

Renewable Energy Topic Paper

February 2024

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1. Introduction

This Topic Paper discusses the various types of renewable energy, their appropriateness in the Broads and outlines the proposed approach to this issue. This Topic Paper will inform policy in the emerging Local Plan for the Broads.

2. What the NPPG says

The NPPG says that:

Local planning authorities are responsible for renewable and low carbon energy development of 50 megawatts or less installed capacity (under the Town and Country Planning Act 1990). Renewable and low carbon development over 50 megawatts capacity are currently considered by the Secretary of State for Energy under the [Planning Act 2008](#), and the local planning authority is a statutory consultee. It is the government's intention to amend legislation so that all applications for onshore wind energy development are handled by local planning authorities. Microgeneration is often [permitted development](#) and may not require an application for planning permission.

Paragraph: 002 Reference ID: 5-002-20150618

When drawing up a Local Plan local planning authorities should first consider what the local potential is for renewable and low carbon energy generation. In considering that potential, the matters local planning authorities should think about include:

- *the range of technologies that could be accommodated and the policies needed to encourage their development in the right places;*
- *the costs of many renewable energy technologies are falling, potentially increasing their attractiveness and the number of proposals;*
- *different technologies have different impacts and impacts can vary by place;*
- *the UK has legal commitments to cut greenhouse gases and meet increased energy demand from renewable sources. Whilst local authorities should design their policies to maximise renewable and low carbon energy development, there is no quota which the Local Plan has to deliver.*

Paragraph: 003 Reference ID: 5-003-20140306

This Topic Paper brings together literature on renewable energy in general as well as relating specifically to the Broads Authority Executive Area.

3. Renewable Energy Solutions in the Broads

In 2013 the Broads Authority commissioned a study to review renewable energy solutions in the Broads (Hickey, 2013). The study concluded that:

'The most efficient and immediate solution for renewable energy generation in the Broads is a combination of GSHP (Ground Source Heat Pumps), ASHP (Air Source Heat Pumps), SG (Solar Greenhouses) and AD-CHP (Anaerobic Digestion Combined Heat and Power). SG or integrated amorphous technology (thin film a-Si) or Solar Slates offer the best form of domestic electricity generation taking the aesthetic constraints of the Broads into consideration.'

