on the River Meon (categorised by the Environment Agency as 10-20 kW) have the greatest potential for the development of hydropower in Fareham. A stretch of the River Meon in the centre of the Fareham Borough is not environmentally constrained. The site of the existing weir within the Fareham borough does however, fall within the Titchfield Abbey Conservation Area. The Conservation Area, designated in 1994, is concerned with protecting the historically significant Abbey and may well restrict the development of an RoR scheme in this location.

6.3.6 The locations with existing weirs are in areas constrained as SINCs in Hampshire (site of importance for nature conservation) and this is shown in Figure 6.4. SINCs are put in place to protect one or more specific species of fauna; detailed data on the wildlife interest of each SINC is held by the Hampshire Biodiversity Information Centre. The SINCs involved are the Winnard & Cawte Copses SINC and Meon Valley Meadows & Wood SINC.

6.3.7 Small RoR schemes have only a very low environmental impact and the primary environmental concern is associated with preventing the migration of fish across the turbine area. Irrespective of the scale of a RoR scheme the damaging impacts on fish

remains the same, further mitigation measures[12] have met with only varying degrees of success in ameliorating the problems.

6.3.8 At this, capacity study level, details of the particular species that are protected by the relevant SINC have not been sourced although it may be inhibitive to a hydro development were fish to be the defined species of concern . Conceivably, the requirements of the SINC may be lenient enough to allow such an otherwise low impact scheme. Removing the SINC constrained areas from the map reveal that the hydropower sites on the River Meon have no other constraints and this is shown in Figure 6.5.

Figure 6.5 – Hyropower sites with landscape, visual and ecological constrained sites Fareham (constraints excluding SINCS)

Hydropower Energy Potential

6.3.9 The relevance and impact of the Conservation Area and SINC designations on the potential for hydropower development are site specific issues which would need to be assessed in more detail as part of any proposal for development. Site specific assessment is outside the scope of this capacity study and therefore the assessment made here is that there is no capacity for hydro power in the borough.

6.3.10 However, this study cannot rule out the potential for viable sites identified and so we have included below an assessment of the potential capacity were more detailed assessment to show an acceptable impact on the SINCs and Conservation Area.

6.3.11 The nature of RoR schemes recommended would be without storage and would therefore, be subject to seasonal variations in flowrate. A nominal weir height of 5m was used for the calculation of head, weir heights should be confirmed with more accuracy as part of any site specific assessment.

6.3.12 Flow data for the River Meon was obtained from the National River Flow Archive from a measuring station at Mislingford. Figure 6.6 shows the flow rates for 2011 and the average monthly flowrate for the period 1958-2011 is show in Figure 6.7.

[12] SNIFFER WFD114: Impact of run-of-river hydro-schemes upon fish populations, August 2012

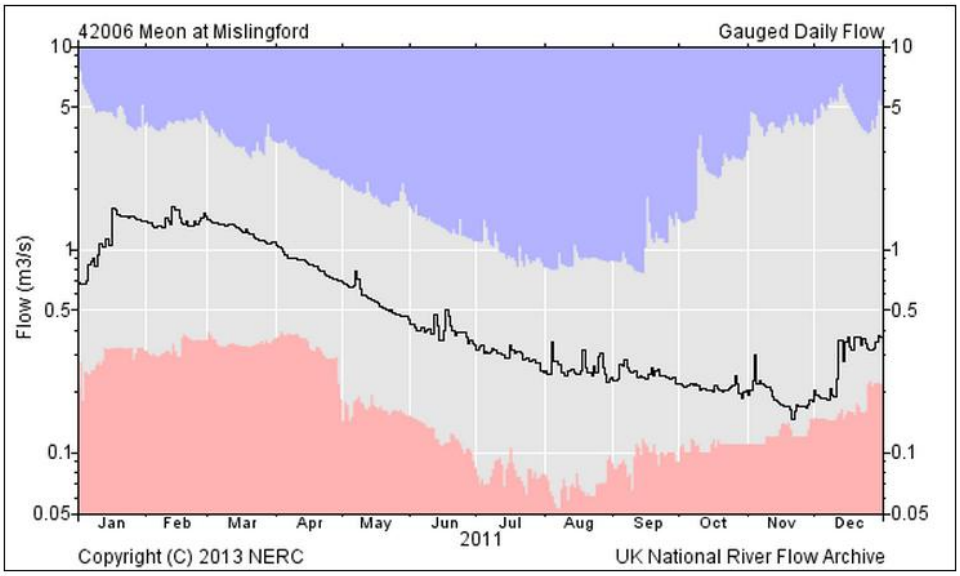


Figure 6.6 – River flow data for the River Meon in 2011

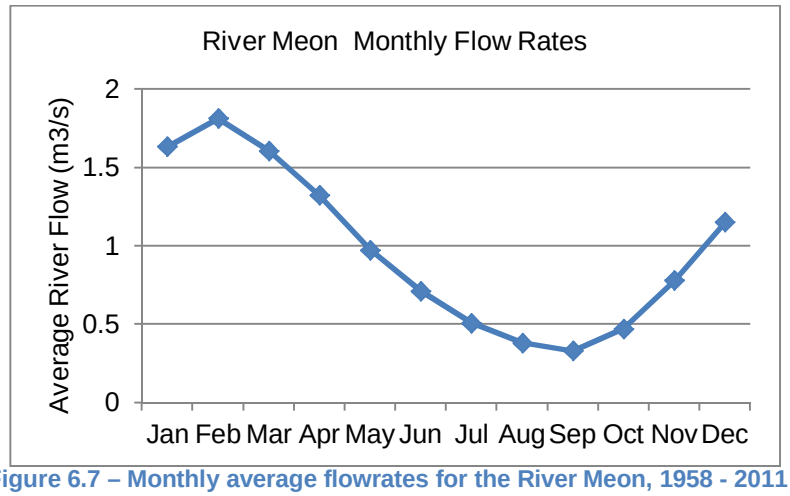


Figure 6.7 – Monthly average flowrates for the River Meon, 1958 - 2011

6.3.13 Expected power and energy outputs for a hydropower station on the River Meon, based on the monthly average flowrates, are shown in Table 6.1.

Table 6.1 – Expected power and energy outputs from hydropower developments on the River Meon

	Av. Flowrate	Expected Power Output	Expected Energy Output
	m^3/s	kW	kWh
Peak (Dec - May)	1.42	20.46	89,881
Low (May - Nov)	0.53	7.65	33,590
		Total Energy/year	123,471

6.4 Combined Heat and Power and District Heating

6.4.1 The approach presented here is to use nationally available data and previous reports to provide a focus on the areas with potential for district heating. Areas with potential should be considered further in feasibility studies and planned developments may want to consider district heating or the potential to integrate with other planned or potential schemes.

