Pembrokeshire and Carmarthenshire: Cumulative Impact of Wind Turbines on Landscape and Visual Amenity guidance



Final Report

for

Carmarthenshire County Council
Pembrokeshire Coast National Park Authority
Pembrokeshire County Council

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Preface

This Guidance on Cumulative Impact of Wind Turbines on Landscape and Visual Amenity: Pembrokeshire and Carmarthenshire provides interim good practice guidance for applicants, developers, consultees and Council officers in the Pembrokeshire County Council planning area.

The County Council are also preparing more detailed guidance on policies of the Local Development Plan (LDP) for renewable energy development proposals and landscape. This best practice guidance on cumulative impacts of wind turbines on landscape and visual amenity will be a supporting document to complement the Renewable Energy SPG and will be subject to approval by the Council's Corporate Management Team. Once draft SPG on Renewable Energy and Landscape are agreed for public consultation, this guidance will sit in support of these SPG documents and therefore comments can be made alongside the SPG consultation.

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Abbreviations used in text

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

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- Alltwalis windfarm, Carmarthenshire.

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 to assessing the cumulative impact of onshore wind turbines on landscape and visual amenity in Pembrokeshire and Carmarthenshire. The guidance[1] is intended to be used for development management purposes by developers, consultants and planning officers.

1.2. The document focuses on cumulative impact issues and should be read in conjunction with other national and local policies (see 1.17 and **Appendix A**) and guidance on landscape, seascape and visual impact assessment (LVIA).

1.3. It is structured so that the background context and objectives are set out in **Part A** (Sections 1-6) and **Appendix A**- Section 10 and the step by step guide, tools and checklists set out in **Part B** (Sections 7-9).

Environmental Impact Assessment requirements in relation to cumulative effects

1.4. 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) (England and Wales) Regulations 2011[2], consolidate previous regulations and set out the current requirements for meeting European Directive 85/337/EEC.

1.5. 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 (Regulation 2(1)).

1.6. Below this threshold, EIA is not mandatory but the Local Planning Authorities will provide a 'screening opinion' if 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 of development

b) the cumulation with other development

……'

1.7. If a proposed development requires an Environmental Impact Assessment, then Schedule 4, Part 1 of the EIA Regulations states that:

'a description of the likely significant effects of the Development on the

[1] Supplementary planning guidance in Carmarthenshire and Pembrokeshire Coast National Park and practice guidance in Pembrokeshire

[2] SI No. 1824

environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the development.....'(4)

1.8. Circular 02/99, which provides guidance on the Regulations, states:

'in judging.... the effects of a development....local planning authorities should always have regard to the possible cumulative effects with any existing or approved development' (paragraph 46).

Definition of cumulative impact

1.9. For the purposes of this guidance the following definition of cumulative impacts, first used by Scottish Natural Heritage (SNH)[3], 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)

1.10. 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 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.

1.11. 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 overall character of landscape and its sensitivity to wind turbine development
- The siting and design of wind turbines and wind farms themselves
- The way in which landscape is experienced.

When will a cumulative assessment will be needed?

1.12. 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 existing, under construction and consented wind turbines and those 'in planning' i.e. at planning application stage.

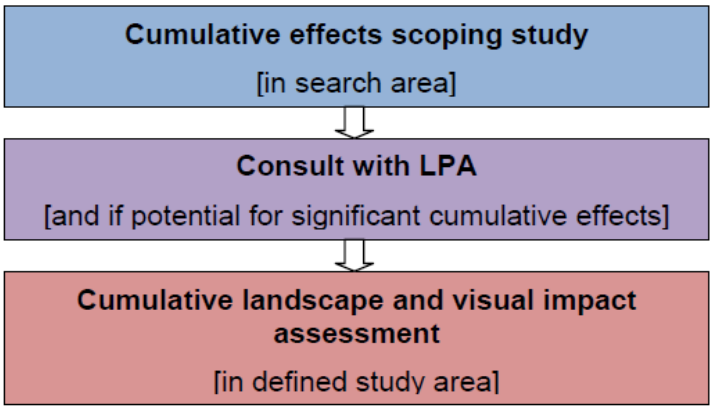
1.13. Detailed cumulative impact assessments are only required where it is considered that the proposal could result in *significant* cumulative impact which could affect the eventual planning decision. The scale and complexity of assessments should be proportionate to the impacts

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

(Scottish Natural Heritage cumulative guidance[2] paragraph 56).