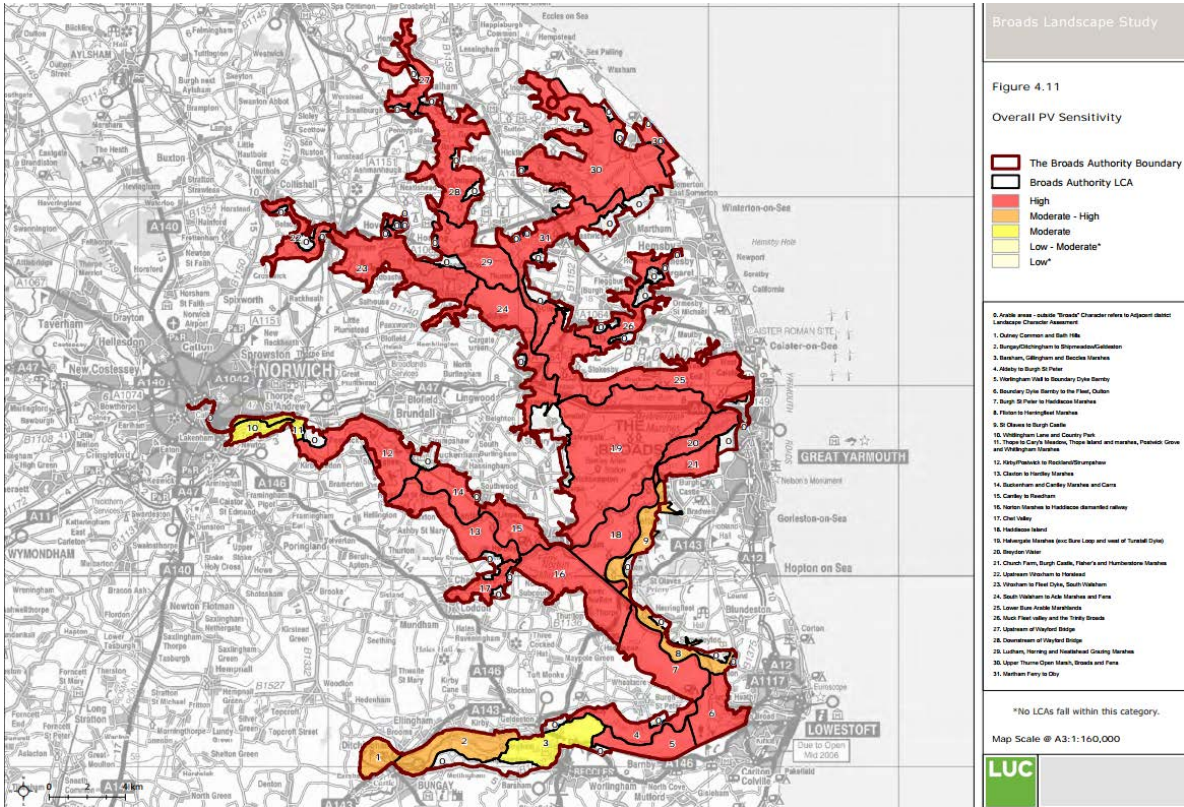
4. Solar panels and solar farms

In 2012 the Broads Landscape Sensitivity Study (2012) assessed the impact of solar photovoltaics on roofs (panels) as well as in fields (farms). The following maps are set out below:

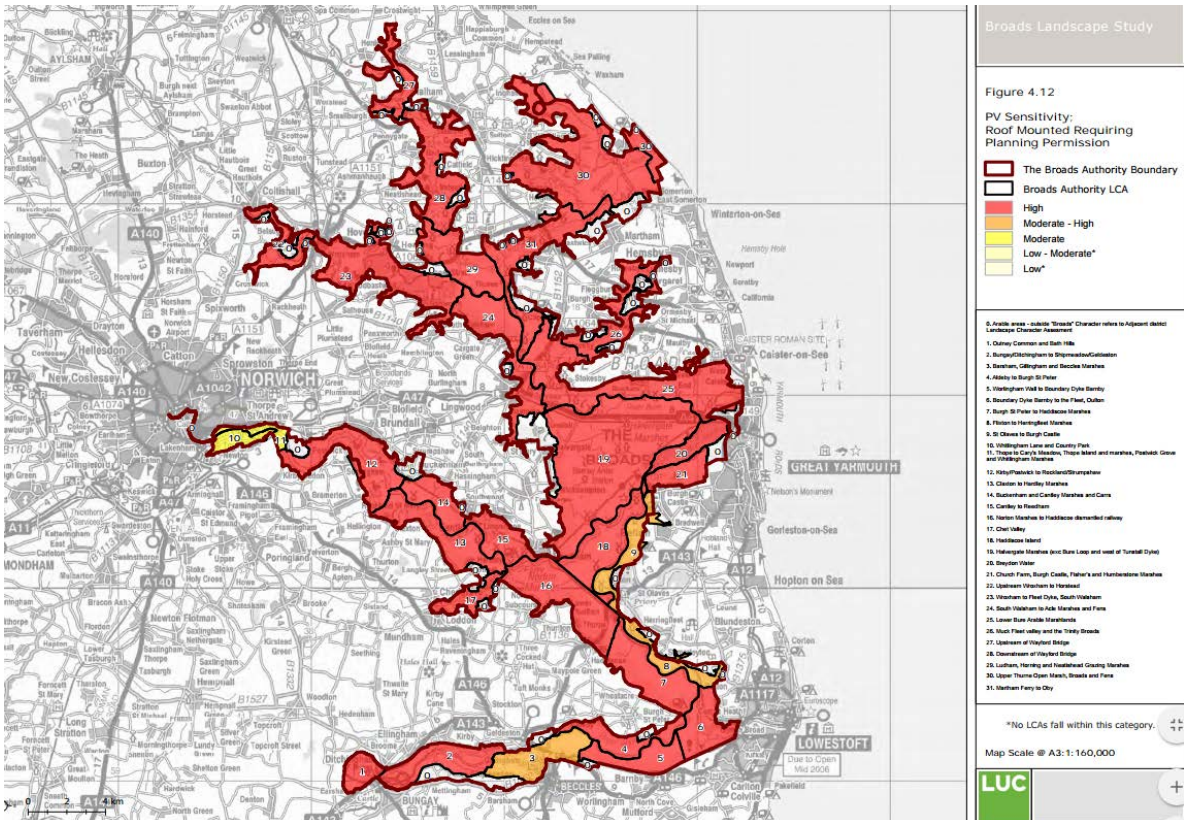
- Figure 4.11: Solar PV – overall landscape sensitivity
- Figure 4.12: Sensitivity to roof mounted solar PV requiring planning permission
- Figure 4.13: Sensitivity to roof mounted solar PV of up to 1 hectare area
- Figure 4.14: Sensitivity to small scale field mounted solar PV of up to 1 hectare area
- Figure 4.15: Sensitivity to medium scale field mounted solar PV of 1-5 hectares area

