Cumulative Impact of Wind Turbines on Landscape and Visual Amenity



Pembrokeshire Coast National Park Local Development Plan 2

Pembrokeshire County Council Local Development Plan 1

Supplementary Planning Guidance

PEMBROKESHIRE COAST NATIONAL PARK AUTHORITY

Consultation: 15 September 2021

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PEMBROKESHIRE COUNTY COUNCIL

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Abbreviations used in text

AONB Area of Outstanding Natural Beauty

CLVIA Cumulative Landscape and Visual Impact Assessment

EIA Environmental impact assessment

GLVIA Guidelines for landscape and visual impact assessment

GIS Geographic information system

km Kilometres

LVIA Landscape and visual impact assessment

m Metres

MW Megawatt

NRW Natural Resources Wales

SPG Supplementary Planning Guidance

ZTV Zone of Theoretical Visibility

Cover photos:

Left- turbine in National Park- Richard James, Pembrokeshire Coast National Park Authority.

Middle- turbines near Herbrandston, Pembrokeshire.

Right- Brechfa Forest West windfarm, Carmarthenshire.

All photos are taken by Simon White, White Consultants unless otherwise stated.

A

INTRODUCTION

ISSUES

OBJECTIVES

CONTEXT

1. Introduction and scope of guidance

1.1. This document sets out the agreed approach across three local planning authorities (LPAs), Pembrokeshire Coast National Park Authority, Pembrokeshire County Council and Carmarthenshire County Council, to assessing the cumulative impact of onshore wind turbines on landscape and visual amenity. It updates a previous document prepared in 2013 and is intended to be used for development management purposes by developers, consultants and planning officers. It may be adapted and adopted as Supplementary Planning Guidance (SPG) by the LPAs or act as a background document to inform policies or SPGs.

1.2. Current national policy states that LPAs are the decision-making authorities for onshore wind farms up to 10MW output. Developments of 10MW over and above are considered to be 'large-scale' and are considered by the Welsh Government through the Developments of National Significance (DNS) process. LPAs are statutory consultees in this case. This document should be taken into account and followed for developments located in the study area which ever process is followed and if energy output thresholds change.

1.3. While only the policies in the development plan have special status in deciding planning applications, (i.e. for the purpose of any determination under the Planning Acts, the determination must be made in accordance with the Plan unless material considerations indicate otherwise), SPG may be taken into account as a material planning consideration. In making decisions, the Welsh Government and the Planning Inspectorate will give substantial weight to approved supplementary planning guidance which derives out of, and has been prepared consistent with, the approach set out in national policy on the preparation of Local Development Plans. Put simply the requirements of the legislation mean that the following needs to be taken into account when considering a proposal:

- Whether the proposal meets the requirements of policies within the Development Plan; and

- Weigh up all the other planning considerations to see whether they outweigh the conclusion of the Development Plan.

1.4. The Pembrokeshire Coast National Park Authority published the original 2013 document as draft Supplementary Planning Guidance and subjected it to consultation. The guidance was adopted as Supplementary Planning Guidance to the Pembrokeshire Coast National Park Local Development Plan, by the National Park Authority, on the 11th December 2013. A report of consultations detailing how the guidance was consulted for Local Development Plan 1 upon is available to view on the Authority's website. The guidance was then rolled over to be effective for development management purposes for the Pembrokeshire Coast National Park Local Development Plan 2 from the date of Plan adoption. This document will when adopted following consultation replace the rolled over guidance.

1.5. Pembrokeshire County Council referred to the original document as Good Practice Guidance in the Renewable Energy SPG prepared by (October 2016). Carmarthenshire County Council referenced the document in its Wind and Solar Energy SPG (June 2019).

1.6. This document focuses on cumulative impact issues and should be read in conjunction with other national and Local Development Plan policies and guidance on landscape, seascape and visual impact assessment (LVIA). It is structured so that the background context and objectives are set out in **Part A** (Sections 1-5) and **Appendix A**- Section 9 and the step by step guide, tools and checklists set out in **Part B** (Sections 6-8).

Environmental Impact Assessment requirements in relation to cumulative effects

1.7. Cumulative impact assessment is set within the framework of Environmental Impact Assessment (EIA). This is an evidence-based procedure which sets out the likely significant effects of a proposed development on the environment so they can be taken into account in the planning process. The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[1], consolidate previous regulations and set out the current requirements. These may be refined as circumstances change post-Brexit and so the most up-to-date regulations should be referred to.

1.8. Currently, EIA may be required for development falling under Schedule 2 of the Regulations. The threshold for wind turbine developments is more than 2 turbines or where the hub height of any turbine or any other structure exceeds 15 metres (3 (i)).

1.9. For development proposals which meet or exceed these criteria or threshold, or located within a sensitive area (as understood in the Regulations), the local planning authority will provide a 'screening opinion', where requested, based on whether the development may give rise to significant environmental effects. Schedule 3 selection criteria for screening Schedule 2 developments states that:

'The characteristics of development must be considered having regard, in particular, to-

a) the size and design of the development

b) the cumulation with other existing development and/or approve development

.....'

1.10. If a proposed development requires an Environmental Impact Assessment, then Schedule 4, Part 5 of the EIA Regulations states that information provided should include description of the likely significant effects of the development resulting from the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources. These should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.

[1] SI No. 2017 No 567

Definition of cumulative impact

1.11. For the purposes of this guidance the following definition of cumulative impacts, first used by Scottish Natural Heritage (SNH)[2] , applies:

'the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together.' (paragraph 7)

1.12. An assessment of *both* combined and additional effects will be required from the developer where a cumulative landscape and visual impact assessment (CLVIA) is considered necessary. The reason for this is that the within the broader context of national policy[3], the Local Planning Authorities consider that the landscapes and seascapes of Pembrokeshire and Carmarthenshire have a range of thresholds of acceptable change for wind energy development beyond which further development would be inappropriate in landscape and visual terms. The developer is therefore required to provide sufficient information to enable the Local Planning Authorities to decide if this threshold has been reached in a given area.

1.13. Factors that contribute to the cumulative impact of wind turbine development on landscape and visual amenity include:

- The distance between individual wind turbine developments
- The distance and area over which they are intervisible
- The siting, design and size of wind turbines and wind farms themselves
- The overall character of the landscape and its sensitivity to wind turbine development
- The way in which landscape is experienced.

When will a cumulative assessment will be needed?

1.14. Cumulative scoping assessments should be carried out where the proposed wind turbine development may be seen in conjunction with other wind turbine developments. These developments will include (most importantly) existing, under construction and consented wind turbines and also those 'in planning' i.e. at planning application stage.

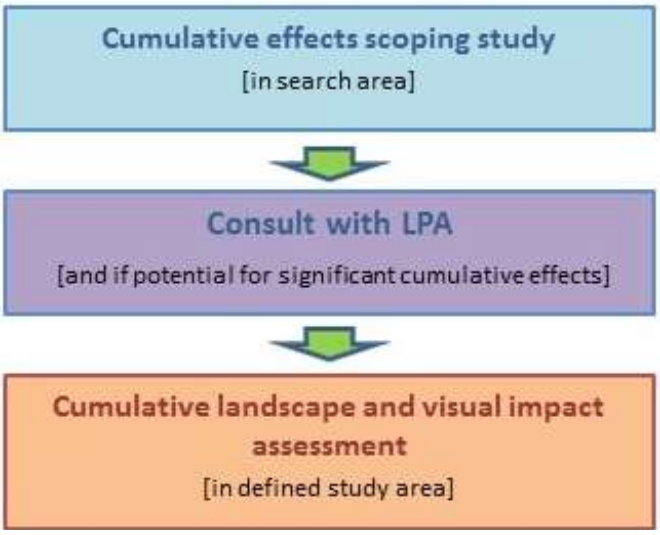
1.15. Detailed cumulative impact assessments are only required where it is considered that the proposal could result in *significant* cumulative impact which could affect the eventual planning decision. The scale and complexity of assessments should be proportionate to the impacts (Scottish Natural Heritage cumulative impact guidance[2] paragraph 56).

1.16. These requirements are summarised in **Figure 1** and set out in more detail in **Figure 5.**

[2] 'Assessing the Cumulative Impact of Onshore Wind Energy Developments', Scottish Natural Heritage, March 2012

[3] Planning Policy Wales 11 and Future Wales: The National Plan 2040

Figure 1 Outline of process



1.17. Whilst the threshold for requiring EIA is turbines above 15m high to hub (as defined in **1.5**) this does not mean that cumulative effects involving turbines at or below 15m to hub will not occur. In respect of this size of turbine, cumulative effects will need to be addressed in documents supporting the planning application taking note of the principles and objectives in this SPG. They should also be taken into account where they are located in the search or study area in a CLVIA for a larger wind turbine development. In both cases, the level of detail should be proportionate. More detail of what information would be required can be found in **Table 5**.

Functional objectives of the guidance

1.18. The guidelines are intended to:

- Set out the emerging cumulative impact issues in Pembrokeshire and Carmarthenshire (**Section 2**).
- Set out clear objectives to accommodate onshore wind energy avoiding significant cumulative impact (**Section 2**).
- Set out guidelines as to what information and assessment is required for wind turbine developments of different sizes (**Sections 3-8**).
- Work within national and local planning policy and complement existing guidance (**Appendix A**).
- Reflect good CLVIA practice (**Appendices B and C**).

Planning Context

1.19. The current planning context relating to onshore wind energy is set out in **Appendix A.** This may change over time and it is recommended that Welsh

Government and Local Planning Authorities websites are checked and officers are contacted to ensure that up to date policies and guidance are noted. The policies must be fully taken into account in locating, designing and assessing wind energy developments and this guidance is intended to complement and support these policies in respect of cumulative impacts.

1.20. There are a number of relevant general policies but key documents and policies include:

- Planning Policy Wales Edition 11 February 2021 (PPW)- Section 5.7.
- Future Wales: The National Plan 2040- Policies 17 and 18.
- Pembrokeshire Coast National Park Local Development Plan 2 (LDP) Policies especially Policy 8 Special Qualities, Policy 14 Conservation of the Pembrokeshire Coast National Park and Policy 33 Renewable and Low Carbon Energy, Renewable Energy Interim SPG for LDP 2 and Landscape Character Interim SPG for LDP 2 and Seascape Interim Supplementary Planning Guidance.
- Carmarthenshire Local Development Plan policies especially Policy RE 1 Large Scale Wind Power and Policy RE 2 Local, community and small wind farms. For the emerging LDP 2018 – 2033, the relevant policies include strategic policy SP 15: Climate Change, Policy CCH 1: Renewable Energy and BHE2: Landscape Character.
- Pembrokeshire Local Development Plan policies, especially GN.1 General Development Policy, GN.4 Resource Efficiency and Renewable and Low-carbon Energy Proposals and strategic policy SP 1 Sustainable Development and 2 Port and Energy Related Development. For the emerging LDP 2 it is GN.1 General Development Policy, GN.4 Resource Efficiency and Renewable and Low-carbon Energy Proposals and GN.5 Renewable Energy - target and allocations and SP.12 Port and Energy Related Development.

Consulting Local Planning Authorities

1.21. Discussions between prospective developers and relevant Local Planning Authorities is encouraged at the pre-application and pre-validation stage. There may be a need to consult more than one authority where the scoping search area crosses borders. This guidance will provide the framework for those discussions on cumulative landscape, seascape and visual issues.

1.22. It is accepted that many experienced cumulative impact assessors will follow their own methods which will be refined and improved over time and so this guidance is not intended to be prescriptive in all respects. However, it does express the concerns of the Local Planning Authorities and will be used as a yardstick with which planning officers will judge the adequacy and conclusions of CLVIAs. Any major deviation should be justified by the relevant consultant.

2. Assessing cumulative impacts- issues and objectives

Landscape overview

2.1. Pembrokeshire and Carmarthenshire display a wide range of landscape and seascape character types. The area forms the exposed south western peninsula of Wales with a long and varied coastline with superb seascapes, some with long views to islands and to the Gower. The land mass is penetrated by two major water bodies- Milford Haven and the Daugleddau to the west and the Tywi and Taf valleys with their confluence and estuary running into Carmarthen Bay to the east. The Teifi valley defines the northern boundaries of the counties running into Cardigan Bay. Inland there are a number of prominent hills- the Preselis to the west, Black Mountain to the east and the south western tip of the Cambrians to the north east. Between the hills and coast there are a range of mainly tranquil pastoral rural landscapes on lower hills and plateau incised with smaller valleys.

2.2. The settlement pattern is mainly dispersed and rural. There are numerous historical settlements and features such as castles, forts and religious sites. The main settlements are linked by a few A roads linking the ports, ferries, energy complexes and tourist destinations to the west with Swansea, Cardiff and London. These routes are used by residents, commercial and tourist/visitor traffic. Power lines run from major users and providers such as from Pembroke Power Station on Milford Haven east along a route set back from the south coast.

Designations

2.3. There are a number of designated landscapes which need to be considered. Within the area, Pembrokeshire Coast National Park along with the Heritage Coast covers the most spectacular coastlines and their related hinterland, the distinctive Preseli Hills and the ria of the Daugleddau. Outside the area to the east, there is the Brecon Beacons National Park massif and, to the south east across the Loughor estuary, the Gower Area of Outstanding Natural Beauty (AONB).

2.4. There are a number of registered Landscapes of Historic Interest including the Milford Haven waterway, St David's Peninsula and Ramsey Island, Tywi valley, Taf and Tywi estuary, Skomer Island, and Black Mountain and Mynydd Myddfai which are classified as outstanding and the Lower Teifi valley, Drefach and Felindre, Newport and Carningli, Pen Caer (Strumble Head), Stackpole Warren and Manorbier which are in the special category.

2.5. In Carmarthenshire there are a series of Special Landscape Areas (SLAs) which include: Tywi Valley, Mynydd Llanllwni, Cothi Valley, Mynydd Pencarreg, North-eastern Uplands, The Carmarthen Bay Coastal Area, Cych Valley, Teifi Valley, Inland cliffs, Afon Morlais Valley, Afon Lliedi Valley, V-shaped valley north of Pwll, Loughor Valley, Coastal plain (east) and the Coastal Plain (salt marsh, sand dunes, beach and mudflats).