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

Figure 1 Outline of process



1.15. 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 4**.

Functional objectives of the guidance

1.16. 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 3-9**).
- Work within planning policy and complement existing guidance (**Appendix A**).
- Reflect good CLVIA practice (**Appendix B**).

Planning Context

1.17. 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 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.

1.18. There are a number of relevant general policies but key policies include:

- National Policy Statements (NPS) EN-1 and EN-3 which apply to significant onshore wind turbine developments in England and Wales i.e. above 50MW output.
- Planning Policy Wales Edition 5 November 2012 (PPW)
- Technical Advice Note (TAN) 8: Planning Policy for Renewable Energy in relation to Strategic Search Area (SSA) G Brechfa Forest.
- Pembrokeshire Coast National Park Local Development Plan (LDP) Policies especially Policy 8 Special Qualities, Policy 15 and Policy 33, Renewable Energy SPG 2011 and Landscape Character Assessment SPG 2011.
- Pembrokeshire County Council Local Development Plan Policies GN.4 Resource Efficiency and Renewable Energy and Low-carbon Energy Proposals and also GN.1 General Development Policy, GN.2 Sustainable Design and in some cases SP.2 Port and Energy related development.
- Carmarthenshire County Council Unitary Development Plan Policies UT6, CUDP 9 and CUDP14.

Consulting Local Planning Authorities

1.19. 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.

1.20. 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.

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 in the outstanding category 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 in relation to other features.