4.1 Solar PV

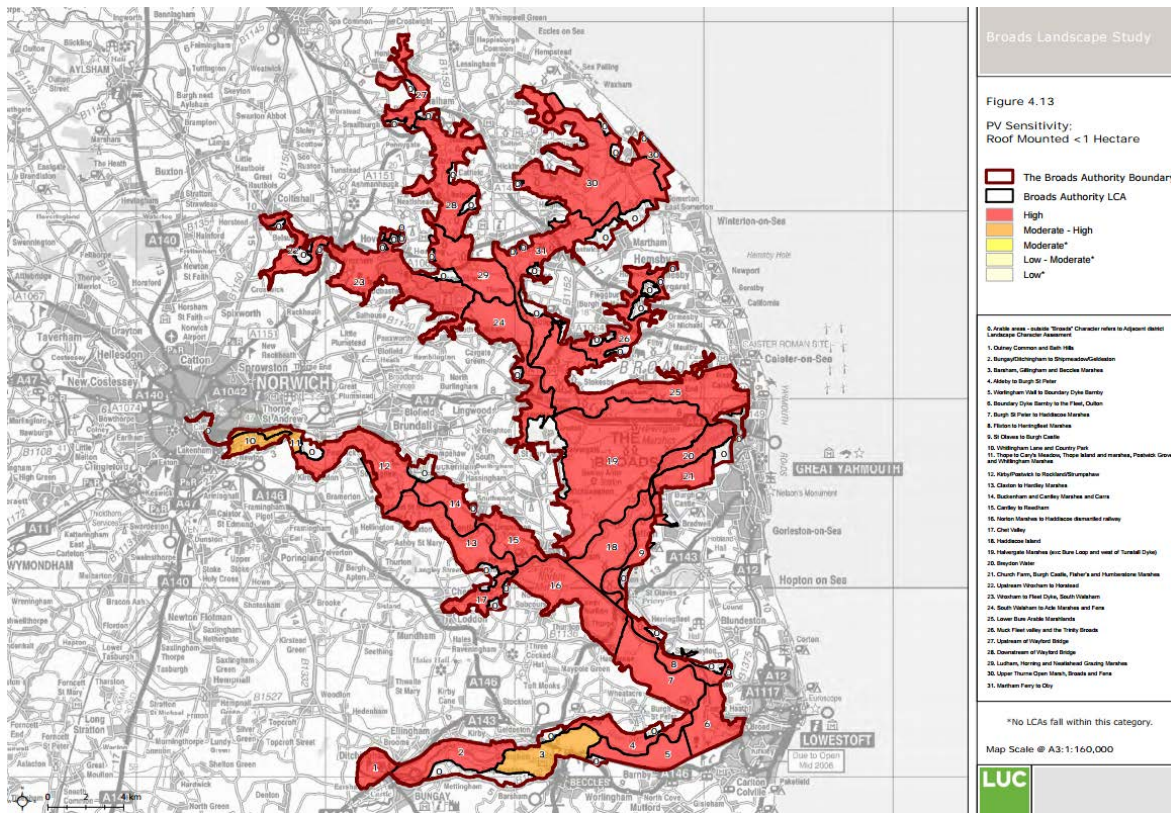
It can be seen from the assessment on the maps that the Broads landscape's sensitivity to solar PV tends to be fairly high, both in terms of landscape character and representation of special qualities. Reflecting these attributes, the assessment has found that there are no landscapes in the Broads which score low or moderate-low to the development of solar PV schemes. This applies to both domestic schemes where planning permission is required and commercial schemes.