Generic wind turbine scale

2.6. Figures 2 and 3 illustrate turbine sizes which are constructed or may come forward in planning applications in the area in relation to other features.

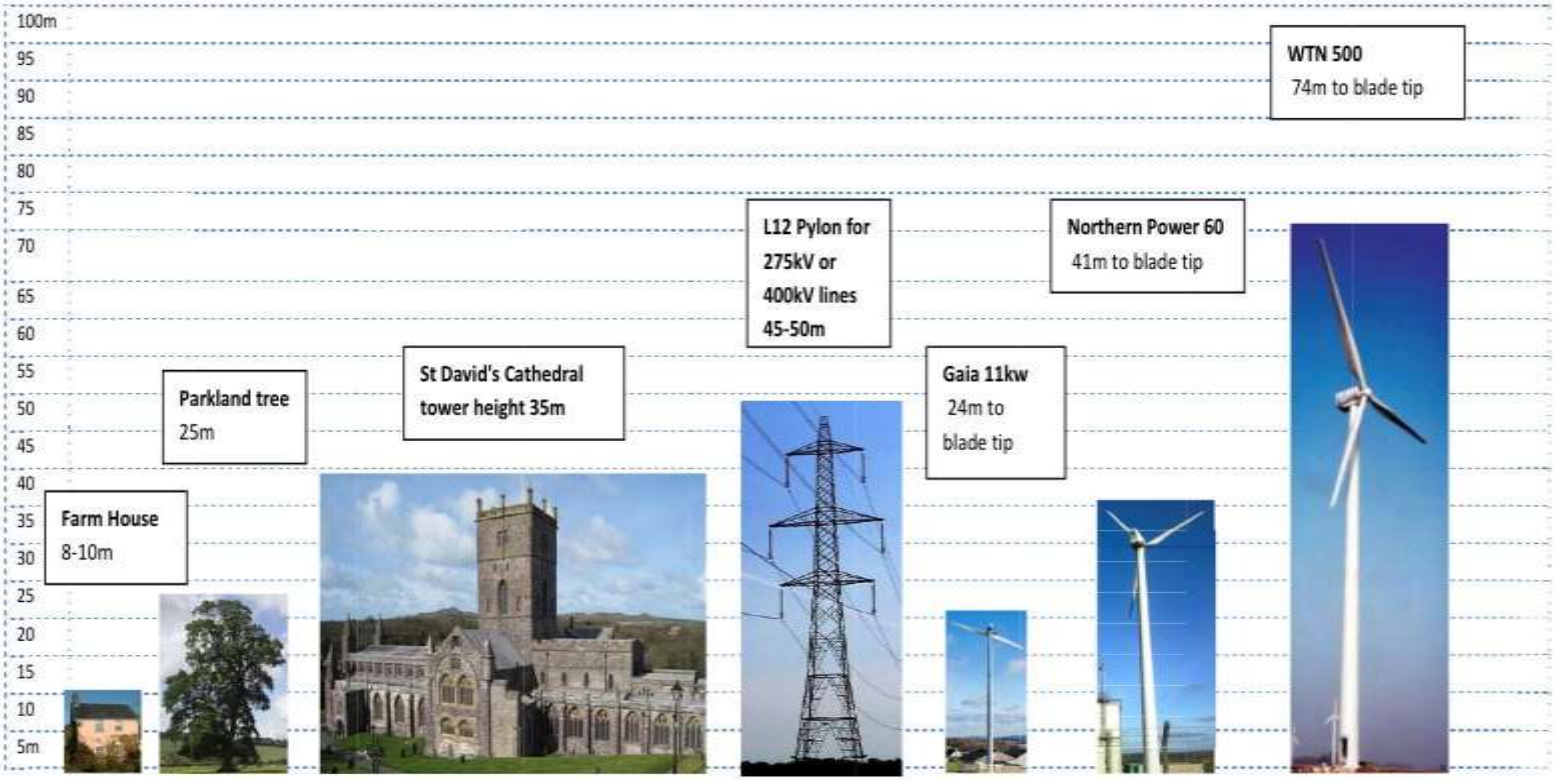


Figure 2: Turbine types and size comparison - small to medium sized turbines

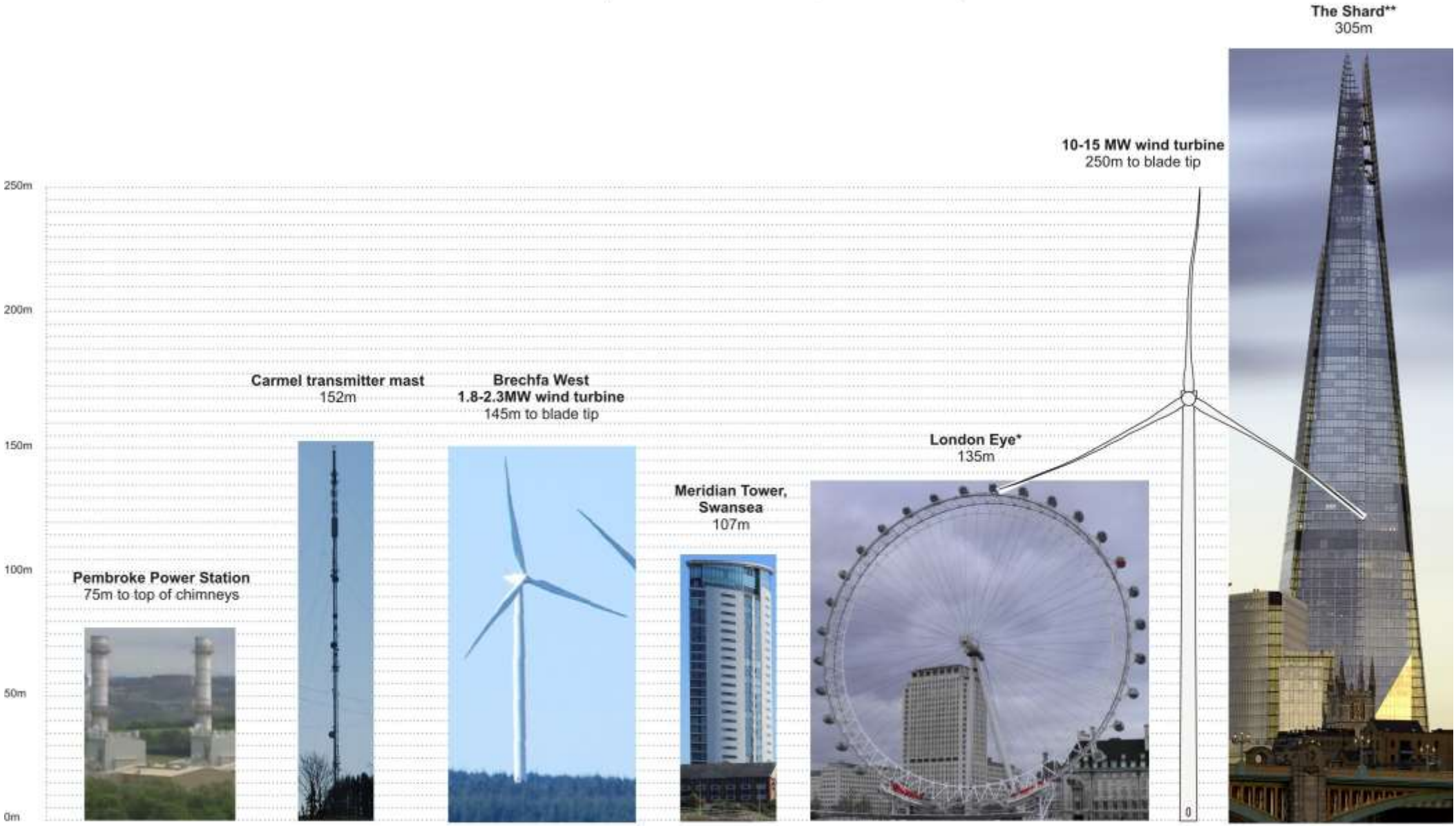


Figure 3: Turbine types and size comparison- large and very large sized turbines

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Cumulative development issues

2.7. Wind turbine development has the potential to cause cumulative effects. These are discussed below.

2.8. Where a number of small and medium sized turbines are proposed in rural parts of the area they may have limited landscape and visual effects on their own but together they may start to have significant cumulative effects on landscape character as well as on visual amenity, particularly in sensitive areas such as the National Park.

Photo 1: More turbines particularly at a larger scale may significantly change landscape character *(R.James, PCNPA)*

2.9. The incremental increase of turbines between and close to the Milford Haven large scale refineries, oil and gas storage and settlements with associated chimney stacks and pylons is potentially leading to a cluttered landscape/seascape of vertical elements.

Photo 2: Some areas appear to have reached capacity with awkward juxtapositions of turbines and clutter with other vertical elements and different size turbines.

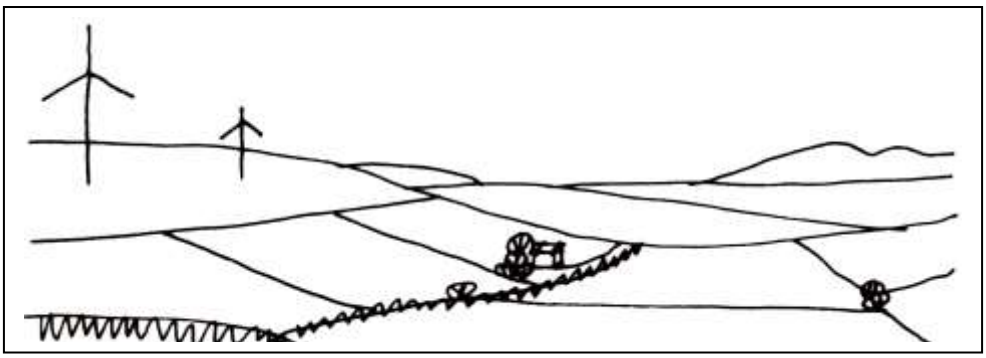
2.10. Development around Brechfa Forest may have significant cumulative effects on settlements in future.

Photo 3: More turbines around the settlement may cumulatively affect residents' amenity

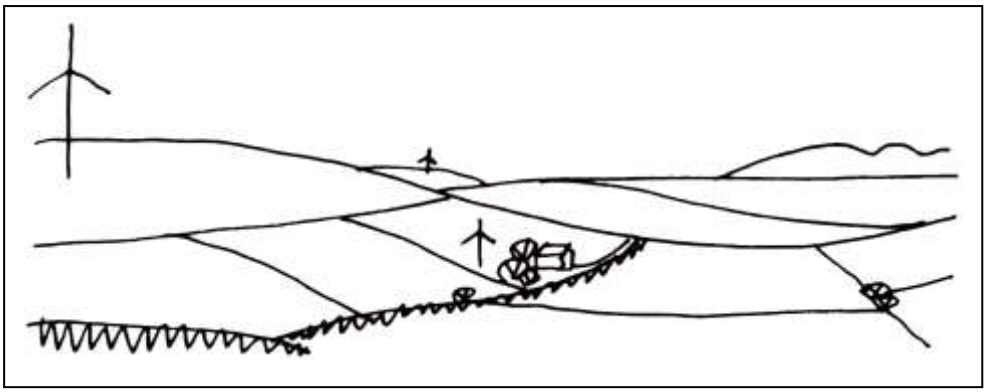
2.11. Some wind turbine developments and applications are located close to power lines. There is potential for 'cumulative' effects with the pylons.

Photo 4: Turbines closer to the background pylons may cumulatively affect landscape character *(R.James, PCNPA)*

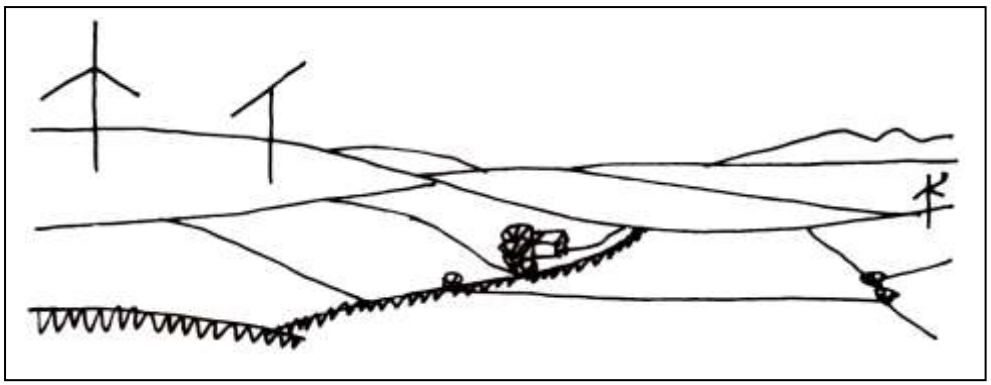
2.12. The great variety of turbines sizes, design or their layout close to each other has the potential to cause visual conflict, confusion and/or complexity as already noted above. The following diagrams further illustrate *some* of the potential issues.



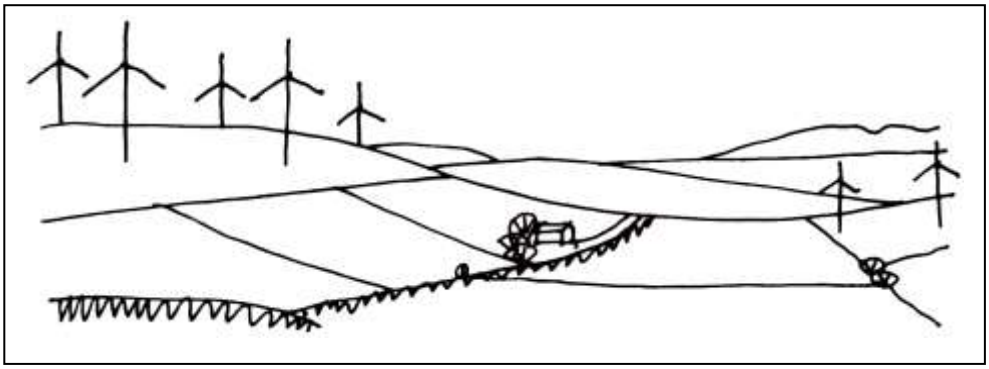
Sketch 1: Difference in turbine sizes can be visually confusing in some situations- the small turbine appears to distort perspective by being closer. Also blades turn at different speeds which can lead to an unsettling image.