6.4.2 Several studies have been conducted at a regional level and below into the potential for combined heat and power with, and without, district heating. This section provides a summary of the demand identified:

Regional Study

6.4.3 In 2009 the South East Partnership Board published in a report 'Assessing the Potential for CHP and Distributed Heat in South East England. This reviewed the potential for supply lead opportunities i.e. waste heat and demand led opportunities. The accuracy of this assessment was limited to the Middle Layer Super Output Area resolution.

6.4.4 Within Fareham this study identified no supply led opportunities such as waste industrial or power station heat or Energy from Waste plants.

6.4.5 One demand led opportunity with significant potential was identified in the north of the borough above the M27 (the site of the proposed Welborne New Community). This was estimated at 66,000MWh/yr[13].

6.4.6 Elsewhere in the borough 16,000MWh of existing commercial and industrial demand was identified spread across the borough. The heat density and the density of the commercial premises were noted as being low.

County Study

6.4.7 In 2010 a report for Hampshire County Council, 'Towards a Hampshire Energy Strategy'[14] included a summary of areas identified as having potential for CHP schemes. The areas identified in Fareham were:

- North Wallington Industrial Park and St Christopher's Hospital
- Titchfield Park Works – Industrial Units, Offices, Hotel
- Town Centre – School, Library, Industrial Park, Offices and Retail Units
- Fleetlands (Newgate Lane) – HMS Collingwood, Industrial Units, Offices and Retail Units.

6.4.8 The heat demand identified for these schemes are summarised in Table 6-2: Summary of Heat Opportunities Identified.

[13] 6,600kwh per Home
[14] Arup, April 2010

Gas Demand Analysis – Non-domestic

6.4.9 Nationally non-domestic gas consumption data is aggregated at Middle Layer Super Output Area (MLSOA) resolution. This data has been summarised in the map below.

6.4.10 The map shows that the relatively highest levels of gas consumption are towards the west of the borough in the area covered by Park Gate and Titchfield Park; this is driven by offices and industrial units. Whilst the moderate levels of gas consumption in the centre are driven by town centre loads and to the south east by HMS Collingwood and the office / retail park located on its east side.

6.4.11 The gas consumption is described in relative terms because the non-domestic demand is, in part, spread over a large area due to the size of each zone. This may mask some areas of higher demand and also because in some areas the density of the distribution of commercial units is low.

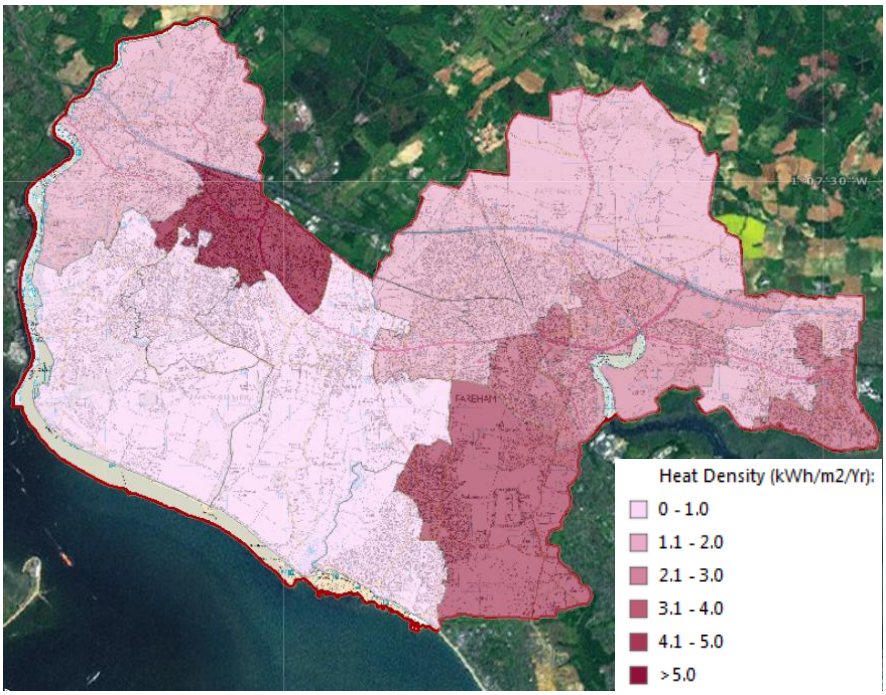


Figure 6-8 - Map presenting non domestic heat demand, green belt land and water courses

Gas Demand Analysis – Domestic

6.4.12 Nationally domestic gas consumption data is aggregated at Lower Layer Super Output Area (LLSOA) resolution. This data, summarised in the map below, provides better resolution than available for non-domestic properties.

6.4.13 The increased spatial resolution and the density of urban conurbations presented shows higher gas consumption is larger than that shown by the non-domestic data.

6.4.14 The map shows the areas with the relatively moderate to high levels of gas consumption track, in line with the density of housing, in the four main conurbation areas in the borough at:

- Locks Heath and Titchfield
- Stubbington and Hill Head
- Fareham
- Portchester

6.4.15 However whilst a few areas show relatively high gas consumption, the majority of the housing appears to be low rise, detached, semi-detached and terraced housing. Individually these are currently unlikely to be viable to connect to district heating due to the high cost of connection and the cost of dealing with individual owners. [15]

6.4.16 The opportunity for district heating in domestic properties should be focussed around communal properties such as tower blocks which have a high heat demand density. Properties such as these are likely to be under the control of a single entity i.e. a social housing provider who can make a decision about connecting an existing communal heating system to a district heating network, or can decide to retrofit a communal heating system. However, there are very few of this type of property in the Borough.

6.4.17 New developments where the district heating infrastructure is built at the same time as the development can be economical where housing density is lower than what would be cost effective for retrofits. The developer can also mitigate the costs of the district heating infrastructure by saving on gas connection costs, gas boiler systems, and possibly minimising the need to implement other carbon reduction measures.