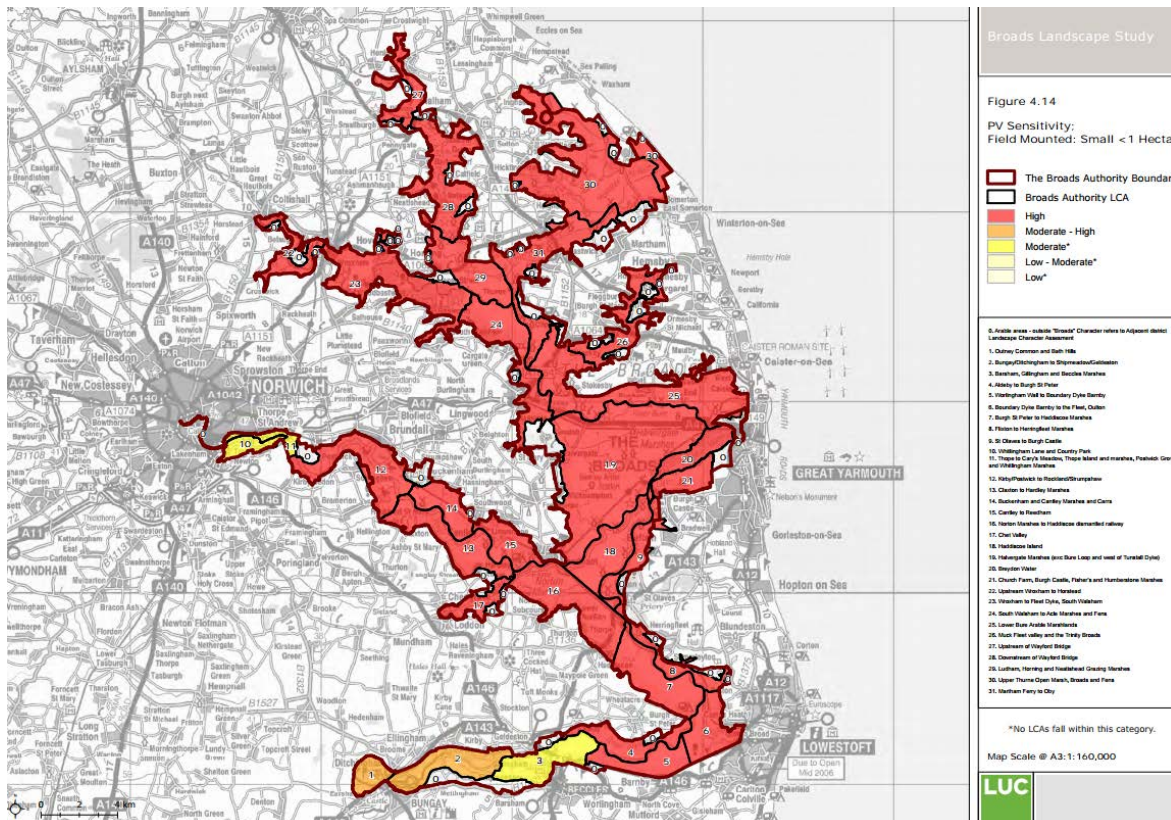
Map 1: Solar PV – overall landscape sensitivity



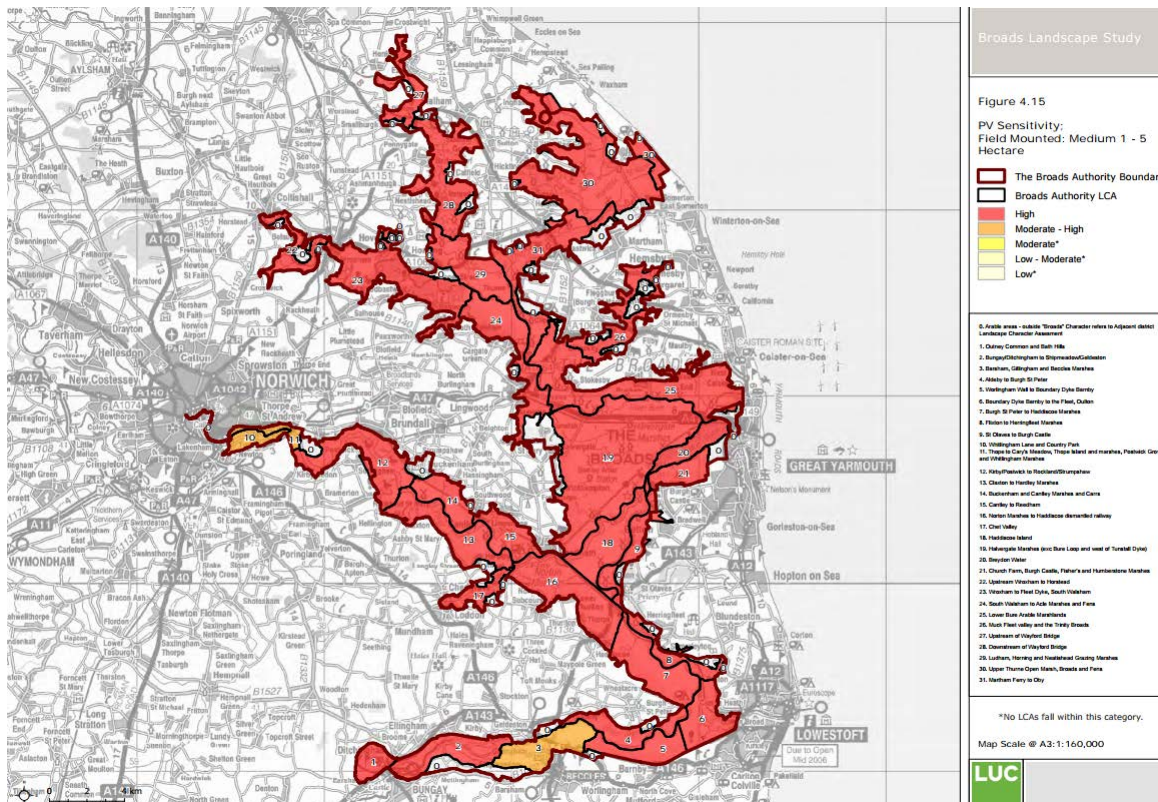
Map 2: Sensitivity to roof mounted solar PV requiring planning permission