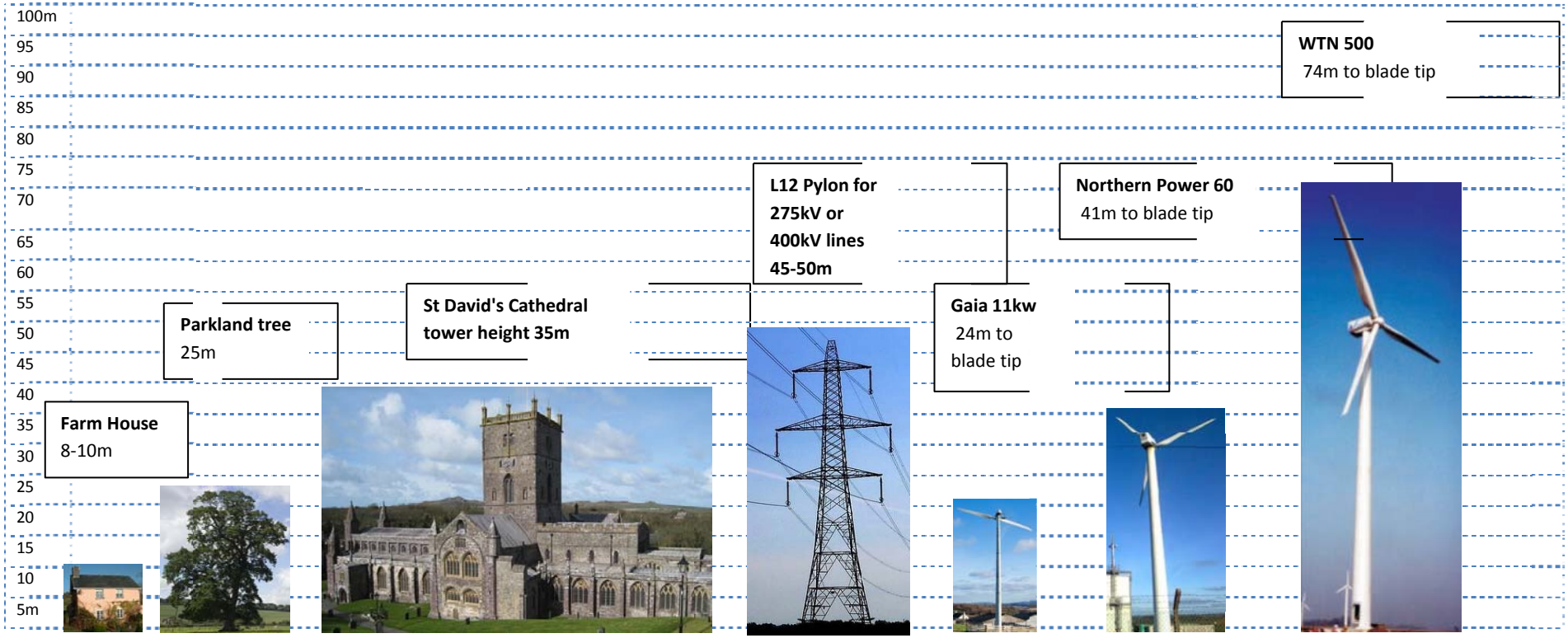


Figure 2: Turbine types and size comparison - small to medium sized turbines

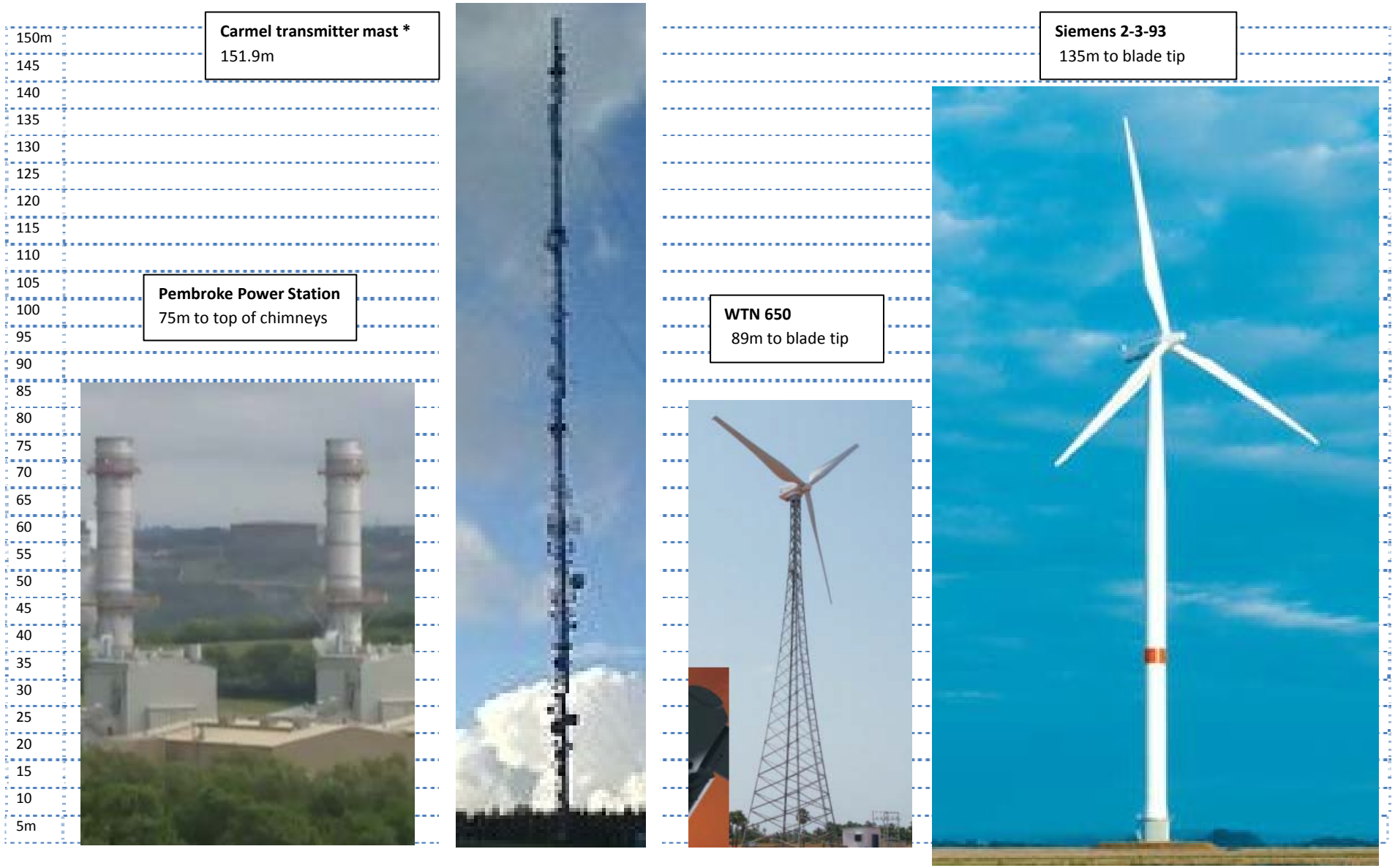


Figure 3: Turbine types and size comparison - medium large sized turbines

Existing wind turbine development in the area

2.7. Wind turbine development has been established in a number of locations with the majority in Carmarthenshire. The largest is in the Brechfa Forest strategic search area where there is one consented windfarm- Brechfa Forest West windfarm with 28 turbines of up to 145m to blade tip and the constructed Alltwalis wind farm with its ten 110m high turbines. Dyffryn Brodyn's 11 turbines are 53.5m high to blade tip and were erected in 1994. Blaen Bowi consists of three turbines 77m high to blade tip constructed in 2002. The Parc Cynog windfarm is located just back from the coast of Carmarthen Bay. This started at 5 turbines in 2001 and has been enlarged with a further 6 turbines in 2009. The Mynydd y Bettws wind farm gained planning permission in 2009 and will consist of 15 turbines, 110m high to blade tip.