6.4.18 New developments are more likely to install or connect to a district heating scheme when incentivised or compelled to by the planning system. The Royal Commission on Environmental Pollution has recommended that net densities of 100 people per hectare or about 40 to 50 dwelling per hectare are the minimum densities required for a viable scheme.[16]

[15] Arup, 2010, Towards a Hampshire Energy Strategy, Chapter 10
[16] Royal Commission on Environmental Pollution, 2007, The Urban Environment, 26th Report

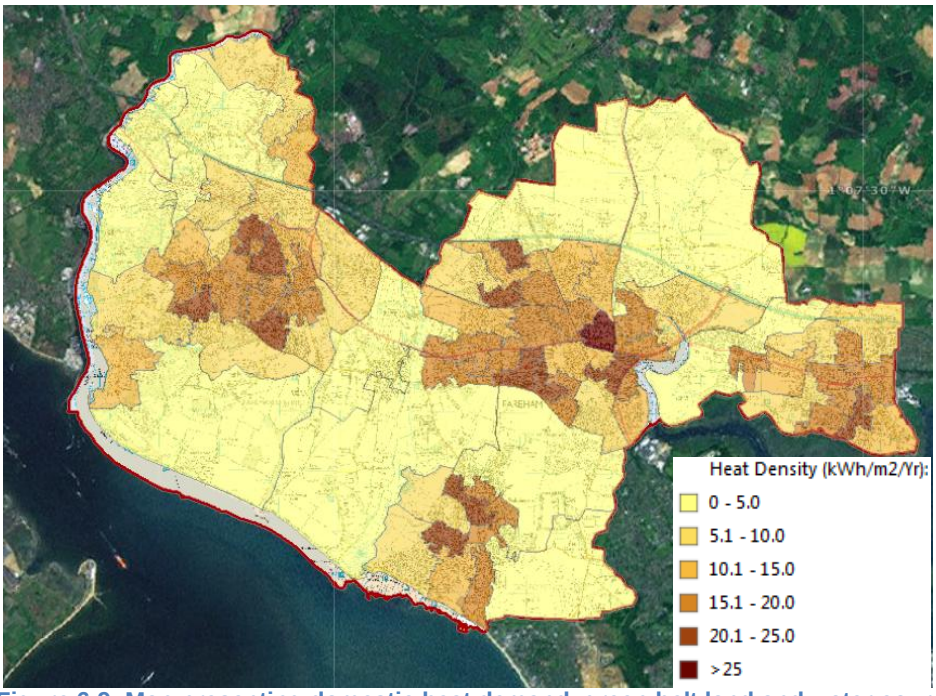


Figure 6-9 -Map presenting domestic heat demand, green belt land and water courses

6.4.19 The development of new housing presents an opportunity to embed district heating into an area when lower connection costs can be included in construction costs. The Draft Local Plan Part 3 already includes proposed policy on developing a district heat network at Welborne.

District Heating Capacity Summary

6.4.20 The approach presented here was to use previous studies backed up by nationally available data to provide a focus on the areas with potential for district heating. Areas with potential should be considered further in feasibility studies and planned developments may want to consider district heating or the potential to integrate with other planned or potential schemes. Policy relating to Welborne has already been discussed.

6.4.21 These areas include the four main conurbations especially where there is potential to integrated domestic and non-domestic loads.

6.4.22 A summary of the known opportunities from referenced studies is presented in the table below.

Table 6-2: Summary of Heat Opportunities Identified

Area	Heat Users	Heat Demand[17] MWh	CHP Capacity[18] MW
North Wallington	Industrial Park and St Christopher's Hospital	1,977	0.2
Titchfield Park Works	Industrial Units, Offices, Hotel	21,028	2.3
Town Centre	School, Library, Industrial Park, Offices and Retail Units	6,951	0.8
Fleetlands [*Newgate Lane*]	HMS Collingwood, Industrial, Retail, Leisure, Offices	11,514	1.2
Fareham Strategic Development Area[19]	6,500 homes	47,000	6.9

Physical Barriers to District Heating

6.4.23 The Borough has several potential barriers to district heating schemes from water courses, the motorway, and railway lines. This does not appear to present any significant challenges to the potential development of district heating in Fareham, although the cost of crossing barrier would need accounted for and this can be influential on scheme viability.

6.4.24 The M27 presents a barrier between the proposed large residential development to the north and the existing heat demand in the south. In Fareham town centre there are two railway lines which intersect as they cross the centre.

6.4.25 Another natural barrier is the Strategic Gap which acts to economically constrain networks to centres of demand.

[17] Arup, 2010, Towards a Hampshire Energy Strategy, Appendix A2
[18] CHP meeting 65% of demand, running for 6000 hours.
[19] Parsons Brinckerhoff, July 2013, New Community North of Fareham Eco-Opportunities (Energy) Study

6.4.26 The figure below summaries the significant barriers.

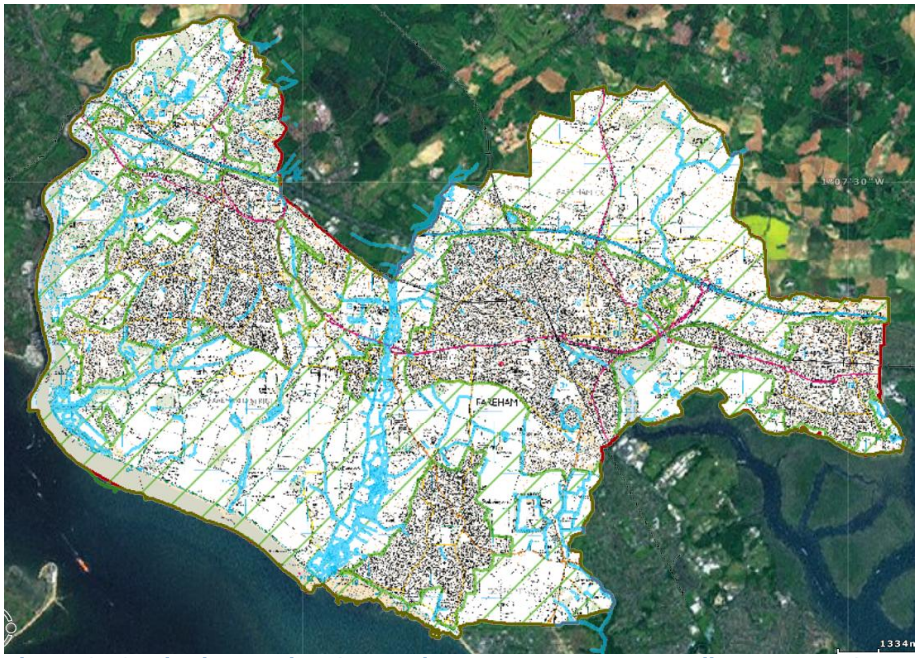


Figure 6-10: District Heating Constraints Map – Motorway, Railway, Water Courses and 'Countryside' Land

6.5 Biomass and Energy from Waste Technical Capacity

6.5.1 This section provides an overview of the potential electricity or heat potential plant capacity for the different forms of biomass resource available which were presented in section 4.4. The data presented is sourced from the same study which provided the resource potential data. The results are disaggregated down to the borough level where data is available.[20]

Electricity Technical Capacity

Table 6-3: Potential Electricity Capacity Based on Available Resource in MWe

Fuel		Fareham	Hampshire	South East	Resource Comment
Wood	Managed Woodland	n/a	17	81	Results only disaggregated to country level
	Waste Wood	n/a	6	30	
	Energy Crops	0.1	13	64	Assumes all abandoned land and pasture are planted with energy crops
Straw	Agricultural Arisings	1.5	81	421	DEFRA survey – wheat and oil rapeseed straw.
Waste	Municipal Solid Waste	23.0	1,491	7,403	Based on collated forecasts.
	Gas - Wet Organic Waste	10.8	736	4,167	Commercial & MSW food waste. Cattle & pig manure
	Gas - Sewage	0.7	9	56	Based on population.