Map 3: Sensitivity to roof mounted solar PV of up to 1 hectare area



Map 4: Sensitivity to small scale field mounted solar PV of up to 1 hectare area



Map 5: Sensitivity to medium scale field mounted solar PV of 1-5 hectares area

4.2 Solar tiles and slates in the Broads

Solar tiles or solar slates are mounted on the roof, in place of the roof tiles. Being integrated into the roof of buildings, as well as potentially of a similar colour to the roof tiles, they can have less of an impact on the street scene and landscape than larger panels which are mounted on the roof tiles. In comparison to solar panels they may be considered appropriate on Listed Buildings or in Conservation Areas.

5. Battery storage capacity¹

The application areas discussed here were determined by examining the applications of battery storage most directly related to wind and solar PV power integration. Batteries can be deployed to aid the integration of renewable energy, especially solar and wind power. These are variable renewable energy sources as the energy produced fluctuates depending on the availability of the resource.

Any deployment of battery storage is highly likely to be closely associated with either solar energy systems or wind energy, and therefore the suitability would be restricted to where these technologies would be considered appropriate, please see sections 3 and 10.

¹ Go here for more information: [Battery Storage for Renewables Market Status and Technology Outlook \(irena.org\)](https://www.irena.org/publications/2018/04/Battery-Storage-for-Renewables-Market-Status-and-Technology-Outlook)

6. Heat pumps

There are three types of heat pumps currently available, Air Source Heat Pumps (ASHP), Ground Source Heat Pumps (GSHP) and Water Source Heat Pumps (WSHP).

6.1 Air Source Heat Pumps

An ASHP can offer a full central heating solution and domestic hot water up to 60 degrees. They are significantly easier to install than a GSHP, given no excavation or heavy machinery is required. The installation of a ASHP benefits from permitted development rights within the curtilage of a dwellinghouse or a block of flats (subject to conditions).

6.2 Ground Source Heat Pumps

They utilise the same principle methods as ASHP but require a degree of ground works to lay the necessary cables. The installation, alteration or replacement of a microgeneration ground source heat pump within the curtilage of a dwellinghouse or a block of flats benefits from permitted development rights.

6.3 Water source heat pumps

Water source heat pumps at a microgeneration scale would benefit from permitted development rights if they are located within the curtilage of a dwellinghouse. As the required water source is unlikely to be considered as part of the curtilage of a dwelling there would be limited opportunities for permitted development rights to be implemented. It is highly likely that planning permission would be required for WSHP.

Water source heat pumps have not been widely adopted and are relatively new form of renewable energy in comparison to solar and wind. Further research would be required into the potential impacts that the required network of piping would have on navigation, dredging and biodiversity.

The Authority is aware that Norwich City Council have permitted and installed a water source heat pump in the River Wensum, but say that it is still too new to have learnt lessons/feedback on at the moment.

7. Anaerobic digestion combined heat and power

Constructing an AD-CHP plant would require a 1 – 1.5 hectare site, which needs to balance minimising transmission losses to domestic units, and ease of access to raw organic waste. These would be best sited on existing agricultural units.