Sketch 2: Difference in turbine sizes can make sense in other situations e.g. the close relationship of the smaller turbine with a dwelling and the larger turbine in open country away from settlement



Sketch 3: Different turbine designs can lead to visual conflict/uncoordinated movement of blades



Sketch 4: Turbines on two sides of dwellings could lead to significant adverse cumulative effect

2.13. In order to address these issues a number of objectives have been drawn up, while providing a positive framework for onshore wind energy.

Key Objectives

2.14. The key objectives are:

- To maintain the integrity and quality of landscape character within the National Park:

  -that is no significant adverse cumulative change to its , special qualities and sensitive characteristics from wind turbine developments. The threshold for acceptable change in these areas is likely to be low.

- In other landscapes outside the pre-assessed areas, to provide a positive framework for wind energy and accept some landscape change providing:

  - that there is no unacceptable adverse cumulative impact on the surrounding landscape, particularly the setting of the National Park(s) and AONB. Unacceptable impact here is taken to mean where wind turbines significantly[4] adversely affect the purposes or special qualities of the designated areas and/or become a dominant or key characteristic of a landscape, depending on its sensitivity, which shall be defined by the assessment.

  - that there is no unacceptable adverse cumulative impact on nearby communities and individual dwellings.

- Within the pre-assessed areas, to provide a positive framework for wind energy and to accept landscape change:

  - that is significant change in the landscape character from wind turbine development subject to no unacceptable adverse cumulative impact on the environment and on nearby communities and individual dwellings.

  - National Plan Policy 17 makes the assumption that appropriate development in these areas will not have an unacceptable impact on National Parks and AONBs based on national strategic analysis.

- To avoid development creating significant cumulative adverse impacts on sensitive receptors

  - this includes residents, users of recreational/tourism features such as the Wales/Pembrokeshire Coast Path and heritage features.

- To avoid development which, in combination, creates the experience of a settlement[5] being surrounded by easily visible wind turbines on two or more sides.

- To locate, design and lay out developments which respond to their

[4] numerous adverse effects that fall below the Environmental Impact Assessment threshold of significance, can conflict with the purposes of a national designated landscape and undermine the special qualities.

[5] To be read as a settlement in general terms, not as specifically defined in the Development Plans.

context and other developments to avoid significant cumulative effects. For example, to maintain distinct separation between developments and to avoid turbines of markedly different designs or scales being located near to, or viewed in juxtaposition with, each other.

- To avoid significant adverse effects when viewed in conjunction with other types of development such as pylons, stacks and masts and solar energy.

3. Assessing cumulative landscape impacts

The landscape resource and LANDMAP

3.1. The underpinning landscape information for both Pembrokeshire and Carmarthenshire is LANDMAP. LANDMAP is structured into five spatial datasets- Geological Landscape, Landscape Habitats, Visual & Sensory, Historic Landscape and Cultural Landscape Services. Natural Resource Wales states that as LANDMAP is the formally adopted methodology for landscape assessment in Wales all landscape work and assessments of the effects arising from a proposals impact on the landscape in Wales should include LANDMAP. Natural Resources Wales Guidance Note 46 defines how LVIAs for developments, including wind energy, should take LANDMAP into consideration.

3.2. **In Pembrokeshire Coast National Park,** a landscape character assessment has been undertaken based on LANDMAP bringing the aspect areas together in a series of 28 landscape character areas. Sensitivity to wind turbine development has been attributed to these areas by a further study. Both studies are SPG. This information should be used as the landscape baseline within the National Park for studies which include the National Park in their study area.

3.3. In Pembrokeshire County, a Renewable Energy SPG has been prepared which refers to the use of LANDMAP. Subsequently, a draft landscape character assessment has been completed which is intended as a draft SPG for LDP 1 and should be used as the landscape baseline. A Renewable Energy Assessment has been prepared to support LDP 2.

3.4. In Carmarthenshire County, a Wind and Solar Energy SPG has been prepared which refers to the wind turbine development landscape sensitivity and capacity study based on landscape units and types- this will directly inform assessments.

3.5. In the above assessments LANDMAP is recommended or used as the landscape baseline to derive landscape character areas or similar units. LVIAs should attribute sensitivity to an appropriate scale of areas using the baseline assessments as context. Landscape sensitivity assessment guidance6 indicates how to undertake this process. Guidelines for Landscape and Visual Impact Assessment7 (GLVIA 3) indicate that sensitivity is derived from combining the susceptibility of the receptor to the type and scale of development combined with the value of the receptor. Value can be derived from LANDMAP and other sources e.g. designations, assessments of qualities-see GLVIA 3 Box 5.1.

3.6. The most sensitive landscapes in broad terms are likely to be designated areas such as the National Parks, Area of Outstanding Natural Beauty and their environs, Registered Historic Landscapes and Special Landscape Areas. However, there will be a variation in sensitivity within these designated areas and outside. Certain landscape patterns and features

[6] An Approach to Landscape Sensitivity, Natural England, 2019.

[7] Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment (IEMA), 2013.

can be susceptible to wind turbine development, such as prominent or complex skylines and settings of historic features. It should be noted that planning policy in Pembrokeshire does not include Special Landscape Areas, but this does not mean that the landscape is less locally valued or sensitive. Overall, it is accepted as a principle that some areas will be able to accommodate more wind turbine development than others.

Types of cumulative landscape effect

3.7. Two types of cumulative landscape effects can occur. The first are the direct effects on the physical fabric of the landscape i.e. where a number of different turbine developments, including road modifications, track access and ancillary development, remove or damage a series of landscape components such as trees, hedgerows or hedgebanks. The second effect is on landscape character, where two or more developments introduce new features into a landscape. The effect may be to change the landscape character to the extent that it becomes a different landscape character type.

3.8. A combined cumulative landscape effect is a measure of whether the proposed development combined with other wind turbine developments significantly change the character of a landscape. The effective baseline for this is the receiving landscape *without turbines*. As such, this differs from the assessment of the individual effects of the proposed development which takes on board existing development as part of the baseline. An additional cumulative landscape effect is a measure of how much the proposal contributes to that overall effect. This is most helpful when defined against the existing and approved turbine developments, excluding other proposals. In some cases, other developments in planning may have more potential cumulative effects and this may be mentioned in the cumulative assessment.

3.9. A further tool for use in defining combined landscape effects is an examination of the current landscape character of the area with regard to existing turbines and how this may change with the addition of the proposal. The status of landscape character areas in respect of wind turbine development with the possibly preferred status is described below in **Table 1** and illustrated in **Figure 4**. **Table 2** shows how these apply to areas of different national wind energy planning status.

Table 1 Landscape types with regard to wind turbine development- descriptions

	Landscape type/status	Description/Comments	Location within study area
1	Landscape character area with no wind turbines	No turbines within an area and not visible except at a distance where they are very small or inconspicuous.	This would be the status and objective in sensitive parts of the study area including most parts of Pembrokeshire Coast National Park, coast and possibly Special Landscape Areas.
2	Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s	Turbines are visible but are not at a scale, number, spacing or extent that makes them a defining/key characteristic. Turbines might be seen occasionally at close quarters but more often within background views. The scale of turbine is likely to be small or medium at most.	This is the 'maximum' status for the Pembrokeshire Coast National Park and areas within it and Brecon Beacons National Park and Gower AONB settings. This may also be appropriate for other higher sensitivity areas outside the designations.*
3	Landscape character area with wind turbines	Turbines are located and visible and are at a scale and/or a spacing that makes them *one* of the defining/key characteristics. Turbines might be seen in the foreground, mid-ground or background. However, there would be other key characteristics which would be strong and there would be sufficient separation between turbines for views without turbines and other characteristics remaining dominant in these parts of the area. The scale of turbine will be appropriate to the scale of landscape.	This status would apply to areas outside the National Parks and AONB and away from their settings and with lower or moderate sensitivity. This may be applicable to parts of the national pre-assessed area where a series of constraints may still apply. *
4	Wind turbine landscape	Turbines are frequent and may include extensive wind farms and are the dominant, defining characteristic but there is separation between groups of turbines. However, within these areas wind turbines are likely to be visible. The scale of turbine will be appropriate to the scale of landscape.	This status may be applicable to parts of the national pre-assessed area where there are limited constraints.*
5	Windfarm	Landscape fully developed as a wind farm with no clear separation between groups of turbines. The scale of turbine will be appropriate to the scale of landscape.	Windfarm locations e.g. Brechfa Forest West and Alltwalis.

***** Local renewable energy landscape sensitivity guidance will be useful in defining what may be appropriate levels of development.

3.10. If in combination with other turbines, a proposed turbine or wind farm changes the landscape from one category above to another then there may be a significant *combined* cumulative *landscape* effect. The

significance depends on whether the landscape can accommodate wind turbine development or not in terms of its characteristics and sensitivity.

Figure 4 Landscape types with regard to wind turbine development

(note these are diagrammatic examples only)

1 Landscape character area with no wind turbines

2 Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s

3 Landscape character area with wind turbines

4 Wind turbine landscape

5 Windfarm

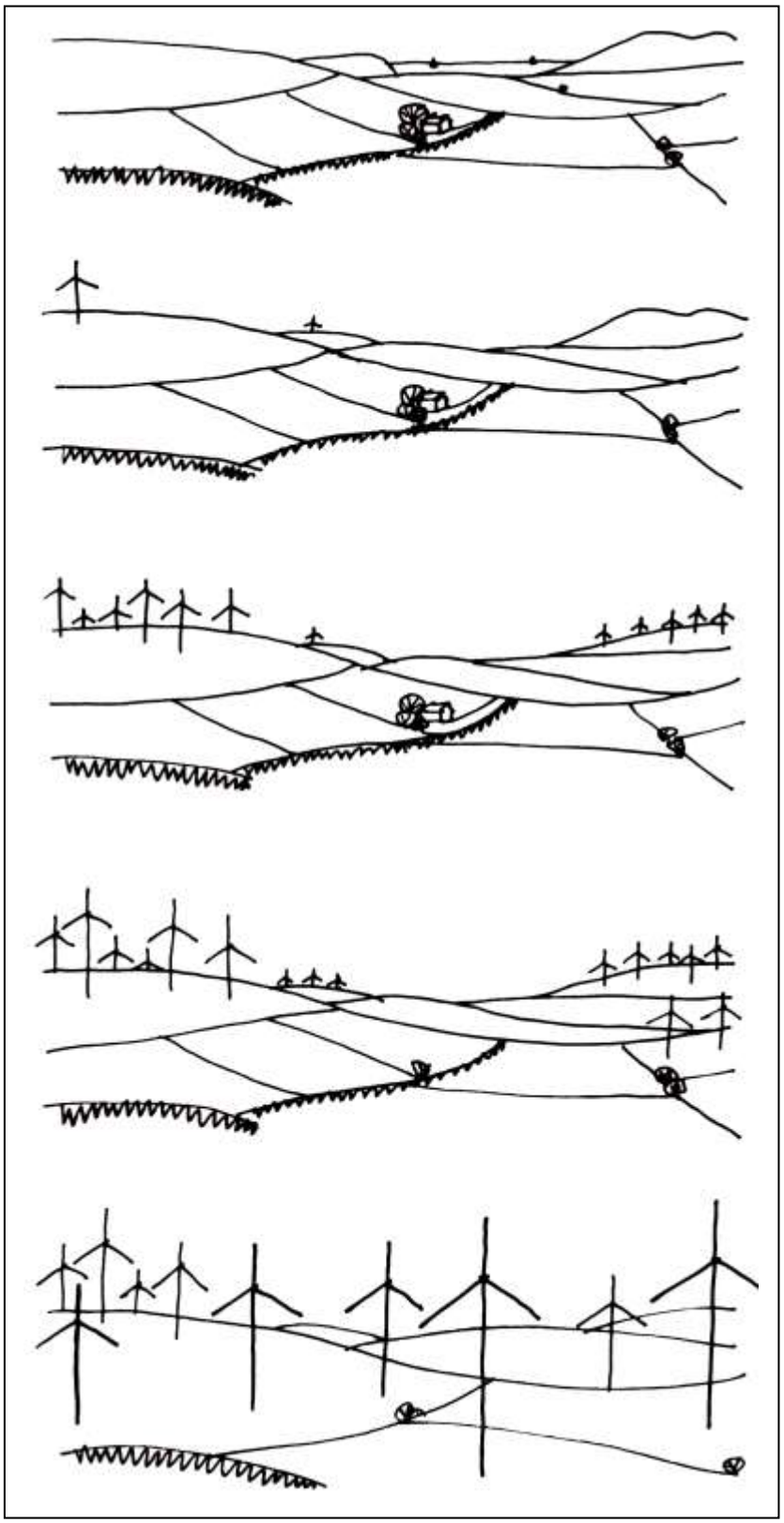


Table 2 Relationship of landscape types with national wind energy policy status

National wind energy policy status	Relevant landscape types
National Parks and AONBs	1,2
Pre-assessed areas	3,4,5
Other areas	2,3, occasional 5

Description and assessment of effects

3.11. The description and assessment of the effects should be separated into direct physical effects and landscape character effects. Both should be divided into combined and additional effects. For larger developments and/or those in or near sensitive areas the level of detail required is likely to be higher than for small-scale developments. There may be a need for addressing the effects of different scenarios either separating effects with existing and consented turbines (which is the most important and useful) from effects with proposed turbines. Alternatively, an assessment may examine effects of a proposal combined with different groups of turbines. A commentary on whether the proposed development would change the status of the landscape type in which it lies would be helpful. The effects can be described by use of tables and/or text depending on the size and complexity of the assessment.

3.12. When proposals are located in or near designated landscapes the cumulative effects on the individual special qualities of those areas should be assessed, with overall conclusions. In the case of Pembrokeshire Coast National Park these are well-defined (see **Appendix A, 9.18**). In other areas, the special qualities may need to be defined as part of the landscape assessment process.