2.8. In Pembrokeshire, from one 60m high turbine consented in 2002 adjacent to Milford Haven, there are now 6 turbines of a similar size located along the waterway with a number of smaller turbines and more proposed. There are a few relatively isolated turbines of between 50 and 80m dotted elsewhere about the two counties, some recently consented, and numerous smaller single or pairs of turbines between 15-50m to blade tip.

Issues

2.9. The number of small and medium sized turbines proposed in rural parts of the area may have limited landscape and visual effects on their own but together they are starting 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)*

2.10. 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.

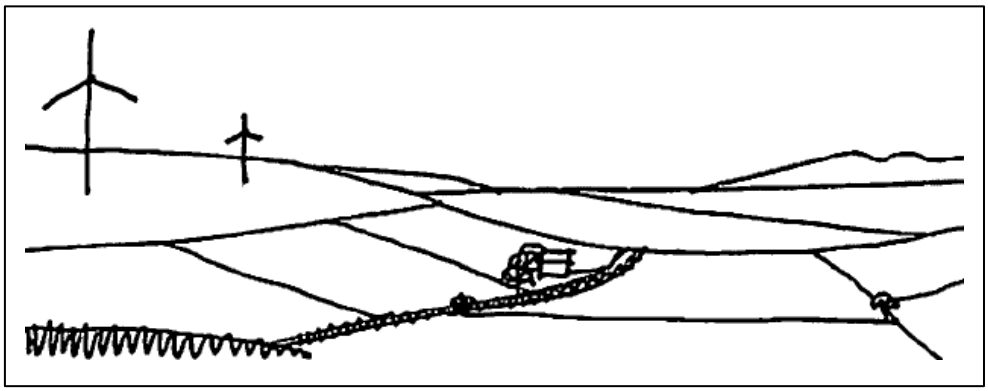
2.11. Applications for smaller scale wind energy developments are being received close to the Brechfa Forest strategic search area and other large windfarms which together may have significant cumulative effects on landscape character as well as on visual amenity outside the strategic search area.