Biomass renewable energy generation in the Broads can be used in conjunction with the findings of the GHG (Greenhouse Gas) reduction strategy as presented by the University of East Anglia in May 2010 (University of East Anglia, Broads Authority. Towards a GHG Reduction Strategy for the Broads – Identifying and Prioritising Actions)). This report has highlighted that the primary asset for both electricity generation and GHG reduction is farm waste. Renewable energy generation reduces the net GHG of the region by displacing emissions that would be produced by fossil fuel

sources. By using the waste assets of the land, GHG is offset and electricity is generated. Biomass assets of the land include –

- Fen, Wetland Vegetation
- Reed Beds
- Scrub
- Mixed Organic Waste
- Slurry
- Woodland

8. Reed as biomass

A 2010 study² investigated options for use of harvested fen. The aim of this report was to identify how fen harvesting could be made sustainable by finding a productive and hopefully commercial end-use for the arisings. Two of the most viable options are:

- The products of pyrolysis include biodiesel and biochar. The latter is an almost pure form of carbon with a wide range of uses. All fen products can be pyrolysed, although the technology is currently at an early stage of development.
- Combustion fuels. These include woodchips, bales of scrub, and reed pellets. The first two are well established processes. Consideration of reed pellets formed the majority of the report.

² [New Opportunities For The Sustainable Management Of Fens: Reed Pelletting, Composting And The Productive Use Of Fen Harvests \(broads-authority.gov.uk\)](http://broads-authority.gov.uk).

As a 2023 update:

- Reed is unlikely to be economically viable as a biomass pellet or brickette energy source in the Broads due to the production difficulties and costs involved.
- Biochar from reed is of interest as a carbon sequestration project rather than an energy source.

9. Hydro

Although the Broads is largely characterised by low-lying wetland and flood plains, there is a potential to extract energy from hydroelectricity. Some of the hydrodynamic assets of the Broads are tidal (River Yare) and weirs. The River Yare provides a tidal current, which could accommodate a tidal barrier / energy harvester. As regards potential weirs for small-scale hydro electricity, three potential sites have been identified:

- Bungay - 52°27'23.25"N 1°26'36.95"E
- Pirnhow - 52°27'29.82"N 1°27'26.39"E
- Mill Pool Lane - 52°28'16.95"N 1°28'46.97"E

10. Wind Energy in the Broads

There is a separate topic paper that looks into wind energy in the Broads. It concludes that due to landscape impacts, no areas should be identified as suitable for wind power in the Broads. See Wind Topic Paper that will be produced and placed on the evidence web page for the Local Plan.

11. Summary

- Solar – roof mounted solar and solar farms can have a landscape impact on the Broads. Solar slates or tiles may be more acceptable.
- Battery storage – Any deployment of battery storage is highly likely to be closely associated with either solar energy systems or wind energy, and therefore the suitability would be restricted to where these technologies would be considered appropriate, please see sections 3 and 10.
- Heat pumps – all types of heat pumps may be suitable in the Broads, depending on the specifics of the site.
- Anaerobic digestion – would best be sited on existing agricultural units and would need to consider landscape impacts.
- Reed as biomass – Reed is unlikely to be economically viable as a biomass pellet or brickette energy source in the Broads due to the production difficulties and costs involved.
- Hydro – hydro may be suitable in some parts of the Broads.
- Wind – as concluded in the separate Wind Topic Paper, no areas are considered suitable for onshore wind.

12. Draft policy

The following draft policy and supporting text is proposed.

This is a proposed draft section/policy for the Preferred Options Local Plan. Member's comments and thoughts are requested. This policy is already in the local plan, but some amendments are proposed.

Amendments to improve the policy are shown as follows: ~~text to be removed~~ and added text.

There is an assessment against the UN Sustainable Development Goals at the end of the policy.

The proposed Sustainability Appraisal of the policy is included at the end of the document. This would not be included in the Preferred Options Local Plan itself; this table would be part of the Preferred Options Sustainability Appraisal but is included here to show how the policy and options are rated.

The currently adopted policy remains in place – these are proposed amendments and this section will form part of the Preferred Options version of the Local Plan.

1 **Policy PODM15: Renewable and low carbon energy**

- 2 1. Renewable/low carbon energy proposals shall be of a scale and design appropriate to the
3 locality and shall not, either individually or cumulatively, have an adverse impact on the
4 distinctive landscape, cultural heritage, biodiversity, recreational experience or special
5 qualities of the Broads or the local amenity³. The Broads Landscape Sensitivity Study⁴ (or
6 successor document) will provide guidance on this. The impact of ancillary infrastructure,
7 including power lines, onshore infrastructure for offshore wind turbines/farms, sub-stations,
8 storage buildings, wharves and access roads, will form part of the evaluation.
- 9 2. Wherever possible, renewable energy proposals should utilise previously developed sites and
10 result in environmental improvements over the current condition of the site.
- 11 3. The developer will also be required to to restore the land to its original use and remove any
12 renewable energy equipment when it is redundant.
- 13 4. Proposals for solar farms on agricultural land are required to use poorer quality agriculture
14 land.
- 15 5. Battery storage proposals will need to address relevant policy considerations, such as
16 landscape impact and impact on the special qualities of the Broads.