4. Assessing cumulative impacts on visual amenity

Types of cumulative impact

4.1. There are three main types of cumulative visual effect:

- In combination from one (static) viewpoint i.e. where more than one development can be seen within the observer's arc of vision at the same time.
- In succession from one (static) viewpoint i.e. where the viewer has to turn to see a number of developments around them.
- Sequential effects on a journey i.e. where more than one wind turbine development can be seen one after the other over a period of time by an observer moving through the landscape.

Types of sensitive visual receptor

4.2. The sensitivity of a visual receptor (i.e. a person) will be determined by the activity and expectation of the receptor, the location, context and importance of the viewpoint, and the number of receptors. Examples of sensitive receptors are set out in **Table 3** (note that this is not intended as comprehensive).

Table 3 Potential sensitive receptors

Static receptors	• Visitors to viewpoints such as hilltops or headlands or scenic viewpoint accessible by car. • Visitors to heritage features such as castles or forts, parks and gardens or listed buildings. • Receptors located in sensitive areas such as the Pembrokeshire Coast or Brecon Beacons National Parks, Heritage Coast and on open access land. • Residents in dwellings whether on the edge of a settlement or located in open countryside.
Receptors that may undergo sequential effects	• Users of the Wales/Pembrokeshire Coast Path, other footpaths such as the Landsker promoted trail. • Users of the National Cycle route. • Users of footpaths and bridleways. • Users of scenic routes or roads used by tourists. • Recreational sea users such as leisure sailors.

4.3. GLVIA 3[8] gives further details on identifying receptors.

[8] Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment (IEMA), 2013.

Description and assessment of effects

4.4. The assessment of the cumulative effects should be informed by a series of assessments from representative and/or worst-case viewpoints. These should consider both combined and additional effects. The magnitude of cumulative change will depend on the landscape context in which the development is viewed and the scale, nature, duration and frequency of combined or sequential views. For larger developments and/or those in or near sensitive areas the level of detail required will be higher than for small-scale developments. There may be a need for addressing the effects of different scenarios either separating assessment with existing and consented turbines (the most important and useful) from assessing proposed turbines. Alternatively, it may be appropriate to examine effects of a proposal combined with different groups of turbines. The effects can be described by use of tables and/or text depending on the size and complexity of the assessment.

5. Relationship between onshore and offshore developments

5.1. Whilst it is recognized that the vast majority of cumulative effects that will occur will be between onshore wind turbine developments, the interaction between onshore and offshore wind turbines should also be addressed where applicable.

Nature of offshore developments

5.2. Offshore windfarms tend to be very large and some distance offshore.

Information available

5.3. A national seascape assessment[9] has been undertaken which identifies and describes the character of different areas of seascape. For each seascape area, land that is intervisible with the sea is mapped, with different levels of intensity. This should be used initially to establish the relationship between the proposed development and the sea.

5.4. The sensitivity of seascape to offshore wind farm development is considered in a linked series of reports[10], also available from the NRW website. These set out the sensitivities which are related in particular to designated areas such as the Pembrokeshire Coast and Gower AONB. This has relevance in terms of the level of sensitivity and the distance over which that sensitivity applies.

5.5. There are local seascape character assessments for the Pembrokeshire Coast National Park and Carmarthen Bay/Gower. These set out the character and sensitivities of local seascape character areas. They are available either as Supplementary Planning Guidance in the case of the National Park study or as a background document in relation to Carmarthenshire.

Approach

5.6. If the proposal is intervisible with an area of sea or coast along with another terrestrial wind energy development and/or offshore renewable energy development, the cumulative effects on regional or local seascape character area/s should be identified depending on the scale of development, taking into account the NRW contextual studies.

5.7. Viewpoints should be selected in representative, sensitive and/or worse case locations taking account of the particular sensitivity of the coastline and seascape and various receptors. These should be located in all the relevant local seascape character areas in the defined study area. Wirelines and/or photomontages should illustrate the wind turbines along with offshore wind turbines. An assessment of the effects should be made from each of these and then used to inform judgements on landscape, seascape and visual cumulative effects.

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[9] National Seascape Assessment for Wales, NRW Evidence Report No 80, November 2015.

[10] Seascape and visual sensitivity to offshore wind farms in Wales: Strategic assessment and guidance. Stages 1-3. NRW Evidence Report No: 315, Natural Resources Wales, 2019.

6. Cumulative effects with other types of development

6.1. Current good practice guidance focuses on the cumulative effects with developments of the same type i.e. wind turbines. However, there may be a case in some areas to consider the potential for potential significant cumulative effects with other non-energy developments. For example, a dwelling with a large chimney or pylon on one side and a proposed wind turbine on the other may undergo a significant cumulative effect. Similarly the juxtaposition of the two elements may change or dominate the landscape character of the area. In terms of the standard GLVIA method, the chimneys or pylons will form part of the baseline landscape character i.e. a landscape with large modern vertical elements. As such, the introduction of further vertical elements such as wind turbines might be argued to be 'in character' with the baseline landscape. This may be the case but needs to be tested against the following questions:

- Does the proposed development 'fit' in terms of scale, layout and design so its composition respects the pattern of landscape as well as the other vertical elements, without causing visual conflict or confusion?
- Does the proposed development in combination with other developments change the character of the landscape to become a key or the dominant characteristic?
- Would the effects on a visual receptor become significantly adverse with the addition of a wind turbine taking into account the existing effect of the existing development such as the chimney or pylon?

6.2. The recommended approach is that the interaction between the proposed development and other types of development should be identified and described with the likely effects on both landscape character and visual receptors defined. Photomontages may be helpful to illustrate this interaction in some cases but it is unlikely to be necessary to use ZTVs.

B

STEP BY STEP GUIDE

TOOLS

CHECKLIST

7. Step by step guide

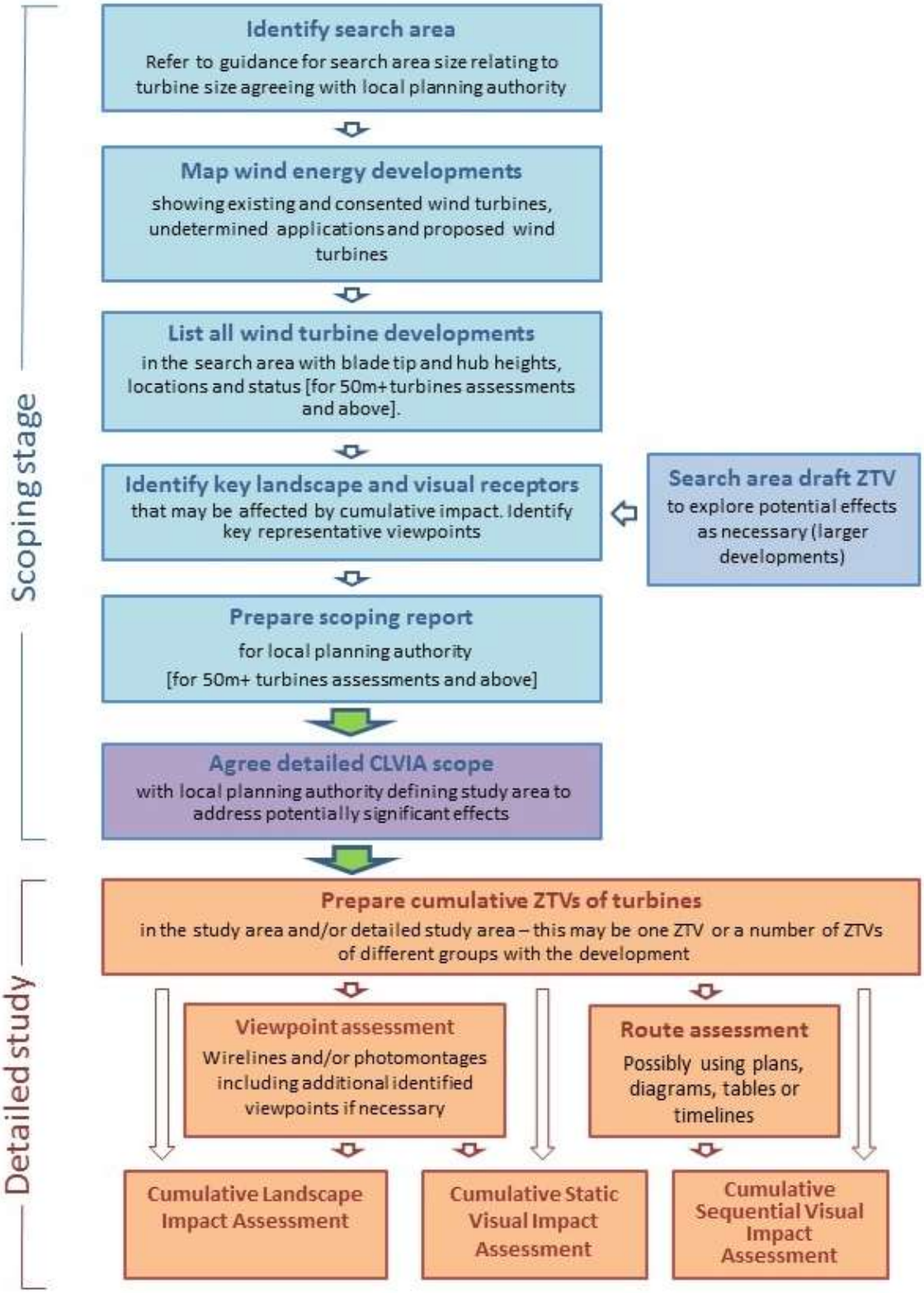
7.1. A two stage process is recommended for carrying out a CLVIA for small and medium-sized developments. The rationale for this is to understand what is important, to take this into account and mitigate appropriately, to focus on determining potentially significant cumulative effects and demonstrate that this process has been followed. It is understood that some developments may not justify time consuming and expensive cumulative assessments techniques. The scoping stage will be a simple method of demonstrating to the Local Planning Authority what level of detail is needed before further detailed work.

7.2. Larger developments will go through the scoping stage and will require a full CLVIA using Zones of Theoretical Visibility (ZTVs), wirelines and possibly photomontages in line with current Landscape Institute guidance[11].

7.3. **Figure 5** sets out the process.

[11] Visual Representation of Development Proposals: Technical Guidance Note 06/19, Landscape Institute, September 2019.

Figure 5 Flow chart of process



8. Tools

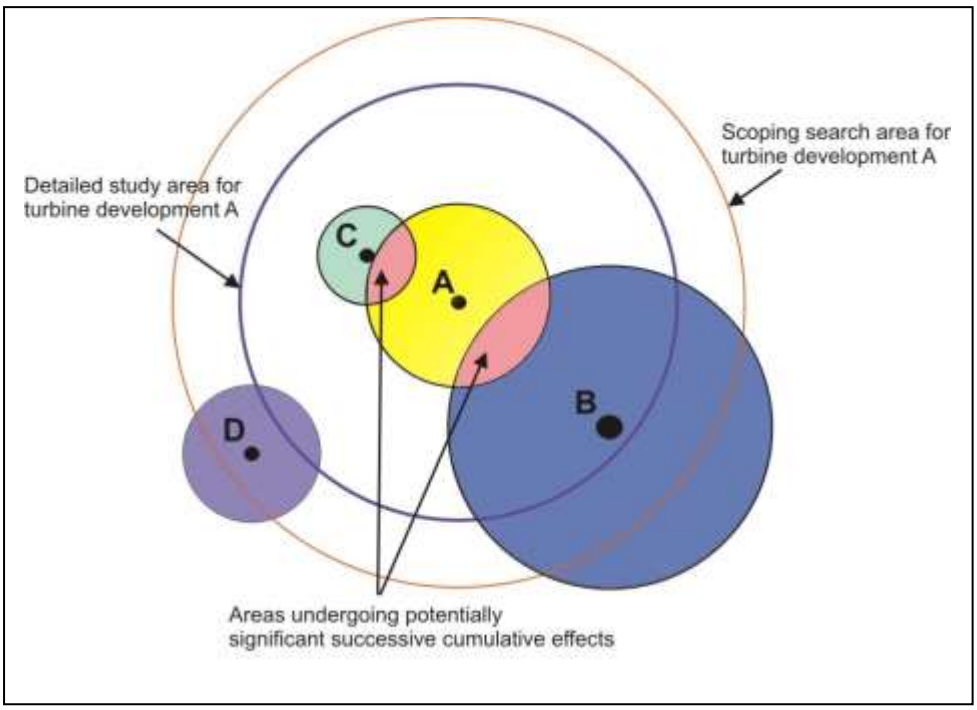
Overview

8.1. The key guidance on wind turbine development LVIAs and CLVIAs is set out in **Appendix B**. This includes GLVIA and Nature Scot/Scottish Natural Heritage guidance on assessing the cumulative impact of wind energy developments[12] and visual representation of wind farms[13]. This guidance is taken as read in the context of this document which is intended to refine, expand and be more specific on key cumulative impact issues.

Two stage process- Scoping and Detailed cumulative impact assessment

8.2. The two stage process is recommended to ensure that all relevant turbine developments and key receptors are taken into account in a broad search area before focusing on a detailed study area where significant cumulative effects may occur. The rationale for the scoping areas is set out in **Figure 6**. The relevant scoping study areas are set out in **Table 4.**

Figure 6 Diagrammatic Scoping and Study areas



Note: the size of the circles are diagrammatic and not necessarily proportional.

8.3. **Figure 6** illustrates a highly simplified scoping and defined study areas for turbine development A which is surrounded by turbine developments B to D. The scoping process finds that there are potentially significant effects

[12] Assessing the cumulative impact of onshore wind energy developments, March Scottish Natural Heritage, March 2012.

[13] Visual Representation of Windfarms: Good Practice Guidance, Version 2.2, Scottish Natural Heritage, February 2017.

between developments A, B and C but not between A and D.