[20] 2010, Land Use Consultants & TV Energy, Review of Renewable and Decentralised Energy in South East England

Table 6-4: Commentary on Electrical Technical Capacity

Fuel	Commentary
Woody Biomass	In Fareham the electrical technical capacity based on the resource potential for forestry, woodland biomass and energy crops is low. If a large scale woody biomass station was constructed the fuel resource required would need to be imported into the borough. This resource would likely need to be imported given the fact that a large scale station would consume the majority of the available resource.[21] Smaller scale woody biomass plants based on organic rankine cycle technology may be more practicable within the borough and reduced biomass requirement more easily supplied from domestic sources.
Straw	In Fareham the electrical technical capacity is minimal but if the resource area is increased to the county level and the south east there is significant potential for a large scale straw fired power station. The potential for such a station depends on the availability of the resource within a 50 mile radius and suitability of the roads. Whilst the local and regional road network may be adequate Fareham's location near the coast significantly limits the area from which straw can be sourced. If such a station is constructed in the area it is likely to be much further inland.[22]
Energy From Waste	There is the electrical technical capacity within the Fareham Borough for an economically sized Energy from Waste plant although this would consume 60% of the MSW resource. Any plant built within Fareham would need to source additional MSW waste to ensure viability. The development of this potential is dependent on the waste policies of the Council and the ability of the Council / developer to secure waste contracts.
Wet Organic Waste (AD)	There is significant technical capacity for wet organic waste processed using anaerobic digestion with the gas being combusted in internal combustion engines. The technical capacity is in part derived from Fareham's urban nature in generating the resource. Development of this capacity is dependent on the waste policies of the Council and the efficient collection of the waste and the ability of the Council / developer to secure waste contracts.
Sewage Sludge	The technical capacity for sewage gas is limited and within Fareham is not practicable. The local wastewater treatment plant at Peel Common does not process the sludge generated on site which instead is dewatered and shipped to the sludge treatment centre in Havant.

Heat Technical Capacity

Table 6-5: Potential Heat Capacity in MWth Based on Available Resource – Plant Utilisation Factor of 20%

Fuel		Fareham	Hampshire	South East	Resource Comment
Wood	Managed Woodland	n/a	282	1,325	Results only disaggregated to county level
	Waste Wood	n/a	92	459	
	Energy Crops	0.9	163	828	Assumes all abandoned land and pasture are planted with energy crops
Straw	Agricultural Arisings	When burned for heat tends to be on small farm holdings.			
Waste	Municipal Solid Waste	Combusted primary to incinerate waste and produce electricity. Utilisation of waste heat depends on location of plant relative to potential heat users.			
	Gas - Wet Organic Waste	Combusted using a gas engine – Waste heat used to support process.			
	Gas - Sewage				

[21] Appendix A provides a capacity estimate for large scale woody power stations
[22] Appendix A provides a capacity estimate for large scale straw power stations

Table 6-6: Commentary on Heat Technical Capacity

Fuel	Commentary
Woody Biomass	The heat technical capacity for straw was not developed due to limitations with data. However at the county level the resource potential for forestry, woodland biomass and energy crops is high. The biomass to supply this technical capacity is relatively local and sustainable.
Straw	A heat technical capacity for straw was not developed as it is not burnt for heat beyond farm holdings.
Energy From Waste	The referenced study did not present a technical capacity for heat from energy from waste plant as these plants are primary built to process waste and generate power. The ability to utilise heat from such a plant is dependent on its location relative the heat users and or a district heating network of sufficient scale to make economic utilisation of the heat worthwhile. An energy from waste facility with a gross electrical output of 14MWe could supply up to 10MWth of heat without significantly impacting on the plant's electrical output. Higher levels of heat could be supplied at increased costs.
Wet Organic Waste (AD)	The referenced study did not present any technical capacity for heat from wet organic waste gas because standard practice is to combusted the gas generated using a gas engine with the waste heat used to support the plants processes. There is however the potential if spare waste heat capacity exists to supply other heat users if the treatment plant is suitably located.
Sewage Sludge	The referenced study did not present any technical capacity for heat from sewage sludge gas because sewage sludge in the area is dewatered and shipped to a sludge treatment centre in Havant for incineration. In addition when aerobically digested standard practice is to combust the gas generated using a gas engine with the waste heat used to support the treatment plant's processes. Based on current operating practice of the local wastewater company there is no technical capacity for heat from sewage sludge.

6.6 Building Integrated Renewables

6.6.1 The SQW Methodology[23] was used to estimate the natural and technically accessible resource for building integrated renewable energy systems. This comprised an assessment of solar thermal and photovoltaic systems and heat pumps (Ground and Air-sourced).

Solar (thermal and photovoltaic)

6.6.2 The SQW Methodology suggests that the following assumptions are used to estimate the number of suitable roofs for solar, whether thermal or photovoltaic:

Table 6-7: Building Integrated Solar capacity assumptions

Building Type	Proportion of roofs suitable for Solar	Typical system size [kW]
Domestic	25%	2
Commercial	40%	10
Industrial	80%	50

6.6.3 The Methodology leaves the Industrial system size open to each region to establish. We have used a typical system size of 50kW which we view as conservative.

6.6.4 Using DECC Energy Statistics to establish building numbers for Fareham, the following table outlines the estimated capacity based on the natural and technically accessible resource.

Table 6-8: Building Integrated Solar capacity estimates

Building Type	Total Number of properties	Total estimated capacity [MW[
Domestic	47178	23,589
Commercial	1395	5,580
Industrial	922	36,880

6.6.5 This establishes a total estimated technically accessible capacity of 66MW of building integrated solar systems.

[23] Renewable and Low-carbon Energy Capacity Methodology for the English Regions, Land Use Consultants and SQW Energy, for Department of Energy and Climate Change and Department of Communities and Local Government, October 2009

Heat Pumps

6.6.6 The SQW Methodology suggests that the following assumptions are used to estimate the number of suitable properties for a heat pump (whether air or ground sourced):

Table 6-9: Building Integrated Heat Pump capacity assumptions

Building Type	Proportion of properties suitable for a heat pump	Typical system size [kW]
Domestic - off gas grid	100%	5
Domestic – Detached and Semi-detached	75%	5
Domestic – Terraced	50%	5
Domestic – Flats	25%	5
Commercial	10%	100

6.6.7 There is a formatting error in the SQW report which results in the percentage for commercial properties being omitted. However in their capacity study for the South West, by AEA Technology for RegenSW, AEA report that they contacted SQW who provided the figure of 10% for Commercial properties.