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

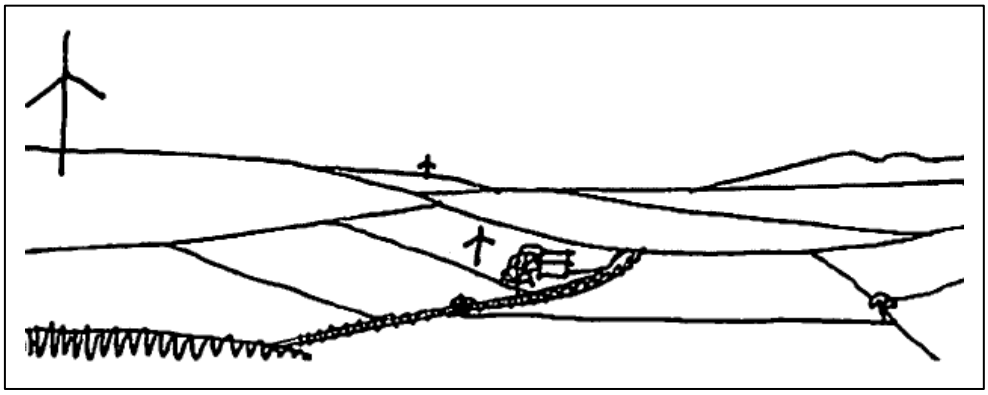
2.12. Some wind turbine developments and applications are located close to power lines. There is potential for 'cumulative' effects with the pylons.

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

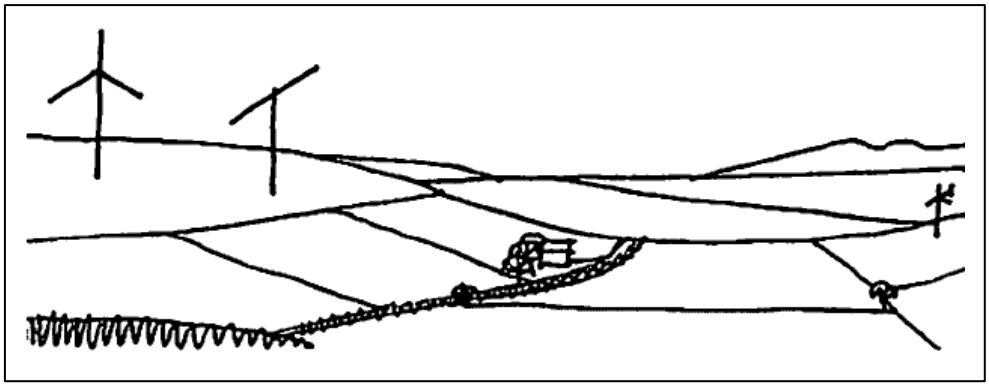
2.13. The great variety of turbines sizes, design or their layout close to each other has the potential to cause visual conflict, confusion and/or complexity as already noted above. The following diagrams further illustrate *some* of the potential issues.



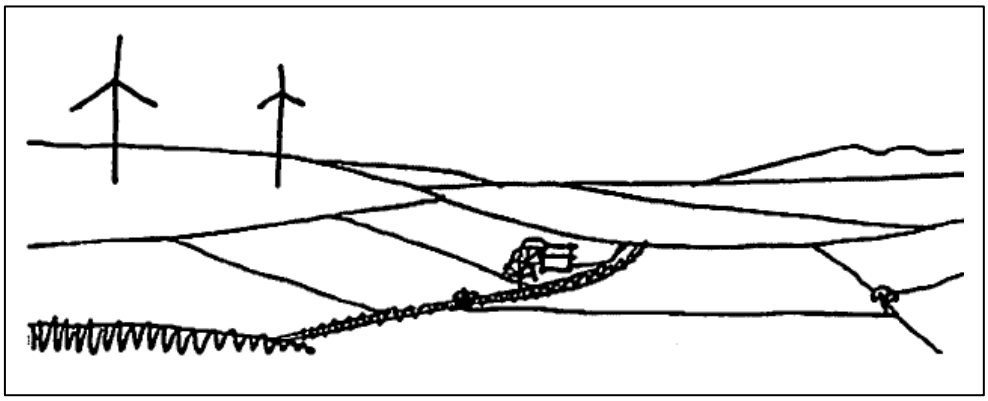
Sketch 1: Difference in turbine sizes can be visually confusing in some situations- the small turbine appears to distort perspective by being closer



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: Different turbine designs/blade lengths can lead to visual conflict and uncoordinated movement of blades i.e. faster blade rotation speeds for smaller blades

2.14. 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

2.15. The key objectives are:

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

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

- In other landscapes outside the strategic search area, to maintain the landscape character

  -that is no significant adverse change in landscape character from cumulative wind turbine development. Significant change here is taken to mean where wind turbines become either the dominant or a key characteristic of a landscape, depending on its sensitivity which shall be defined by the assessment.