Table 4: Recommended areas for cumulative assessment of onshore wind farms search and study

Proposed Turbine/s height to blade tip (m)	Scoping search area/ broad study area (km radius)	Detailed study area (km radius)
<25	5km	2.5km
26 to 49	15km	7.5km
50 to 79	20km	10km
80 to 108	25km	12.5km
109 to 145	30km	15km
146 to 175	40km	20km*
175 to 225	50km	25km*
225 to 300	60km	35km*

* There may also be a need to present clear additional ZTVs on more detailed map bases to underpin assessment of cumulative effects in areas close to the development- say within 5-10km.

8.4. As demonstrated above, there could be a significant difference between the scoping study areas and the detailed study areas, especially for smaller developments. The reason is that if there are no larger turbine developments or sensitive receptors within a given development's scoping search area then cumulative impacts are likely to be more limited in extent. It should be noted that effects on landscape character are likely to cover a smaller geographic area than visual effects (see NRW LANDMAP LVIA guidance (2021)).

8.5. It may also be that a study area will be effectively asymmetric in order to take in particularly sensitive receptors at longer distances in particular directions. Practically, it is accepted that study areas are circular and the effects on these types of receptors will be assessed while others of limited sensitivity at a similar distance in other directions will not.

8.6. Turbines of the same height to blade tip with different size blades and sweep paths have potentially different effects. The above *search* areas cover the likely worst case effects for onshore development. A rationale for the above search and study areas is provided in **Appendix B**.

Turbine development information available

8.7. Pembrokeshire Coast National Park Authority, Pembrokeshire County Council and Carmarthenshire County Council have data of relevant wind turbine developments in their areas including existing and consented wind turbines and those 'in planning' i.e. as planning applications. Each has data on the planning application number, status, applicant, turbine type, height to hub and blade tip and OS coordinates. These excel tables can be used to create GIS maps showing all developments, and subsequent use in ZTVs,

wirelines and photomontages. It is worth checking with Local Planning Authorities if any recent applications have been received at the end of the scoping process to ensure an up-to-date assessment is carried out. If the detailed cumulative assessment process is prolonged further checks with the Local Planning Authority may be desirable, and a 'cut off point' agreed.

Cumulative Zones of Theoretical Visibility

8.8. Good practice guidance notably *Visual Representation of Windfarms: Good Practice Guidance*, Version 2.2, 2017, Scottish Natural Heritage set out in detail the techniques that should be used. Primarily, it shall be the individual consultant's responsibility to ensure that the cumulative ZTVs clearly illustrate and inform the assessment.

8.9. The ZTV radii will depend on the number and size of wind turbine development around the proposal as discussed above. Ideally, the resolution of the Digital Terrain Model (DTM) will be as fine as possible to reflect any complexities of landform around the development eg terrain data on a 5m grid although a coarser grain (25m or 50m grid), may be acceptable beyond 10km from the proposal, depending on its scale and height.

8.10. Ideally ZTVs should show at least visibility to blade tip height. The number and range of ZTVs will depend on the number and pattern of developments. For much of the study area the traditional style of assessing one windfarm's intervisibility with other windfarms through a series of ZTV scenarios may not be appropriate, although this should certainly be carried out for large-scale developments. In most cases the basic ZTV will indicate where the proposed development's ZTV overlaps with all the other developments. This can be refined by dividing the other developments into groups either geographically or by category such as existing/consented and those in planning. An additional ZTV could illustrate the number of turbines that are visible across the study area e.g. 1-3, 3-6, 7-9 or 1-5, 6-10, 11-15 etc. This ZTV is helpful in areas where development is small and dispersed. It would also be helpful as an overlay on landscape character areas to inform judgement of effects.

8.11. For linear receptors such as the Coast Path an analysis of the lengths of intervisibility between the development and receptors based on the ZTV should be undertaken. The complexity and sophistication of this will depend on the size of development.

8.12. It is accepted that ZTVs show the worst case scenarios of bare ground visibility. The actual visibility may be less due to the screening effect of hedgebanks, trees and buildings in the landscape.

Cumulative wirelines and photomontages

8.13. Visualisations should be carried out in line with the latest guidance[14] .

8.14. Cumulative wirelines are useful to illustrate the relationship between the proposed development and other wind turbines. They should be located at worst case, sensitive and/or representative viewpoints agreed with the Local Planning Authority. The number required will depend on the scale of

[14] Visual Representation of Development Proposals (Landscape Institute TGN 06/19).

development and the likelihood of cumulative effects. For the smallest developments one or two may be acceptable, rising to four or five for intermediate developments and a significant number of all the viewpoints selected for assessment of large-scale developments. 360 degree wirelines can be helpful with viewing distances[15] as large as possible within practicalities.

8.15. For larger developments and/or from sensitive viewpoints, cumulative photomontages are helpful. Whilst panoramic views are useful for context, images scaled to a size with a comfortable viewing distance at arms' length are essential and preferably should include A3 single frame views for reliable on-screen and on-site viewing.

[15] Viewing distance is the distance between the eye and an image/visualisation of a development

9. Cumulative Landscape and Visual Impact Assessment Checklist

9.1. A matrix summarising the information and level of detail likely to be required for each scale of development is set out in the following pages. It should be read in conjunction with the rest of the guidance including the objectives.

Table5 Cumulative impact assessment information requirements for turbine size ranges

Turbine size	Height range to blade tip (m)**	Scoping/ search area/ broad study area radius (km)	Cumulative effects scoping/search area	*Typical* detailed study area radius (km)*	Cumulative Landscape and Visual Effects in study area/ detailed study area
Micro/ domest-ic	Less than 25m	5-8	-	1-4km	• In the information supporting the planning application, (e.g. Design and Access Statement), map and describe other turbines which can be seen in conjunction with the proposal and identify potential cumulative effects in a proportionate level of detail depending on potential effects.
Small/ medium	25-49m	15	Agree with LPA: • Map all wind energy development within the scoping search area radius (a 1:250,000 OS base would be sufficient). Development will include all wind turbines that are operational, under construction, consented and 'in planning' i.e. undetermined planning applications. This information will be available from the LPA. • Differentiate graphically between those in planning and others and also between sizes, preferably in size categories defined in this guidance if possible. • Define key landscape and visual receptors that may undergo significant cumulative effects in the scoping area. • Define detailed study area focusing on where significant cumulative effects may be possible. • Define if ZTV is necessary • Define a limited number of viewpoints for assessment and if wirelines and/or photomontages are necessary- say 2-5 unless in sensitive area	7.5	• Prepare a cumulative ZTV of all turbines in study area if necessary. This may include a ZTV showing the overlap of visibility with other turbines and/or the number of turbines visible. • Prepare wirelines from key viewpoints if necessary. • Provide an assessment of combined and additional cumulative **landscape** effects (see Section 3.0) concentrating mainly on interaction with closest turbines e.g. do the turbines combined change the landscape character of an area and meet the objectives for the area (2.14) and what is the contribution of the proposed turbine to this? • Provide an assessment of combined and additional cumulative **visual** effects (see Section 4.0) concentrating mainly on interaction with closest turbines e.g. is the proposed turbine intervisible with other turbines from key viewpoints, what is the effect and does the proposed turbine with

					others meet the objectives for the area (2.14)? • Assess effects with other forms of development if necessary (see Section 6.0).
Medium	>50-79m	20	Agree with LPA: • Map all wind energy development within the scoping search area radius (a 1:50,000 OS base would be sufficient). Development will include all wind turbines that are operational, under construction, consented and 'in planning' i.e. undetermined planning applications. This information will be available from the LPA but should be updated if necessary. • Differentiate graphically between those in planning and others and also between sizes, preferably in size categories defined in this guidance if possible. • List turbine developments taken into consideration. • Define key landscape and visual receptors that may undergo significant cumulative effects in the scoping area. • Define detailed study area for ZTV focusing on where significant cumulative effects may be possible. • Define a limited number of viewpoints for assessment and if wirelines and/or photomontages are necessary- say 3-5 unless in sensitive area	10	• Prepare a cumulative ZTV of all turbines in study area if necessary. This may include a ZTV showing the overlap of visibility with other turbines and/or the number of turbines visible. Scenarios differentiating between existing/consented and 'in planning' may be helpful. • Prepare wirelines from key viewpoints if necessary. • Provide an assessment of combined and additional cumulative **landscape** effects (see Section 3.0) using standard CLVIA methods (e.g. tables of effects) also addressing if the developments meet the objectives for the area (2.14) and what the contribution of the proposed turbine is to this. • Provide an assessment of combined and additional cumulative **visual** effects (see Section 4.0) using standard CLVIA methods (e.g. tables of effects) also addressing if the developments meet the objectives for the area (2.14) and what the contribution of the proposed turbine is to this. • Assess effects with other forms of development if necessary (see Section 6.0).
Medium /large	80-108m	25	Agree with LPA: • Map all wind energy development within the scoping search area radius (a 1:50,000 OS base would be sufficient). Development will include all wind turbines	10-15	• Prepare a cumulative ZTV of all turbines in study area. This may include a ZTV showing the overlap of visibility with other turbines and/or the number of turbines visible.

			that are operational, under construction, consented and 'in planning' i.e. undetermined planning applications. This information will be available from the LPA but should be updated if necessary. • Differentiate graphically between those in planning and others and also between sizes, preferably in size categories defined in this guidance. • List turbine developments taken into consideration. • Carry out scoping ZTV to establish potential for significant effects. • Define key landscape and visual receptors that may undergo significant cumulative effects in the scoping area. • Define detailed study area focusing on where significant cumulative effects may be possible. • Define a number of viewpoints for assessment and where wirelines and/or photomontages are necessary. These may range from 5 to many of the viewpoints selected for the individual impact assessment for larger projects.		Scenarios differentiating between existing/consented and 'in planning' would be helpful. • Prepare wirelines and/or photomontages from key viewpoints if necessary. • Prepare wirelines from key viewpoints. • Provide an assessment of combined and additional cumulative **landscape** effects (see Section 3.0) using standard CLVIA methods (e.g. tables of effects) also addressing if the developments meet the objectives for the area (2.14) and what the contribution of the proposed turbine is to this. • Provide an assessment of combined and additional cumulative **visual** effects (see Section 4.0) using standard CLVIA methods (e.g. tables of effects) also addressing if the developments meet the objectives for the area (2.14) and what the contribution of the proposed turbine is to this. • Assess effects with other forms of development if necessary (see Section 6.0). This is a transitional category where the approach taken for larger turbines or developments is likely to follow that for the large turbine category below.
Large	109-145m	35	Agree with LPA: • Map all wind energy development within the scoping search area radius (a 1:50,000 OS base would be sufficient). Development will include all wind turbines that are operational, under construction, consented and 'in planning' i.e. undetermined planning applications. This information will be available from the LPA but should be updated if necessary.	15	Full CLVIA requirements including: • Prepare cumulative ZTVs of scenarios/groups of all windfarms i.e. 3 or more clusters of turbines and those over 50m tall to blade tip for *broad* study area. • Prepare a ZTV showing the overlap of visibility with all other turbines and/or the number of turbines visible in *detailed* study area. Scenarios differentiating between

			• Differentiate graphically between those in planning and others and also between sizes, preferably in size categories defined in this guidance. • List turbine developments taken into consideration. • Carry out scoping ZTV to establish potential for significant effects. • Define key landscape and visual receptors that may undergo significant cumulative effects in the scoping area. • Define detailed study area focusing on where significant cumulative effects may be possible. • Define a number of viewpoints for assessment and where wirelines and/or photomontages are necessary. These may range from around 10 to many of the viewpoints selected for the individual impact assessment.		existing/consented and 'in planning' would be helpful. • Prepare wirelines and photomontages from all viewpoints where cumulative effects are possible. • Provide detailed assessment using standard CLVIA methods (e.g. tables of effects) and commentary on combined and additional cumulative landscape and visual effects with larger developments. • Provide a commentary on the interaction of the development with smaller scale wind turbine development (in less than clusters of 3 and less than 50m to blade tip) in the detailed study area. • Provide a commentary on whether the proposals with other developments meet the objectives for the area (2.14) • Assess effects with other forms of development if necessary (see Section 6.0).
Very large	146-175m	40	As for 109-145m turbines.	20	As for 109-145m turbines.
Very large	176-225m	50	As for 109-145m turbines.	25	As for 109-145m turbines.
Very large	226-300m	70	As for 109-145m turbines.	35	As for 109-145m turbines.

*Note that typical study areas distances stated may be insufficient to include all relevant sensitive receptors who may undergo significant effects so this is for general guidance only.
**Unless otherwise stated

APPENDICES

APPENDIX A

Planning Context and Background

10. Planning context and background

10.1. This guidance provides information to support planning policy. The current planning policies and guidance of particular relevance to wind energy are set out below. At the time of writing, there are adopted LDPs and emerging replacement plans (LDP 2s) to consider for Pembrokeshire CC and Carmarthenshire CC. It is the responsibility of the developer to check the relevant Welsh Government and LPA websites to ensure that the latest policies are taken into account.

National legislation and guidance

10.2. Planning applications for onshore generating projects in Wales which have an installed generation capacity of 10MW and over are made directly to the Welsh Ministers under the Developments of National Significance (DNS) process. These are defined as 'large scale'. This forms the primary basis for decisions by the Planning Inspectorate. Planning authorities are only statutory consultees in relation to these developments.

Future Wales: The National Plan 2040

10.3. This spatial plan was issued in February 2021 replacing TAN 8. It sets out two policies relating to wind energy and identifies 'pre-assessed areas'.

10.4. **Policy 17 – renewable and low carbon energy and associated infrastructure** states that the Welsh Government strongly supports the principle of developing renewable energy at all scales. Decision-makers must give significant weight to the need to meet the target to generate 70% of consumer electricity by renewable means by 2030. In pre-assessed areas for wind energy policy states that the Welsh Government has modelled the likely impact on the landscape and have found them capable of accommodating development in an acceptable way. There is a presumption in favour of large-scale wind energy development including repowering in these areas subject to the criteria in Policy 18. Applications for large-scale wind energy development will not be permitted in National Parks and AONBs and all proposals should demonstrate that they will not have an unacceptable adverse impact on the environment.