6.6.8 Using 2011 Census Data to establish the proportion of dwelling types (detached, semi-detached etc.) applied to the DECC property numbers used above, the table below presents our estimate of the potential capacity of heat pumps in the Borough.

Table 6-10: Building Integrated Heat Pump capacity estimates

Building Type	Total Number of properties	Total estimated capacity [MW[
Domestic - off gas grid	2322	12
Domestic – Detached and Semi-detached	30737	115
Domestic – Terraced	8455	21
Domestic – Flats	5663	7
Commercial	1395	7

6.6.9 This methodology estimates a potential capacity of 160MW of heat pumps in the Borough based on the natural and technically accessible resource.

Welborne

6.6.10 In our Eco Opportunities report [24]for the Welborne Plan we estimated 12MW of PV, 14MW[25] of solar thermal and 25MW of heat pumps could be installed across the whole development.

[24] New Community North of Fareham: Eco-Opportunities Study August 2012 LDA Design & Parsons Brinckerhoff

7 ELECTRICITY NETWORK INFRASTRUCTURE

7.1 Scottish and Southern Energy Power Distribution (SSEPD) Long Term Development Statement (LTDS)

7.1.1 The Scottish and Southern Energy Power Distribution (SSEPD) Long Term Development Statement (LTDS) includes a geographic network map, an extract of which (covering Fareham) is presented in Figure 7-1 below. This map is taken from the 2008 LTDS

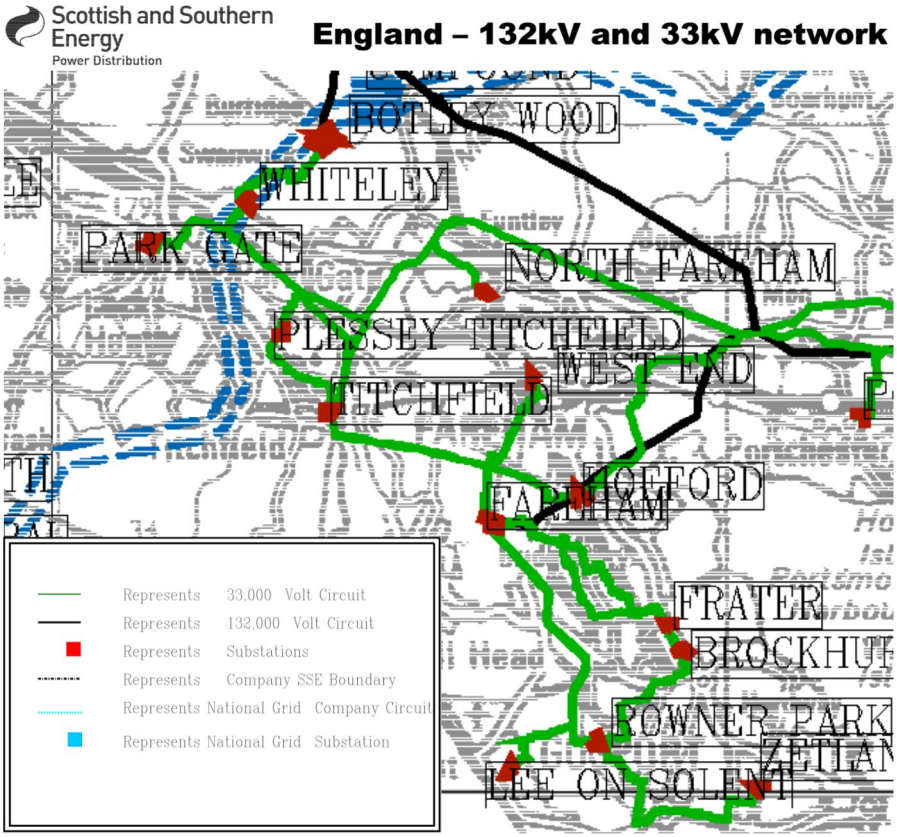


Figure 7-1: Extract of SSE LTDS 33kV and 132kV network map Nov 2008 - covering Fareham

7.1.2 The 2011 LTDS document provides a list of the substations that sit within the Borough of Fareham. The 132kV line serves the Fareham 132kV to 33kV substation. This then serves a 33kV network comprising 33kV to 11kV substations. The 11kV network extends out from these substations but the location of this network is not provided on the LTDS map.

[25] Study calculated 14,000m^2 installed. Generally evacuated tube collectors deliver a maximum of 1kW per m^2.

132kV substation:

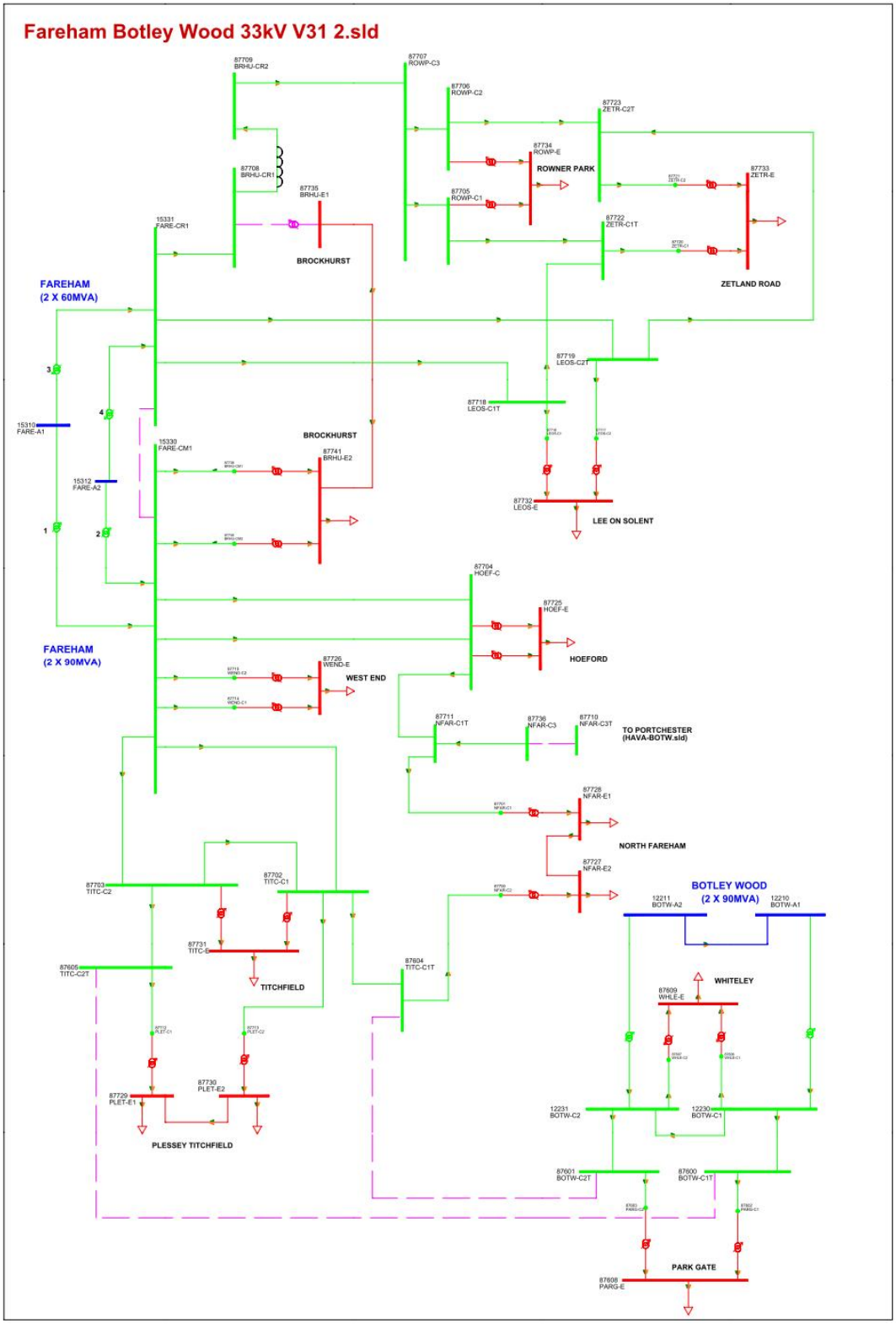
- Fareham 132kV

33kV substations:

- Park Gate
- Plessey Titchfield
- Tichfield
- West End
- North Fareham
- Hoeford
- Portchester

7.1.3 There is also a National Grid transmission network landing point on the coast at Solent Breezes Holiday Village, where the transmission line goes under Southampton Water to cross over to Fawley.

7.1.4 The following Network Diagram for Fareham 132kV substation shows supplies to several 33kV/11kV substations:



7.2 Distributed Generation Connections

7.2.1 Embedded generators rated at above 2MVA would normally be connected to the 11kV network. Generators are available at 11kV up to 30MVA but connection voltage for larger generators at 11kV or 33kV would be subject to discussion with SSE.

7.2.2 The constraints on distributed embedded generation are the rating of SSE network in terms of current carrying capacity and fault level.

7.2.3 A review of the LTDS shows fault levels and maximum demands on the 33/11kV substations as follows:

33kV substation	Designation Name	Existing Fault Level kA	11kV Rated Fault Level kA	Forecast Demand MVA	Firm Capacity MVA
Plessey Titchfield	PLET	7.2	12.5	14.1	26
Tichfield	TITC	8.8	13.1	10.6	15
West End	WEND	10.2	13.1	17.8	30
North Fareham	NFAR	6.6	13.1	13.4	15.2
Hoeford	HOEF-E	8.7	13.1	17.5	19.5
Portchester	NFAR-3C3T	10.5	13.1	13	15.2
Brockhurst	BRHU	9.7	13.1	18.4	27.6
Rowner Park	ROWP	8.5	13.1	9	30
Lee on Solent	LEOS	7.2	13.1	12	24
Zetland Road	ZETR	9.1	13.1	21.6	26

7.2.4 The table above shows that all the 33kV substations have available capacity for connection of distributed generation at 11kV in terms of both load and fault level. Caution needs to be exercised in arriving at any conclusions from this information because the LTDS may not be up to date and there are several Connection Offers shown as having been accepted in Table 6 of the LTDS.

7.2.5 The other important issue is the available capacity of underground networks or overhead lines at the location of any proposed generator connections.

7.2.6 Specific proposals need to be discussed with SSE who may insist on Generator Application Form being submitted to obtain Budget Costs or Firm quotations.

7.3 Correlation of network and least constrained areas

7.3.1 The area along the coast, south of Titchfield between Warsash and Stubbington has been identified as least constrained for renewable and low carbon energy development. This area, however, is poorly served by the 33kV network having potential implications for the economic viability of development there.

7.3.2 The Fareham 132kV to 33kV substation at HMS Collingwood serves the least constrained area identified around it. This may provide an economically viable connection for distributed generation of a significant scale, potentially multiples of 10MW.

7.3.3 The least constrained area identified immediately north of the M27 motorway (part of Welborne) has a 33kV line running through it (on the north side of the M27 and parallel to it). This may provide economically viable connections for the connection of distributed generation connections potentially multiples of 10MW.

7.3.4 The area further north is poorly served by the distribution network since the nearest substations (from which 11kV network extends) are at North Fareham and Portchester. However the 132kV line runs through this area potentially offering a viable connection for a much larger scale of distributed generator again, potentially multiples of 10MW (The costs of connection at 132KV is significantly higher than those at 33kV hence the need for much larger scale of generation to justify the connection cost).

7.3.5 The Daedalus/Lee on Solent Airfield (also identified as a least constrained area) is not directly served by the 33kV network but is only approximately 500m from the nearest 33kV line which makes it potentially viable for a new connection to the 33kV network for distributed generation. The 11kV network is unlikely to offer a viable connection due to the distance from the nearest substation at Lee on Solent.

8 POLICY RECOMMENDATIONS

8.1 Aims

8.1.1 This section aims to inform the preparation of planning policies by Fareham Borough Council relating to renewable energy development. The recommendations made here reflect the conclusions reached in the Study and are designed to inform the formation of renewable energy policies in Part 2 of the emerging Local Plan: Development Control Policies.

8.2 Basis for planning policy recommendations for stand alone renewable energy schemes

8.2.1 There is no current local or national policy which provides criteria against which specific types of renewable energy schemes should be assessed. Currently the merits of each proposal in the Borough must be assessed on a case-by-case basis, supported by an Environmental Impact Assessment where required under the relevant Regulations. Although this will continue to be the case, locally specific policies and Supplementary Planning Documents (SPDs) would provide clarity to developers when submitting applications for renewable energy schemes.

8.2.2 The proceeding policy recommendations are based upon the evidence and conclusions reached in the Capacity Study and outlined above. The key conclusions from the Study that provide a basis for locally specific policy is the quantification of available capacity and evidence establishing which technologies could contribute most significantly to the Borough's 12MW target. These include (in order of capacity), solar, wind energy, biomass, district heat, and combined heat and power.

8.2.3 The policy and guidance recommendations made below are intended to be supplementary to Policy CS16 'Natural Resources and Renewable Energy' in the Local Plan Part 1 and to meet the requirements of the NPPF (see Section 2.1), which requires local authorities to *"have a positive strategy to promote energy from renewable and low carbon sources".*

8.2.4 As has been highlighted in Section 2, the NPPF indicates that Local Planning Authorities (LPAs) cannot require developers to demonstrate the 'need' for a proposed renewable energy scheme. In assessing the case for stand alone renewable energy developments, the main issue the Council faces is balancing the economic and climate change benefit of renewable energy schemes against the impact of the scheme on the landscape, ecology and historic environment.