- Within the strategic search area, to accept landscape change

  -that is significant change in the landscape character from wind turbine development.

- To avoid development which, in combination, creates the experience of a settlement[4] being in a wind turbine landscape

  -such as being surrounded by wind turbines on two or more sides.

- To avoid development cumulatively creating significant adverse effects on sensitive receptors

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

- To avoid turbines of markedly different designs or scales being located or viewed in juxtaposition with each other.

- To avoid significant adverse effects when viewed in conjunction with other types of development.

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

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 aspects- the Geological Landscape, Landscape Habitats, Visual & Sensory, Historic Landscape and Cultural Landscape. The Countryside Council for Wales (now 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. Countryside Council for Wales Guidance Note 3 (2010) [5] defines how wind energy developments should take LANDMAP into consideration in relation to wind energy LVIAs**.**

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[6]. Sensitivity to wind turbine development has been attributed to these areas by a further study[7]. 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. **Outside the National Park,** LANDMAP can be used as the landscape baseline to derive landscape character areas or similar units, and to attribute sensitivity to each of these areas. Landscape character assessment guidance[8] indicates how to undertake this process and draft, unpublished guidance indicates the relationship between landscape character assessment and LANDMAP. LANDMAP information for each aspect area includes value but this is not the same as sensitivity although it may inform a judgement on this. Topic Paper 6 on sensitivity (Countryside Agency 2004)[9] explains further. Landscape character assessment and/or sensitivity studies undertaken by Pembrokeshire County Council or Carmarthenshire County Council in due course should be used as part of the landscape baseline.

3.4. 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 can be sensitive to wind turbine development, such as prominent or

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[5] LANDMAP information Guidance Note 3: Using LANDMAP for landscape and visual impact assessment of onshore wind turbines, COUNTRYSIDE COUNCIL FOR WALES, May 2010 (to be updated by 2013 edition).

[6] Pembrokeshire Coast National Park Authority Landscape Character Supplementary Planning Guidance

[7] Pembrokeshire Coast National Park Authority Renewable Energy Supplementary Planning Guidance

[8] Landscape Character Assessment, Guidance for England and Scotland, Swanwick, Carys and LUC, Scottish Natural Heritage with the Countryside Agency, 2002.

[9] Topic Paper 6 'Techniques and criteria for judging landscape sensitivity and capacity', Countryside Agency, 2004. (The updated version is to be made available soon at the time of writing).

complex skylines and settings of historic features. It should be noted that planning policy in Pembrokeshire is not reliant on 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

3.5. 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.

3.6. 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.

3.7. 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 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 parts of the 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.	This is the 'maximum' status for the Pembrokeshire Coast National Park and most of the landscapes of the study area. The Renewable Energy SPG is useful in defining what may be appropriate levels of development in the National Park.
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.	This description may be acceptable for some areas with lower sensitivity but may be above an acceptable threshold for many landscape character areas.
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.	This is highly likely to occur in the Strategic Search Area as approved schemes are implemented.
5	Windfarm	Landscape fully developed as a wind farm with no clear separation between groups of turbines.	Windfarm locations e.g. Alltwalis

3.8. 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)