10.5. **Policy 18 – Renewable and Low Carbon Energy Developments of National Significance** states that renewable energy projects qualifying as Developments of National Significance (DNS) will be permitted subject to policy 17 and criteria including:

1 outside of the pre-assessed areas for wind developments the proposal does not have an unacceptable adverse impact on the surrounding landscape (particularly on the setting of National Parks and Areas of Outstanding Natural Beauty).

2 there are no unacceptable adverse visual impacts on nearby communities and individual dwellings

Cumulative impacts of (sic) existing and consented renewable energy schemes should also be considered.

10.6. The background text recognises landscapes across Wales whose intrinsic value should be protected from inappropriate development and cites

National Parks and AONBs. However, outside these areas a positive policy framework exists. The pre-assessed areas are intended to provide certainty where, in principle, developments would be acceptable. In these areas there is a presumption in favour of large-scale onshore wind energy development and the associated landscape change subject to criteria in Policy 18. Outside these areas a positive policy framework still exists.

10.7. Irrespective of location or scale the design and micro-siting of proposals must seek to minimise the landscape and visual impact, particularly those in close proximity to homes and tourism receptors. Both within and outside the pre-assessed areas, communities should be protected from significant cumulative impacts to avoid unacceptable situations such as where smaller settlements could be potentially surrounded by large wind schemes.

10.8. It should be noted that NRW are carrying out follow up landscape-related studies to help understand the effects of development. The Mapping the visible settings of Designated Landscapes in Wales study[16] will be useful to analyse the likely effects of different sizes of turbines around the National Parks and AONBs including Area 11.

Planning Policy Wales Edition 11, February 2021 (PPW 11)

10.9. Planning Policy Wales Edition 11 sets out the land use planning policies of the Welsh Government. It was issued at the same time as the National Plan.

10.10. Key planning principles are set out in Figure 4 for achieving the right development in the right place. This includes making best use of resources by making development resilient to climate change and decarbonising society. Facilitating accessible and healthy environments involves planning the built environment to promote mental and physical well-being. The best way of achieving this is to involve and collaborate with others to ensure issues are understood and prevented at the earliest opportunity through effective engagement. Finally, maximising environmental protection and limiting environmental impact is achieved by protecting, promoting, conserving and enhancing natural, historic and cultural assets. Negative environmental impacts should be avoided in the wider public interest. This means acting in the long term to respect environmental limits and operating in an integrated way.

10.11. Planning authorities should support and guide renewable energy development to ensure their area's potential is maximised (5.9.14). Planning authorities should assess the opportunities for renewable energy in their areas and use this evidence to establish spatial policies in their development plan which identify the most appropriate locations the development of energy developments below 10MW. 'There should be a presumption in favour of development in identified areas, including an acceptance of landscape change, with clear criteria-based policies setting out detailed location issues to be considered at the planning application stage'. Outside these areas, policies should be developed with criteria against which planning applications will be determined.

[16] Hodges, C.J., Batten, H., Dowding, D., Roberts, O. 2021. Mapping the visible settings of Designated Landscapes in Wales. Natural Resources Wales Evidence Report No. 522

10.12. The text relating to 'large scale' development over 10MW (DNSs) echoes Policy 17 and 18 of the National Plan with a presumption in favour within pre-assessed areas (5.9.17). Local planning authorities should not seek to amend the pre-assessed areas as they form part of the development plan (5.9.18). Whilst other uses may be defined within these areas these should not prejudice the ability of large-scale wind developments to come forward.

10.13. In terms of development management, planning authorities should identify suitable ways to avoid, mitigate or compensate adverse impacts of renewable energy development (5.9.20). These should take into account cumulative impact amongst other factors.

10.14. Planning authorities have a statutory duty to have regard to National Parks' and AONBs' purposes (6.3.5) and these areas must be afforded the highest status of protection from inappropriate developments (6.3.8). This duty applies in relation to all activities affecting the designated areas whether those activities lie within each area or in their setting. This is relevant in this area to the Pembrokeshire Coast and adjoining Brecon Beacons National Parks, and Gower AONB. Planning authorities should give great weight to the statutory purposes which are to conserve and enhance natural beauty, wildlife and cultural heritage and to promote opportunities for public understanding and enjoyment of their special qualities (6.3.6). The special qualities should be given weight in the development planning and development management processes and proposals must be carefully assessed to ensure that their effects on features which the designation is intended to protect are acceptable (6.3.9).

10.15. Pembrokeshire and Carmarthenshire are coastal and planning authorities need to consider both landward and seaward pressures and the impacts of these pressures (6.5.4). The impacts associated with such activities can be widespread and overlap between sea and coastline. They may relate to inappropriate land use, pressure for services and facilities, and impacts on existing businesses and employment as well as the natural and historic character of the coastline and seascape where there is extensive inter-visibility between land and sea along the coastline.

LOCAL POLICIES

10.16. The local policies set out below were prepared before the publication of the National Plan 2040 and PPW 11. They should be regarded in this light and given the appropriate weight.

Pembrokeshire Coast National Park Policies

10.17. Pembrokeshire Coast National Park is the only UK national park predominantly designated for its coast. The splendour of its coastline and islands off the coast, the influence of the seascape, its spectacular scenery, and rugged, unspoilt beauty combine to produce strong scenic quality. A sense of tranquillity and remoteness is also highly valued amongst visitors to the area.

10.18. The **Pembrokeshire Coast National Park Local Development Plan** 2 was adopted in September 2020. It includes a number of policies relevant to wind turbines.

10.19. The special qualities of the Park are listed such as coastal splendour, islands, remoteness, tranquillity and wildness and diversity of landscape. Policy 8 Special Qualities (Strategy Policy) states that the special qualities of the Pembrokeshire Coast National Park will be protected and enhanced. The priorities will be to ensure that:

'a) The sense of remoteness and tranquillity is not lost and is wherever possible enhanced...

c) The pattern and diversity of the landscape is protected and where possible enhanced...

d) The historic environment is protected and where possible enhanced…

i) Development of the undeveloped coast is avoided and sites within stretches

of the developed coast are protected for uses that need a coastal location.'

10.20. Policy 14 Conservation and enhancement of the Pembrokeshire Coast National Park, states that: Development will not be permitted where this would adversely affect the qualities and special character of the Pembrokeshire Coast National Park by:

'a) causing significant visual intrusion; and/or,

b) introducing or intensifying a use which is incompatible with its location; and/or

c) failing to harmonise with, or enhance the landform, landscape and seascape character of the National Park; and/or

d) losing or failing to incorporate important traditional features.'

10.21. Pembrokeshire Coast National Park Local Development Plan Policy 33: Renewable and Low Carbon Energy, states that:

'for renewable and low carbon energy development including those relating to wind, solar and hydro power, anaerobic digestion and biomass will be permitted subject to the following criteria:

a) Small and medium scale renewable energy schemes would not individually or cumulatively have an unacceptable impact on the visual amenities, landscape character and/or nature conservation value of the local area.

b) Large scale renewable energy and low carbon energy schemes would not individually or cumulatively have an unacceptable adverse effect on the special qualities of the National Park'.

10.22. It goes on to clarify what is meant by these scales of energy and the potential for them in the Park in Table 6

10.23. A **Landscape Character Assessment SPG** for Pembrokeshire Coast National Park was completed in 2006 and updated in 2011 and 2020/2021. The Assessment identified 28 distinct Landscape Character Areas lying within, or partly within, the National Park. A data sheet for each Landscape Character Area identifies the particular attributes of these areas and the threats they face, and sets out management guidance for them.

10.24. A local seascape character assessment was carried out for Pembrokeshire, among other areas, in 2013. The National Park Authority's **Seascape Character Assessment SPG** is based on this. The report explains the method, gives an overview of the seascape, sets out the cultural benefits and services, the forces for change and the key sensitivities.

10.25. The Pembrokeshire Coast National Park Authority **Renewable Energy SPG 2021** supports the positive implementation of Policy 33. Turbines are classified in four sizes to blade tip 'to reflect the landscape sensitivities' of Pembrokeshire Coast National Park- Large- greater than 65m; Medium- 25-65m; Small- less than 25m; and Micro- Building or mast orientated. The landscape sensitivity to the above scales of development of each of the 28 landscape character areas are set out based on a study carried out in 2008 and updated in 2020. These should be taken into consideration in any CLVIA where the landscape impact assessment study area includes the National Park.

10.26. Key landscape sensitivities for the Pembrokeshire Coast National Park are set out including:

- Locate any development back from the coastal edge
- Locate any development away from the most prominent rural skylines
- Consider views along the coast including along the Coast Path
- Avoid siting turbines in the most tranquil areas
- Only site turbines where they can relate well to existing buildings or built structures in the landscape
- Wind turbine development within the protected landscape should not sacrifice the essential integrity, coherence and character of the landscape or the special qualities of the Park.

Pembrokeshire County Council Local Development Plan Adopted 2013

10.27. The current relevant Pembrokeshire Local Development Plan policies include GN.1 General Development Policy, GN.4 Resource Efficiency and Renewable and Low-carbon Energy Proposals and strategic policies SP 1 Sustainable Development and SP 2 Port and Energy Related Development.

10.28. GN.1 General Development Policy states:

'Development will be permitted where the following criteria are met:

1. The nature, location, siting and scale of the proposed development is compatible with the capacity in character of the site the area within which it is located;

2. It would not result in significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, odours, smoke, fumes, dust, air quality or increase in noise or vibration levels;

3. It would not adversely affect landscape character, quality or diversity, including the special qualities of the Pembrokeshire Coast National Park and neighbouring authorities…'

10.29. GN.4 Resource Efficiency and Renewable and Low-carbon Energy Proposals states:

'Development proposals should seek to minimise resource demand, improve resource efficiency and seek power generated from renewable resources, where appropriate. They will be expected to be well designed in terms of energy use.

Developments which enable supply of renewable energy through environmentally acceptable solutions will be supported.'

10.30. SP 1 Sustainable Development states:

'All development proposals must demonstrate how positive economic, social and environmental impacts will be achieved an adverse impact is minimised.'

10.31. SP 2 Port and Energy Related Development focusses energy-related development on the ports of Milford Haven and Fishguard.

10.32. The Landscape Character Assessment Consultation Draft SPG, July 2019, identifies the key qualities of the county's landscape, including:

- *'Much of Pembrokeshire is cultivated rolling lowland with small areas of woodland, hedges and hedgebanks and a dense network of narrow lanes provide a sense of enclosure and seclusion. Settlements are sparser in areas to the north, and*
- *Farmsteads frequently punctuate the landscape and traditional houses and buildings, alongside significant archaeology and historic buildings provide a sense of the long lived and human influence on the landscape.*
- *Large areas of open, exposed and rugged landscape particularly to the north where there are exposed rock and stone, and views out towards the Preseli Hills and the coast, provide strong sense of place and coastal association. Historic towns and villages can sit prominently along ridgelines or hilltops or sit secluded within valley bottoms.*
- *Quietness and tranquillity is still pervasive away from main roads and industrial areas. The naturalistic sounds of wind, birdcall or livestock complement the stillness of the soundscape…..*
- *…..*
- *Areas to the south and at the Haven in particular make a significant contribution to energy provision, including fossil and renewable sectors and can be visually intrusive…..'*

10.33. 28 landscape character areas are identified with associated underpinning LANDMAP information.

Pembrokeshire County Council Deposit Local Development Plan 2017 – 2033

10.34. This emerging plan has limited weight before adoption but sets out the thrust of future policy within the County. Relevant emerging development

management policies include Policy GN4 relating to renewable energy and Policy GN38 which considers landscape.

10.35. GN 4 Resource Efficiency and Renewable and Low-carbon Energy Proposals states that:

'Development proposals should seek to minimise resource demand, improve resource efficiency and seek power generated from renewable resources, where appropriate. They will be expected to be well designed in terms of energy use.

Developments which enable the supply of renewable energy through environmentally acceptable solutions will be supported.'

10.36. Landscape impact, alone and in combination, is considered to be material consideration in the evaluation of proposals, with LANDMAP providing invaluable landscape analysis tool (5.38).

10.37. GN 38 Landscape states that:

'Development which would have an unacceptably adverse effect on the landscape will not be permitted. All proposals will be required to:

i) Be well integrated into the landscape in terms of scale, siting and design and have an acceptable visual impact in relation to the characteristics and qualities of the landscape.

ii) Acceptably mitigate any impact on protected landscapes, registered historic landscapes, or parks and gardens.

Proposals which are likely to have a significant visual or landscape character impact will be required to demonstrate how the development can be acceptability mitigated.'

10.38. The policy aims to ensure that unacceptable harmful impact on landscape is avoided. The Authority's landscape character assessment is referenced as the evidence base and, following public consultation, will be adopted as Supplementary Planning Guidance. It will form a material consideration for the consideration of development proposals.

10.39. The current Landscape Character Assessment Consultation Draft SPG, July 2019 (see above), is likely to become an SPG for LDP 2 as well.

10.40. An LDP renewable energy assessment (April 2017) was based on assumptions derived from the Welsh Government Renewable Energy Toolkit. It did not identify further opportunities for wind energy due to the consideration of potential cumulative effects with existing developments (page 18). The separate application of both 7km and 15km GIS buffers from existing development excluded potential future development at that time (Map 3.3.3). (*It is worth noting that the 15km buffer was spuriously derived from the White Consultants, April 2013 report- this was defined as an LVIA detailed study area radius to explore potential effects, not a strategic buffer.)*

Carmarthenshire County Council Deposit Local Development Plan 2006 - 2021

The current relevant Carmarthenshire Local Development Plan policies include Policy RE 1 Large Scale Wind Power and Policy RE 2 Local, community and small wind farms. These have to be considered in the context of the revised national policies, in particular the removal of strategic search areas and the introduction of pre-assessed areas.

10.41. Policy RE 1 Large Scale Wind Power states:

'Large scale wind farms of 25MW and over will be permitted provided that the following criteria can be met:

a. The development is located within a Strategic Search Area and will contribute to meeting the indicative generating capacity within the Area;

b. The development will not have an unacceptable impact on visual amenity or landscape character through: the number, scale, size, design and siting of turbines and associated infrastructure;

d. The development will not have an unacceptable impact upon areas designated for their landscape value;

e. The development will not result in significant harm to the safety or amenity of sensitive receptors and will not have an unacceptable impact on roads, rail or aviation safety;

h. The development will not have unacceptable cumulative impacts in relation to existing wind turbines and those which have permission….'