17 **Reasoned Justification**

18 It is widely acknowledged that tackling the challenges posed by climate change will necessitate a
19 radical increase in the proportion of energy generated from renewable sources. The UK
20 Renewable Energy Strategy (2009) includes the UK's legally binding renewable energy target of

³ For example through: visual dominance, noise, fumes, odour, vibration, glint and glare, shadow flicker traffic generation, broadcast interference

⁴ Landscape Sensitivity Study (broads-authority.gov.uk)

21 15% by 2020⁵. This is part of a wider suite of strategies within the UK Low Carbon Transition Plan.
22 The Authority must ensure that the causes of climate change are addressed at the local level. This
23 will, however, need to be undertaken within the context of the special circumstances pertaining to
24 the Broads.

25 Landscape impact of proposals

26 A range of renewable energy technologies may be suitable for the Broads, including solar
27 photovoltaic cells, ground and water and air source heat pumps and wind turbines⁶. However, the
28 sensitivity of the Broads landscape means that large-scale renewable energy developments are
29 generally inappropriate. Where wind turbines, solar photovoltaics cells or other large-scale
30 renewable energy developments are proposed, applications should be accompanied by a
31 landscape and visual impact assessment of the impact of the development from a full range of
32 viewpoints, including from the waterways, and is completed in accordance with the Guidelines for
33 Landscape and Visual Impact Assessment published by the Landscape Institute and Institute of
34 Environmental Management and Assessments⁷.

35 Wind turbines

36 The NPPF ~~2019 2023~~ ~~(paragraph 154 footnote 49) says ‘Except for applications for the repowering~~
37 ~~of existing wind turbines, a proposed wind energy development involving one or more turbines~~
38 ~~should not be considered acceptable unless it is in an area identified as suitable for wind energy~~
39 ~~development in the development plan; and, following consultation, it can be demonstrated that~~
40 ~~the planning impacts identified by the affected local community have been fully addressed and the~~
41 ~~proposal has their backing’.~~ ~~(paragraph 158, footnote 54) says: ‘Except for applications for the~~
42 ~~repowering and life-extension of existing wind turbines, a planning application for wind energy~~
43 ~~development involving one or more turbines should not be considered acceptable unless it is in an~~
44 ~~area identified as suitable for wind energy development in the development plan or a~~
45 ~~supplementary planning document; and, following consultation, it can be demonstrated that the~~
46 ~~planning impacts identified by the affected local community have been appropriately addressed~~
47 ~~and the proposal has community support’.~~

48 The Landscape Sensitivity Study concluded that wind turbines are tall structures that have the
49 potential to detract from the mainly open and low-lying character of the Broads landscape,
50 particularly when they are in large groups or sited in prominent locations. The **Wind Energy Topic**
51 **Paper** assesses the potential for wind turbines in the Broads and does not identify specific areas of
52 suitability within the Broads Authority Executive Area for wind turbines and as such no areas are
53 identified in this Local Plan.

⁵ Since that Strategy, the UK Government have committed to net zero by 2050.

⁶See Renewable Energy Topic Paper **xxxx**

⁷ Guidelines for Landscape and Visual Impact Assessment: www.landscapeinstitute.org/product/guidelines-for-landscape-and-visual-impact-assessment/

54 Any deployment of battery storage is highly likely to be closely associated with either solar energy
55 systems or wind energy, and therefore the suitability would be restricted to where these
56 technologies would be considered appropriate.

57 **Renewable/low carbon proposals outside of the Broads**

58 The Authority will not support proposals for renewable energy development that are sited outside
59 but close to the Broads executive boundary that would have an adverse impact on the Broads
60 environment, the special qualities of the Broads and the special landscape setting and character.

61 **Reasonable alternative options**

- 62 a) No policy
- 63 b) Original policy

64 **Sustainability appraisal summary**

65 The three options (of having a policy and not having a policy and the amended policy) have been
66 assessed in the SA. The following is a summary.

A: Policy – Preferred Option	11 positives. 0 negatives. 1 ? Overall, positive.
B: No policy	0 positives. 0 negatives. 12 ?
C: Original policy	11 positives. 0 negatives. 1 ? Overall, positive.