8.2.5 The policy recommendations have had regard to planning policy approaches that have been adopted by other Local Planning Authorities (LPA) in England or Wales. These approaches have been assessed in a report by the Planning Advisory Service (PAS) 2013[26] and the conclusions of this report are reflected by these recommendations. In particular, LPA experience elsewhere has been used to help determine suitable criteria against which different types of renewable and low carbon energy development can be assessed.

[26] Renewable Energy and Local Plan Policies: Case Study (2013) Planning Advisor Service

Area of least constraint for wind and solar energy

8.2.6 As is indicated in the PAS study, a number of LPA have considered identifying 'areas of least constraint' or 'areas of opportunity' for wind and solar development in renewable energy policy. As with this Capacity Study, identifying 'areas of least constraint' relies upon setting buffers around built up areas or environmental constraints, and correlating these with areas where there may be resource capacity. A key outcome of this Study therefore, is whether the 'areas of least constraint' or buffer identified in the Study could be used to inform such a spatial policy in Fareham.

8.2.7 There have been a number of occasions where draft policies of this nature have previously been proposed initially and then changed to exclude reference to 'areas of least constraint' or similar such policy devices. For example, at the inspection of Wiltshire's Core Strategy[27]/[28] a successful objection was made on the basis that wind energy development in an area identified as unsuitable could be made acceptable in terms of its impacts, and therefore the buffer was incorrectly applied.

8.2.8 In order to avoid the risk of objections such as this, it appears that many LPA, such as those identified in the PAS Study (2013) as including 'areas of opportunity' in draft policy have not adopted such areas into policy (for example: London Borough of Richmond-upon-Thames; Hastings Borough Council and Wiltshire Council). Therefore, while the 'areas of constraint' provide good evidence for establishing the capacity for renewable energy in the Borough, it is not recommended that the Council adopt these areas into planning policy.

Potential environmental issues to be addressed in policy

8.2.9 The following environmental issues were identified as potentially applying to all stand alone renewable energy schemes:

- **Landscape and visual impacts:** the scale of the proposal and its visual impact in relation to the character and sensitivity of the surrounding landscape and designated landscape features;
- **Cultural or heritage impacts:** effect of development on national and local heritage buildings, sites, and archaeological features or their setting. Assets considered including Listed Buildings, Conservation Areas, Scheduled Ancient Monuments, Registered Parks and Gardens, historic settlements and undesignated features where these are considered as having local importance;
- **Open space and green infrastructure impacts:** effect of the development on access to locally designated green infrastructure or open space assets, including outdoor sports facilities; children's play areas; amenity open space; parks and gardens; natural and semi natural green spaces; and cemeteries;
- **Air quality, waste, noise, hydrological impacts:** anticipated effects resulting from construction and operation such as air quality, atmospheric emissions, noise, odour, water pollution and the disposal of waste;
- **Ecological impacts:** effect on designated and non-designated ecological conservation sites and features, biodiversity and geodiversity, water supply and hydrology;

[27] Wiltshire Core Strategy Examination (2012) Wiltshire Council [online] http://www.wiltshire.gov.uk/planninganddevelopment/planningpolicy/wiltshirecorestrategy/wiltshirecorestrategyexamination.htm

[28] Wilshire Told to Rethink New Wind Farm Policy (2012) Wiltshire Gazette and Herald [online] http://www.gazetteandherald.co.uk/news/9884683.Wiltshire_Council_told_to_rethink_wind_farm_policy/

- **Traffic and transport impacts:** accessibility by road and public transport for construction (and installation of specialist equipment) and maintenance, and proximity to fuel sources;
- **Public Rights of Way and access:** The proximity of footpaths, bridleways and highways should be considered, both for potential implications for future access, but also due to landscape and visual impacts affecting the experience of users;
- **Agricultural impacts:** effect on agriculture or farming in terms of land take and existing and future use for farming;
- **Grid connection:** The proximity of the proposal to existing connections to the national grid should be considered. If a new connection to the grid is required the environmental impact of this connection should be considered as part of the proposed development;
- **Lighting:** any necessary lighting should be designed to limit the impact on nearby residential areas; and
- **Cumulative impacts with other renewable energy schemes:** cumulative impact of the development in relation to other similar developments.

8.2.10 After examining the Council's policies, it is clear that the requirement to address many of these issues is already addressed. Consequently, only the most significant environmental issues have been identified for consideration as assessment criteria. Instead of repeating this, or providing overly detailed technical guidance in policy, policies adopted by LPA elsewhere tend to refer applicants to additional Supplementary Planning Documents for further detailed technology specific guidance (see Recommendation 2).

Community involvement

8.2.11 In accordance with the NPPF (para. 97), the Council should encourage developers to progress renewable energy development which has support from, and/or meets the needs of the local community. Community involvement and engagement should be considered as an integral part of any new renewable energy development. Developers should therefore be encouraged to engage with the community throughout all stages of design, ensure local concerns are considered, and where possible addressed before a planning application is submitted.

8.3 Policy Recommendation 1: Planning policy should be incorporated into a renewable energy policy in 'Local Plan Part 2: Development Sites and Policies'

8.3.1 The Core Strategy (Policy CS16) supports the provision of renewable energy as part of new development. In accordance with the NPPF it is the recommendation of this Study that the Council establishes an additional development management policy which sets out criteria against which stand-alone renewable energy developments can be assessed.

Suggested Renewable and Low Carbon Energy Policy wording

When considering proposals for renewable and low carbon energy development the planning merits at the local level will be balanced with the wider benefits of providing renewable energy. This will include a consideration of the cumulative impact of proposals.