10.42. Policy RE 2 Local, community and small wind farms states:

'Local, Community and Small wind farms or individual turbines will be permitted provided the following criteria can be met in full:

a. The development will not have an unacceptable impact on visual amenity or landscape character through: the number, scale, size, design and siting of turbines and associated infrastructure;

b. The development will not have an unacceptable cumulative impact in relation to existing wind turbines and other renewable energy installations and those which have permission;

c. The siting, design, layout and materials used should be sympathetic to the characteristics of the land-form, contours and existing features of the landscape.'

Carmarthenshire County Council Deposit Local Development Plan 2018 - 2033

10.43. This emerging plan has limited weight before adoption but sets out the thrust of future policy within the County. Relevant emerging development management policies include Policy CCH1 relating to renewable energy and Policy GN38 which considers landscape.

10.44. CCH1 Renewable Energy states

'Proposals for renewable and low carbon energy development and

associated infrastructure, either on their own, cumulatively or in combination with existing, approved or proposed development will be permitted provided they accord with the following:

- *Proposals will not cause an unreasonable risk or nuisance to, and impact upon the amenities of, nearby residents or other members of the public, and will not result in unacceptable loss of public accessibility to the area;*
- *The development will not have an unacceptable impact on visual amenity or landscape character through: the number, scale, size, design and siting of turbines and associated infrastructure;*
- *The development will not have an unacceptable impact upon areas designated for their landscape value;*
- *Wind turbine developments should not have unacceptable cumulative impacts in relation to existing wind turbines, those which have permission or are proposed.'*

10.45. This policy also has references to the superseded TAN 8 Strategic Search Areas.

10.46. The background text indicates that in assessing the cumulative impact of proposals, any unacceptable harm to the landscape, and visual impact, will also be considered against other renewable energy and low carbon developments.

10.47. BHE2: Landscape Character states:

'Development proposals should relate to the specific landscape and visual characteristics of the local area, ensuring that the overall integrity of landscape character is maintained by:

- *identifying, protecting and, where appropriate, enhancing the distinctive landscape and historical, cultural, ecological and geological heritage, including natural and man-made elements associated with existing landscape character;*
- *protecting international and national landscape designations;*
- *preserving local distinctiveness, sense of place and setting;*
- *respecting and conserving specific landscape features, and integrating the principles of placemaking and Green Infrastructure;*
- *protecting key landscape views and vistas.'*

10.48. The policy will be supported by a Supplementary Planning Guidance (SPG) on LANDMAP Landscape Character Assessment. This SPG will identify and describe distinctive landscape character areas and types throughout the plan area.

10.49. A Carmarthenshire Wind Turbine Development Landscape Sensitivity and Capacity study (2017) has been prepared which identifies 80 landscape units based on individual or combined LANDMAP visual and sensory aspect areas and 20 landscape types. Their sensitivities to different typologies of wind energy development are based on an evaluation against a set of

defined criteria and value. Guidance within the document mentions the approach to be taken to cumulative development including referencing this document. The landscape objectives (2.33) reflect the now superseded TAN 8 approach.

10.50. Existing special landscape areas identified in the current LDP (Policy EQ6) but are not referenced in the emerging policies. It is not clear what their status will be.

APPENDIX B

Rationale for recommended areas for cumulative assessment search and study

11. Rationale for recommended areas for cumulative assessment search and study

11.1. The report recommends the following search/scoping and detailed study areas in Table 4:

Proposed Turbine/s height to blade tip (m)	Scoping search area/ broad study area (km radius)	Detailed study area (km radius)
<25	5-8km	1-4km
26 to 49	15km	7.5km
50 to 79	20km	10km
80 to 108	25km	10-15km
109 to 145	35km	15km
146 to 175	40km	20km*
175 to 225	50km	25km*
225 to 300	60-70km	35km*

11.2. The rationale for the distances is that the document is focussed on understanding the likely significant cumulative effects for onshore wind turbine development assessments rather than all effects. Many CLVIAs provide *only* large study areas/ZTVs which cover many viewpoints at larger distances which can obscure consideration of the more significant effects which tend to occur closer to any given development. Broad scoping areas are helpful in determining which developments should be included, and where there are sensitive landscapes, receptors or large development within them these should be assessed to the appropriate level of detail. However, the detailed study areas are most likely to encompass receptors undergoing significant effects.

11.3. The SNH guidance Visual Representation of Windfarms: Good Practice Guidance, Version 2.2 (2017) puts forward recommended ZTV distances as follows (p12):

Height of turbines including rotors (m)	Recommended initial ZTV distance from nearest turbine or outer circle of wind farm (km)
Up to 50	15
51-70	20
71-85	25
86-100	30

101-130	35
131-150	40
150 +	45

11.4. The above figures are reflected in the recommended scoping search area radii put forward in SNH guidance 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' i.e. 35km- 60km (60, 63, p14). The latter figure of 60km is an approximate doubling to allow for the effects of other developments up to 100m with similar effects.

11.5. This scale of scoping ZTV and study area is particularly pertinent in large scale, wild, tranquil or remote landscapes and seascapes, possibly with uninterrupted views. However, in more complex landscapes including lowland landscapes and for smaller scale onshore developments, a more focussed area is more relevant to addressing potentially significant effects.

11.6. In order to test the need for large study areas it is useful to establish if there are likely effects at these distances. This has only been analysed comprehensively for offshore developments. The seascape and visual effects of offshore wind farm development and related buffers have been considered in two studies- in Wales for NRW[17] and an offshore energy strategic environmental assessment (OESEA) background study[18] concerning English and Welsh waters. The latter built on the NRW study collating and analysing all available seascape and visual impact assessments (SVIAs) to establish the levels of visual effects that wind turbines of different sizes have at distance. In addition, assessments of wireline scenarios were carried out for larger turbine sizes not yet coming forward in applications. The summary table of effects (Table 13.1) is as follows:

Overall analysis of the magnitude of visual effect related to distance

Offshore wind farm SVIAs	Low magnitude of effect	Low magnitude of effect	Medium magnitude of effect	Medium magnitude of effect
Heights of turbine to	Average	Maximum	Average	Maximum

[17] Seascape and visual sensitivity to offshore wind farms in Wales: strategic assessment and guidance. Stage 1- ready reckoner of visual effects related to turbine size, NRW, White Consultants, March 2019.

[18] Review and update of OESEA seascape and visual buffer study, White Consultants, March 2020.

blade tip (m)	Distance km	Distance km	Distance km	Distance km
107-145	**19.2**	26.1	**14.0**	15.0
150-175	**21.7**	26.5	**15.8**	17.7
176-223	**26.2**	31.9	**20.2**	26.3
250-300	**38.6**	47.6	**27.5**	31.1
301-350	**35-44*** **44****	-	**24-35*** **32.8****	-
351-400	**35-44***	-	**24-35***	-

*Wireline assessment ** NRW, 2019 findings

Note: The ranges show analysis of available wind farm turbine sizes' SVIAs, and are not entirely sequential e.g. no SVIAs were available for turbines between 224m and 249m.

11.7. The low magnitude of effect (used in three/four point scale assessments such as high/medium/low/negligible) also includes medium/low magnitude of effects (as used in five point scale assessments such as high/high–medium/medium/medium–low/low). These can result in significant effects on high sensitivity receptors, such as National Parks and AONBs. The medium magnitude of effect is very likely to have significant effects on high sensitivity receptors such as designated areas, residents and countryside recreation users.

11.8. Offshore development is different to onshore development inasmuch as there are usually no intervening features between coast and development. Inland this will correspond to areas of open moorland or farmland, usually on higher ground with clear views e.g. the Preselis, Llanllwni Common. Elsewhere, landform and landcover, such as trees, hedges and built form, may intervene to reduce visibility or modify views. However, the analysis shows the potential for effects to be significant and where terrestrial wind farms are located in higher or prominent locations, the effects are relevant.

11.9. The other factor that comes into play at distance is the effect of atmospheric interference through weather conditions such as haze and mist. The OESEA background study analysis of eight coastal weather stations found that 40km was the distance beyond which there was visibility for an average 10% of the time (9.37). Inland weather conditions may be more or less clear but 40km is probably a sensible maximum to expect significant visual effects from wind farms with very large scale wind turbines.

11.10. The development with the largest consented wind turbines in the UK at the time of writing is at Lethans, East Ayrshire. The 200m turbines to blade tip were attributed a 35km radius study area/ZTV in the LVIA[19] as this was considered the maximum distance for a potentially significant effect (9.8, page 171). This ties in with the OESEA study table above. The overall scoping search area used was 60km radius in line with Nature

[19] Lethans Environmental statement LVIA

Scot/SNH 2012 guidance. Small scale wind energy developments were scoped within 20km (9.87). Considering the likely significant effects and the limited amount of other relevant development, a detailed cumulative study area of 35km radius was applied (9.95).

11.11. In South Wales a scoping study20 for Y Bryn wind farm with up to 250m high turbines to blade tip proposed a 45km radius baseline and cumulative ZTV. The response from Neath Port Talbot and Bridgend Councils requested an additional detailed 15km radius ZTV to explore cumulative effects on the adjacent densely settled valleys.

11.12. The experience of Carmarthenshire Council and White Consultants in reviewing terrestrial wind farm LVIAs and assessing the effects of many wind farm developments for development control purposes informs the following rules of thumb developed by White Consultants:

Height of turbines	Typical upper distance for where a wind energy development may be an apparent* feature (km)	Doubling for minimum cumulative scoping/ broad study area (km)	Typical upper distance where a wind energy development may be a noticeable* or conspicuous* feature (km)	Doubling (generally) for cumulative detailed study area (km)
>15m to hub-35m	5	10	2.5	5
>35-50m	7.5	15	4	7.5
>50-80m	10	20	6	10
>80-109m	12.5	25	8	10-15
109-145m	15	30	10	10-15

Notes:

*derived from terminology used in 'Visual Assessment of Windfarms: Best Practice', Scottish Natural Heritage, 2002, Table 18, p64.

1 If two wind energy developments are apparent to a receptor on two sides this may lead to significant effects, especially on sensitive receptors. If they are noticeable or conspicuous on two sides then the effect is more likely to be significant.

2 Individual developments should be considered on their own merits as different distances may be appropriate for some situations (e.g. depending on character and sensitivity) and developments (e.g. depending on extent). The detailed study area distances may also need to be adjusted if existing or consented developments of different sizes are located in the broad study area.

3 The detailed study areas do not necessarily equate with the extent of potential significant effects and may need to be adjusted. For larger developments it should be used in conjunction with the broader study area.

11.13. Bringing the analyses together for the maximum size of turbine that may

[20] Y Bryn wind farm scoping report, Natural Power, January 2021.

now be considered on land (250m to blade tip), the above tables are combined and modified.

Likely effects of turbines and derived search and study areas

Height of turbines	Typical upper distance for where a wind energy development may be an apparent* feature (km)	Doubling for minimum potential cumulative scoping/ broad study area (km)	Typical upper distance where a wind energy development may be a noticeable* or conspicuous* feature (km)	Doubling (generally) for potential cumulative detailed study area (km)
>15m to hub-35m	5	10	2.5	5
>35-50m	7.5	15	4	7.5
>50-80m	10	20	6	10
>80-109m	12.5	25	8	10-15
110-145m	15	30	10	10-15
146-175	20**	40	15**	30
176-225	25**	50	20**	40
226-300	35**	70	25**	50

** Figures derived from OESEA 2020 report rounded down or averaged to nearest number divisible by 5 to compensate for possible effects from inland developments.

11.14. NRW LANDMAP LVIA guidance (2021) uses a slightly different set of ranges of turbine sizes for LVIA assessments. Transposing the above table into these ranges results in the final Table 4. It should be noted that the detailed study areas suggested in Table 4 for larger turbine sizes are slightly less than the above table. This is a matter of judgement and depends on the size of other developments and intervening screening which should be picked up in the scoping phase. It is also driven by the aim to concentrate on significant effects which are more likely closer to the proposed development. However, it may be possible that the detailed study area should be as the table above in some circumstances.

11.15. There may be a need to prepare additional ZTVs to underpin assessment of cumulative effects in areas close to the development- say within 5-10km. This may be particularly appropriate for residential receptors particularly bearing in mind Future Wales 2040 Plan policies.

APPENDIX C

Useful References

Appendix C: Useful References

Landscape and visual impact assessment, cumulative landscape and visual impact assessment and residential visual amenity assessment

An Approach to Landscape Character Assessment, Christine Tudor, Natural England, October 2014.

Assessing the cumulative impact of onshore wind energy developments, March Scottish Natural Heritage, March 2012.

Assessing the impact of small-scale wind energy proposals on the natural heritage, Version 3, Scottish Natural Heritage, March 2016.

Designing windfarms in Wales, Design Commission for Wales, Arup, October 2012

Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition, Landscape Institute and IEMA, April 2013.

Landmarks, essay- Energy–scapes of Wales: shaping land and sea, Simon White, Design Commission for Wales, 2015.
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Landscape Capacity Studies in Scotland – a review and guide to good practice', Scottish Natural Heritage, 2009.

Mapping the visible settings of Designated Landscapes in Wales, Natural Resources Wales Evidence Report No. 522, Hodges, C.J., Batten, H., Dowding, D., Roberts, O., 2021.

Residential Visual Amenity Assessment (RVAA): Technical Guidance Note 2/19, Landscape Institute, March 2019.

Review of Guidance on the Assessment of Cumulative Impacts of Onshore Windfarms, Entec, DBERR, 2008.

Siting and designing windfarms in the landscape, Version 3a, Scottish Natural Heritage, August 2017.

Spatial Planning for Onshore Wind Turbines – natural heritage considerations, Scottish Natural Heritage, June 2015.

Using LANDMAP for landscape and visual impact assessments: Guidance Note 46, Natural Resources Wales, 2021.