67 In terms of wind specifically, the option of identifying areas for wind has also been assessed:

D: Identify areas for wind	6 positives. 2 negatives. 1 ?
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68 **How has the existing policy been used since adoption in May 2019?**

69 According to recent Annual Monitoring Reports, the policy has not been used.

70 **Why have the alternative options been discounted?**

71 The amendments follow the Planning Policy for Traveller Site as well as well as referring to
72 nutrient enrichment, recreation impacts and biodiversity considerations and is favoured as it
73 updates the policy and provides more detail.

Sustainability Appraisal

SA objectives:

- ENV1: To reduce the adverse effects of traffic (on roads and water).
- ENV2: To safeguard a sustainable supply of water, to protect and improve water quality and to use water efficiently.
- ENV3: To protect and enhance biodiversity and geodiversity.
- ENV4: To conserve and enhance the quality and local distinctiveness of landscapes and towns/villages.
- ENV5: To adapt, become resilient and mitigate against the impacts of climate change
- ENV6: To avoid, reduce and manage flood risk and to become more resilient to flood risk and coastal change.
- ENV7: To manage resources sustainably through the effective use of land, energy and materials.
- ENV8: To minimise the production and impacts of waste through reducing what is wasted, and re-using and recycling what is left.
- ENV9: To conserve and enhance the cultural heritage, historic environment, heritage assets and their settings
- ENV10: To achieve the highest quality of design that is innovative, imaginable, and sustainable and reflects local distinctiveness.
- ENV11: To improve air quality and minimise noise, vibration and light pollution.
- ENV12: To increase the proportion of energy generated through renewable/low carbon processes without unacceptable adverse impacts to/on the Broads landscape
- SOC1: To improve the health and wellbeing of the population and promote a healthy lifestyle.
- SOC2: To reduce poverty, inequality and social exclusion.
- SOC3: To improve education and skills including those related to local traditional industries.
- SOC4: To enable suitable stock of housing meeting local needs including affordability.
- SOC5: To maximise opportunities for new/ additional employment
- SOC6: To improve the quality, range and accessibility of community services and facilities and to ensure new development is sustainability located with good access by means other than a private car to a range of community services and facilities.
- SOC7: To build community identity, improve social welfare and reduce crime and anti-social activity.
- ECO1: To support a flourishing and sustainable economy and improve economic performance in rural areas.
- ECO2: To ensure the economy actively contributes to social and environmental well-being.
- ECO3: To offer opportunities for Tourism and recreation in a way that helps the economy, society and the environment.

Assessment of policy

		A: Amended policy	B: No policy	C: Original policy
ENV1				
ENV2				
ENV3	+	Impact on the special qualities of the Broads is included in the policy, including the natural environment.	?	+ Impact on the special qualities of the Broads is included in the policy, including the natural environment.
ENV4	+	Impact on the special qualities of the Broads is included in the policy, including the landscape.	?	+ Impact on the special qualities of the Broads is included in the policy, including the landscape.
ENV5	+	The benefit of renewable/low carbon energy is that it does not have the emissions associated with burning fossil fuels.	?	+ The benefit of renewable/low carbon energy is that it does not have the emissions associated with burning fossil fuels.
ENV6				
ENV7	+	Seeks use of previously developed land for proposals if possible.	?	+ Seeks use of previously developed land for proposals if possible.
ENV8	?	If the scheme is for Anaerobic Digestion, this would use waste materials.	?	? If the scheme is for Anaerobic Digestion, this would use waste materials.
ENV9	+	Impact on the special qualities of the Broads is included in the policy, including heritage assets.	?	+ Impact on the special qualities of the Broads is included in the policy, including heritage assets.
ENV10	+	Fundamentally, the policy taken together means that any scheme is designed appropriately for the area.	?	+ Fundamentally, the policy taken together means that any scheme is designed appropriately for the area.
ENV11	+	The benefit of renewable/low carbon energy is that it does not have the emissions associated with burning fossil fuels.	?	+ The benefit of renewable/low carbon energy is that it does not have the emissions associated with burning fossil fuels.
ENV12	+	Fundamentally, the policy relates to renewable and low carbon energy generation.	?	+ Fundamentally, the policy relates to renewable and low carbon energy generation.
SOC1				
SOC2				
SOC3				
SOC4				
SOC5				
SOC6				
SOC7				
ECO1	+	The policy enables appropriate renewable and low carbon energy schemes that could benefit businesses in the area.	?	+ The policy enables appropriate renewable and low carbon energy schemes that could benefit businesses in the area.
ECO2	+		?	
ECO3	+		?	