Proposals for renewable and low carbon energy development will be assessed in accordance with the following generic principles:

- *the scale and character of the proposed development and the capacity and sensitivity of the landscape to accommodate the development. This includes the cumulative impact of the proposal on the wider landscape;*

- *the impact of proposals on scheduled monuments, listed buildings, conservation areas or other designated heritage assets. The impact on below ground archaeological features must also be addressed;*

- *the extent to which proposals are lead by or meet the needs of local communities, or create opportunities for co-location of energy producers with energy users, in particular heat, and facilitate renewable and low carbon energy innovation.*

- *In all cases the environmental and local amenity impacts of all renewable and low carbon energy schemes, including any infrastructure or buildings must be fully addressed in accordance with other Local Plan Policies, particularly CS4, CS5, CS14, CS15, CS16, CS17 and CS21.*

Proposals for Solar Energy, Wind Energy, Combined Heat and Power, and Biomass will be considered as follows:

Solar Energy

In addition to the generic principles set out above, proposals for Solar Energy development will be considered in accordance with the following principles:

- *proposals should not be subject to shading by future development or vegetation;*

- *where the proposal is located on agricultural land, the future agricultural use of the land should be protected. Proposals which enable the continued agricultural use of the land during operation are preferred.*

Wind Energy

In addition to the generic principles set out above, proposals for wind energy development will be considered in accordance with the following principles:

- *the impact upon the habitats or flight paths of birds and bats should be demonstrated to be acceptable;*

- *the impact of shadow flicker should be demonstrated to be acceptable when the nearest sensitive receptor is within 10 rotor diameters of the proposed wind turbine(s);*

- *the impact of noise from the proposed development should be demonstrated to be acceptable. The proposal must be accompanied by an assessment which examines the impact on the proposal on noise sensitive receptors, considering acoustic data for the specific make/model of wind turbine(s) proposed;*

- *the impact of the proposed development on transport infrastructure and the local highway network should be demonstrated as acceptable;*

- *for wind turbines greater than 11m tall, or with a rotor diameter of above 2m the MoD, CAA and NATS must be consulted in respect of the proposed development and raise no objection.*

Combined Heat and Power

In addition to the generic principles set out above, proposals for Combined Heat and Power development will be considered in accordance with the following principles:

- *any impacts on designated biodiversity sites, species and ancient woodland should be addressed;*
- *the impact on local amenity and on existing residential development should be demonstrated as acceptable;*
- *the impacts associated with the delivery of fuel, including traffic, air quality, odour, waste and noise associated with transit of fuel should be addressed;*
- *the long term viability of the scheme, and access to fuel must be addressed. The applicant would need to provide certainty that the proposed fuel source will be secure and accessible for these users in the long term.*

Biomass/Anaerobic Digestion

In addition to the generic principles set out above, proposals for Biomass or Anaerobic Digestion development will be considered in accordance with the following principles:

- *if the proposal includes tall turbine buildings or a chimney stack the visual impact of these buildings on the setting of landscape designations, or any nationally significant heritage assets should be addressed;*
- *the impacts associated with the delivery of fuel, including traffic, air quality, odour, waste and noise associated with transit of fuel should be addressed;*
- *the long term viability of the scheme, and access to fuel should be addressed. For a proposed development to be acceptable there should be certainty that the proposed fuel source will be secure and accessible for the users in the long term;*
- *measures to limit any impact of any pests likely to be associated with the storage of fuel should be incorporated into the mitigation strategy for the proposed development;*
- *in the case of an Anaerobic Digestion plant, the use of the end/ waste product should also be addressed. The plant should be located as close as possible to the end/ waste user to reduce traffic movements.*

8.4 Recommendation 2: Planning guidance to be incorporated into a future 'Renewable and Low Carbon Energy Supplementary Planning Document (SPD)'.

8.4.1 It is not within the scope of this Study to provide detailed guidance on all of the technical and environmental issues surrounding renewable energy development. However, Cornwall Council[29] has produced a series of Renewable Energy Guidance Notes, which it intends to adopt as SPD. The Council's approach to renewable energy development has been recognised as best practice in the British Renewable Energy Industry Awards (2011)[30].

8.4.2 This SPD should provide detailed technical guidance on the Council's expectations for renewable and low carbon energy development, and also repeat national and building control standards. This approach therefore provides a helpful one-stop source of guidance to developers.

8.4.3 It is therefore recommended that Fareham should provide further detailed technology specific guidance on a similar basis to Cornwall Council.

[29] Renewable Energy Planning Guidance Notes (2012) Cornwall Council [online] http://www.cornwall.gov.uk/default.aspx?page=25182
[30] British Renewable Energy Industry Awards (2011) http://www.r-e-a.net/news/awards-celebrate-the-best-in-british-renewables

APPENDIX A - BIOMASS FOR DEDICATED POWER STATIONS

Dedicated biomass power stations need to achieve a level of scale generally in excess of 25MWe to achieve economies of scale. Stations with a generating capacity up to 50MWe are considered under the Town and Country Planning Act 1990[31].

Biomass power stations would need to import fuel from beyond the Borough boundary. In Fareham the most likely route would be via ports. The following figures are provided to give an indication of the volumes of biomass required for a typical biomass power station exporting 38MWe of electricity.

Straw

Straw combustion plants are specifically designed to handle this type of fuel from the fuel handling equipment to the boiler technology. A 38MWe straw fired power station requires approximately 240,000 tonnes per annum of straw if fully fuelled by it. However, it is likely that a mixed fuel supply would offer a better fuel risk position than focusing purely on straw. For example straw combustion plants can combust up to 20% of the fuel input as wood chips. This upper limit is based on the maximum moisture content the boiler will tolerate. In this supply scenario the volume of straw required would reduce to 205,000 tonnes and 50,000 tonnes of wood (moisture content 45%).

Straw fuel for the stations would be sourced from the local area with a maximum radius of approximately 60miles depending on the road network. A developer will need to carry out an assessment of the ability of the local area to supply the volumes required for the size of station proposed. The table below outlines summaries the volumes and supporting land area required.

Table 0-1 - Straw fuel volume required to supply 38MWe plant

	Straw	Hectares[32]	Wood Chip[33]
100% Straw	240,000	68,500	0
80% Straw / 20% Wood	205,000	58,500	50,000

In the UK most barley straw is used for animal bedding and feed and for wheat straw 40% is chopped and returned to the soil, 30% used on the farm (for animal bedding and feed) and 30% is sold. The proportion of available for sale may increase if a market for power generation is created.

The movement of straw will increase traffic movements in the area. Depending on the volume of straw required and the method of transport anywhere between 35 and 75 fuel vehicle movements per working day of the year is required.

Wood Chip

- A 38MWe wood fuelled power station can be fuelled on wood chips (chipped on or off site) or industrial wood pellets.
- If combusting relatively fresh biomass with moisture content of 45% approximately 350,000 tonnes of wood is required. If more seasoned wood with a moisture content is combusted with a moisture content of 30%, and likely imported, then the volume of wood required would reduce to 260,000 tonnes.
- Importing industrial wood pellets with a moisture content of 10% would require 190,000 tonnes.

[31] http://www.legislation.gov.uk/ukpga/1990/8/contents
[32] Estimated wheat straw yield 3.5 tonnes per hectare. NB Barley is 2.75 t/ha
[33] 45% moisture content

- Location of the power plant in relation to the fuel source and the local transport infrastructure will be key to the efficient movement of biomass from the source to the station.

Table 0-2 - Biomass fuel volume required to supply 38MWe plant

Form	Moisture Content	Volume (Tonnes / annum)
Chip	45%	350,000
Chip	30%	260,000
Industrial Pellets	10%	190,000