Visual Assessment of Windfarms: Best Practice, Scottish Natural Heritage, 2002.

Visual Representation of Development Proposals: Technical Guidance Note 06/19, Landscape Institute, September 2019.

Visual Representation of Windfarms: Good Practice Guidance, Version 2.2, Scottish Natural Heritage, February 2017.

Seascape

An approach to Seascape Character Assessment, (NECR105), Natural England, Scottish Natural Heritage and Countryside Council for Wales, 2012.

An Approach to Seascape Sensitivity Assessment, MMO Project No: MMO1204, Marine Management Organisation, December 2019.

Guidance on the assessment of the impact of offshore wind farms: seascape and visual impact, DTI, 2005

National Seascape Assessment for Wales, Natural Resources Wales Evidence Report No 80, November 2015

Seascape and visual sensitivity to offshore wind farms in Wales: Strategic assessment and guidance. Stages 1-3. NRW Evidence Report No: 315, Natural Resources Wales, 2019.

Other guidance referred to in preparation of report

Argyll and Bute Landscape Wind Energy Capacity Study, Argyll and Bute Council, March 2012

Cumbria Wind Energy Supplementary Planning Document, Cumbria County Council, 2007

North Ayrshire Supplementary Landscape Wind Energy Capacity Study, North Ayrshire Council and Scottish Natural Heritage, June 2013.

Onshore Wind Energy Strategy for Fife, Cumulative Impact Assessment', Fife Council, December 2012.

Strategic Landscape Capacity Assessment for Wind Energy in Aberdeenshire, Aberdeenshire Council and Scottish Natural Heritage, March 2014.

Wind Turbine Development Policy Guidance, Fenland District Council, 2009

Wind Energy Supplementary Planning Guidance, Fife Council, 2011

APPENDIX D

Glossary

Appendix D: Glossary of landscape, seascape and visual terms

Term	*Definition*
Amenity Planting	planting to provide environmental benefit such as decorative or screen planting.
Analysis	the process of dividing up the seascape/landscape into its component parts to gain a better understanding of it.
Ancient Woodland	land continuously wooded since AD 1600. It is an extremely valuable ecological resource, usually with a high diversity of flora and fauna.
Apparent	object visible, evident, obvious and/or discernible in the landscape.
Approach	the step-by-step process by which seascape/landscape assessment is undertaken.
Arable	land used for growing crops other than grass or woody species.
Aspect	in Wales, an aspect is a component of the LANDMAP information recorded, organised and evaluated into a nationally consistent spatial data set. The landscape information is divided into five aspects- geological landscape, landscape habitats, visual and sensory, historic landscape and cultural landscape services.
Aspect area	areas defined in each of the LANDMAP aspect assessments which are mutually exclusive
Assessment	term to describe all the various ways of looking at, analysing, evaluating and describing the seascape/landscape or assessing impacts on seascape/landscape and visual receptors.
Biodiversity	the variety of life including all the different habitats and species in the world.
Character	see landscape/seascape character.
Characteristics	elements, features and qualities which make a particular contribution to distinctive character.
Characterisation	the process of identifying areas of similar character, classifying and mapping them and describing their character.
Classification	concerned with dividing the landscape into areas of distinct, recognisable and consistent common character in grouping areas of similar character together. It requires the identification of patterns in the landscape, created by the way the natural and human influences interact and are perceived and experienced to create character.
CLVIA Scoping assessment	the scoping process as set out in this document. This should preferably be carried out at the initial scoping stage of the EIA process but can follow at a later date in some situations, but before submission of the LVIA/CLVIA.
Compensation	the measures taken to offset or compensate for adverse effects that cannot be mitigated, or for which mitigation cannot entirely eliminate adverse effects.
Combined visibility	the observer is able to see two or more developments from

Term	*Definition*
and effects	one viewpoint. This divided into '*in combination*'- several wind turbine developments are within the observer's arc of vision at the same time OR '*in succession*', where the observer has to turn to see various wind turbine developments.
Term	*Definition*
Complexity	(in the context of describing a skyline) how varied or complicated the skyline is from dead flat with even vegetation at one end of the scale to mountainous with varied vegetation at the other.
Conservation	the protection and careful management of natural and built resources and the environment.
Consistent	relatively unchanging element or pattern across a given area of seascape/landscape.
Cumulative Impacts	the changes caused by a proposed development in *addition* to other similar developments or as the *combined* effect of a set of developments, taken together. This may be an on-going process as new applications are made. The assessment of these impacts (a CLVIA) is normally carried out as part of an environmental impact assessment.
Cumulative landscape effects	cumulative effects as defined above on landscape can impact on either the physical fabric, or character of the landscape.
Cumulative visual effects	cumulative effects as defined above on people who have differing sensitivity depending on what they are doing and where they are located.
Description	capturing the overall essence of the character of the landscape with reference to geology, landform, landscape pattern, vegetation, settlement, historical and cultural associations etc, drawing out the ways in which these factors interact together and are perceived and experienced and are associated with events and people.
Distinctiveness	see sense of place
Diversity	(in terms of the function of an area) the variety of different functions of an area.
Dominant	main defining feature or pattern.
Effects, direct	where development lies within a seascape/landscape and physically removes or affects an element or feature e.g. rocks, vegetation, watercourses, drainage, built features such as walls.
Effects, indirect	non-physical effects such as perceived change of character or from associated development such as transport infrastructure
Elements	individual component parts of the landscape such as hedges, walls, trees, fields.
Environmental Impact Assessment	the process used for describing, analysing and evaluating the range of environmental effects that are caused by a proposed development.
Environmental	the document supporting a planning application that sets out

Term	*Definition*
Statement	the findings of the environmental impact assessment
Features	particularly prominent or eye-catching elements such as churches, castles, rock outcrops.
Field Boundary	the defined edge of a field eg fence, hedge, bank, ditch or wall.
Term	*Definition*
Field Size	Large 2 Ha Above, Medium Around 1.5 Ha, Small Less Than 1 Ha.
Geology	the study of the origin, structure, composition and history of the Earth together with the processes that have led to its present state.
Impact	used as part of overall term, as in EIA or LVIA, to help describe the process of assessing potentially significant effects. See effects.
Improved (in relation to soils or pasture)	addition of fertiliser and, in the case of pasture, reseeding with more productive grass species.
Inherent	dictionary definition- 'existing as an inseparable part'. In the context of sensitivity means the sensitivity of the seascape/landscape zone itself with all its component elements and features rather than its relationship with adjacent zones.
Integrity	unspoilt by large-scale, visually intrusive or other inharmonious development
Key characteristics	those combination of elements which help give an area its distinct sense of place.
Landcover	combinations of natural and man-made elements including vegetation that cover the land surface.
Landform	combinations of slope and elevation which combine to give shape and form to the land.
LANDMAP	*LANDMAP* is the national Geographical Information System (GIS) based information system for Wales, devised by the Countryside Council for Wales, for taking landscape into account in decision-making. It is a nationally consistent dataset divided into 5 aspects- geological landscapes, landscape habitats, visual and sensory, historical landscapes and cultural landscapes.
Perception	perception combines the sensory (that which we receive through our senses) with the cognitive (knowledge and understanding gained from many sources and experiences).
Landscape	an area of land, as perceived by people, whose character results from the actions and interactions of land with natural and/or human factors.
Landscape Capacity	the degree to which a particular landscape character type or area is able to accommodate change of a particular *type*, *scale* and *amount* without unacceptable adverse effects on its

Term	*Definition*
	character.
Landscape Capacity Assessment/study	the process of describing, analysing and evaluating the landscape capacity of an area. This is normally carried out as a strategic baseline study for a local authority area.
Landscape character	a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse *(source: GLVIA 3)*.
Landscape character assessment (LCA)	the process of identifying and describing variation in the character of the landscape, and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscape distinctive. The process results in a Landscape character assessment *(source: GLVIA 3)*.
Term	*Definition*
Landscape character areas	these are single unique areas which are discrete geographical areas of a particular landscape type *(source: GLVIA 3)*.
Landscape character types	these are distinct types of landscape that are relatively homogenous in character. They are generic in nature in that they may occur in different locations but wherever they occur they share broadly similar combinations of geology, topography drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes *(source: GLVIA 3)*.
Landscape guidelines	actions required to ensure that distinctive landscape character is maintained, enhanced or if appropriate, changed through the creation of new character.
Landscape quality	the physical state of the landscape. It includes the extent to which typical character is represented in individual areas, sometimes referred to as strength of character, the intactness of the landscape from visual, functional and ecological perspectives and the condition or state of repair of individual elements of the landscape.
Landscape Resource	the overall stock of the landscape and its component parts. (the landscape considered as a measurable finite resource like any other e.g. minerals, land, water).
Landscape Sensitivity Assessment/study	the process of describing, analysing and evaluating the landscape sensitivity of an area. This is normally carried out as a strategic baseline study for a local authority area.
Landscape value	the relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons *(source: GLVIA 3)*. In Wales, LANDMAP aspects assess value against a series of criteria. For LVIAs, value can also be derived from designations at a national and local level and from other factors including scenic beauty, tranquillity, wildness, special cultural associations, the presence of conservation interests, use, rarity or the existence of a consensus about importance.
Landscape and	A tool used to identify and assess the likely significance of

Term	*Definition*
Visual Impact Assessment (LVIA)	effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity *(source: GLVIA 3)*.
Magnitude of effect	a term that combines judgements about the size and scale of effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration *(source: GLVIA 3)*. In terms of this report the main/key component is the size/scale of effect.
Micro-generation	very small scale power generation schemes, typically providing energy to a single dwelling
Mitigation	measures including any process, activity or design to avoid, reduce or remedy adverse effects of a development proposal. It does not include compensation.
Term	*Definition*
Mixed Farmland	a combination of arable and pastoral farmland
Mosaic	mix of different landcovers at a fine grain such as woodland, pasture and heath.
Objective	method of assessment in which personal feelings and opinions do not influence characterisation or judgements.
Perceived effects	the perceptions of the impact on the landscape by people who *know* of other developments even when they cannot *see* them.
Physiography	expression of the shape and structure of the land surface as influenced both by the nature of the underlying geology and the effect of geomorphological processes.
Polygon	discrete digitised area in a geographic information system (GIS).
Prominent	noticeable feature or pattern in the landscape.
Protect	to keep from harm.
Qualities	aesthetic (objective visible patterns) or perceptual (subjective responses by the seascape/landscape assessor) attributes of the seascape/landscape such as those relating to scale or tranquillity respectively.
Receptor, visual	Individuals and/or defined groups of people who have the potential to be affected by a proposal *(source: GLVIA 3)*.
Receptor, seascape/landscape	Defined aspects of landscape resource that have the potential to be affected by a proposal. *(source: GLVIA 3)*. Receptors could include seascape/landscape character areas, types, designations, elements or features.
Remoteness	physical isolation, removal from the presence of people, infrastructure (roads and railways, ferry and shipping routes) and settlement and noise.
Renewable Energy	collective term for energy flows that occur naturally and repeatedly in the environment without significant depletion of resources. It includes energy derived by the sun, such as wind,

Term	*Definition*
	solar hot water, solar electric (photo-voltaics), hydro power, wave, tidal, biomass, biofuels, and from geothermal sources, such as ground source heat pumps.
Resource	see landscape resource.
Scenic quality	seascape/landscape with scenes of a picturesque quality with aesthetically pleasing elements in composition (*derived from LANDMAP visual and sensory aspect*).
Scoping assessment	the process of identifying the issues to be addressed by an EIA. It is a method of ensuring that an EIA focusses on the important issues and avoids those that are considered to be less significant. *(source: GLVIA3).* See also CLVIA scoping assessment.
Semi-natural vegetation	theoretically any type of vegetation that has been influenced by human activities, either directly or indirectly. The term is usually applied to uncultivated areas managed at a low intensity such as heathland, herb and fern, rough grassland, wetland/mire, scrub and woodland.
Term	*Definition*
Sensitive receptor	in terms of a visual receptor, a person who can experience views of a development and who may be particularly affected by the change because of the activity in which they are engaged. Sensitive receptors can include people in and around their own homes and those setting out to enjoy the landscape or seascape such as users of public rights of way, open access land and tourists. In terms of landscape, sensitive receptors may include designated and highly valued areas and certain landscape patterns and features such as prominent or complex skylines and settings of historic features.
Sensitivity	A term applied to specific receptors, combining judgements of susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor *(source: GLVIA 3).*
Sensory	that which is received through the senses i.e. sight, hearing, smell, touch.
Sense of Place	the character of a place that makes it locally identifiable or distinctive i.e. different from other places. Some features or elements can evoke a strong sense of place eg islands, forts, vernacular architecture.
Sequential cumulative visual effects	where the observer has to move to a series of viewpoints to see different developments. This can be *frequently sequential* where features appear with short time lapses in between to *occasionally sequential* where there are long time lapses between locations where wind turbines are visible.
Setting, of a heritage asset	the surroundings in which the asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or a negative contribution to an asset, may affect the ability to

Term	*Definition*
	appreciate that significance or may be neutral.
Significance/ significant effect	in environmental impact assessment- the importance of an effect. A significant effect needs to be taken into account in decision-making.
Subjective	method of assessment in which personal views and reaction are used in the characterisation process.
Topography	term used to describe the geological features of the Earth's surface e.g. mountains, hills, valleys, plains.
Unity	consistency of pattern over a wide area i.e. the repetition of similar elements, balance and proportion, scale and enclosure.
Value	see landscape value
Viewing distance	the distance between the eye and an image/visualisation of a development.
Visibility in succession	where the observer at a static viewpoint has to turn to see various wind turbine developments.
Visual Effects	effects on specific views and on the general visual amenity experienced by people *(source: GLVIA 3).*
Term	*Definition*
Wind Energy Development	development consisting of one or more wind turbines, access tracks, ancillary buildings, substation, anemometer masts and supporting infrastructure.
Zone of Theoretical Visibility (ZTV)	ZTV or ZVI (Zone of Visual Influence) is a map, usually digitally produced, showing areas of land within which a development is theoretically visible *(source: GLVIA 3)*.