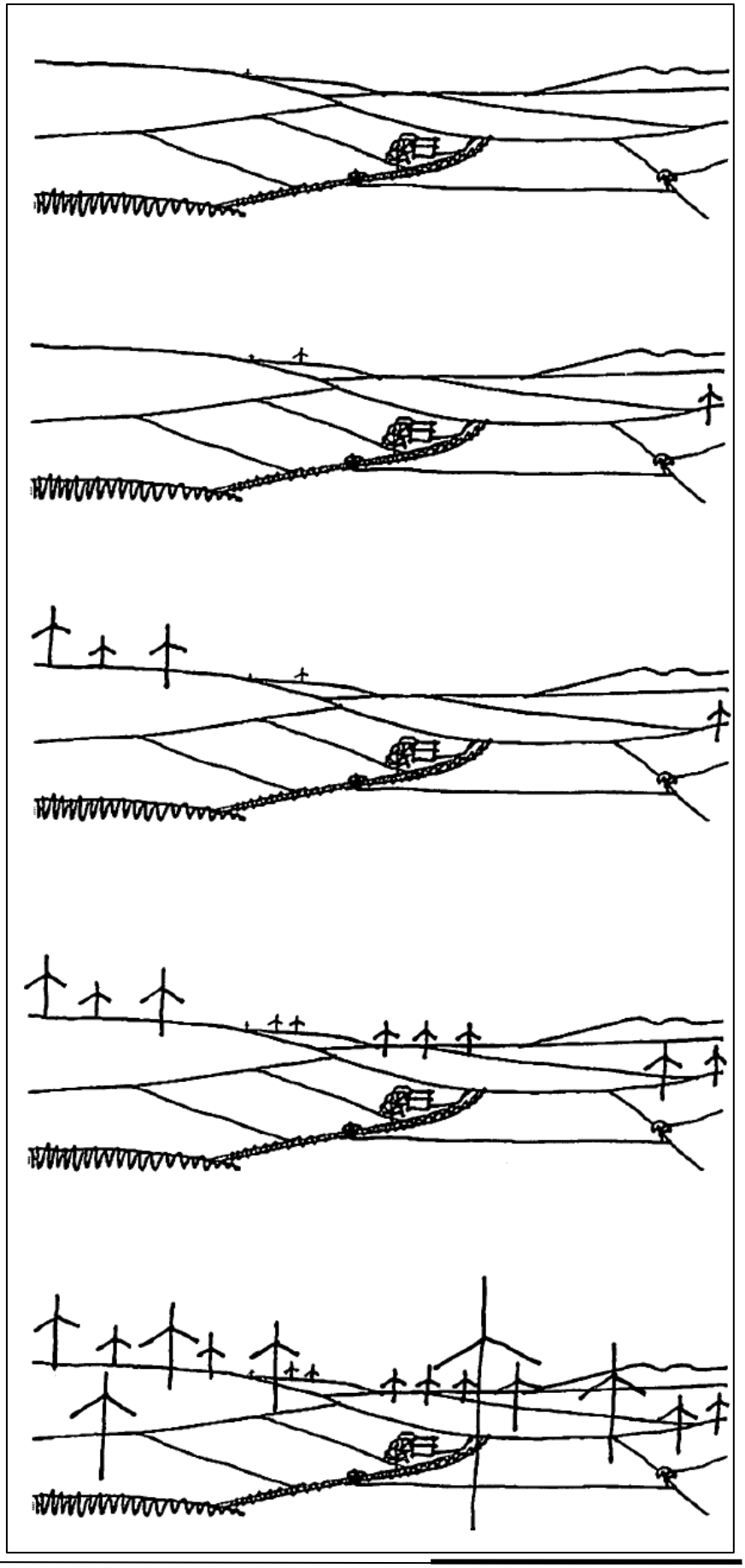
1 Landscape character area with no wind turbines

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



Description and assessment of effects

3.9. 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 existing and consented turbines from proposed turbines or examining 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.

3.10. When proposals are located in or near designated landscape areas 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, 10.8**). 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 2** (note that this is not intended as comprehensive).

Table 2 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. The GLVIA gives further details on identifying receptors.

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 existing and consented turbines from proposed turbines or examining 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.

Nature of offshore developments and the Atlantic Array

5.2. Offshore windfarms tend to be very large developments some distance offshore. The smaller 'Round 1 and 2 developments' around the UK's shores have been located away from the coasts of Pembrokeshire or Carmarthenshire. However, the site of the proposed development of the Atlantic Array lies in the outer Bristol Channel in UK territorial waters within the 'Round 3' Bristol Channel Zone.

5.3. As these large wind farm proposals are Nationally Significant Infrastructure Projects (NSIP) under section 15(3) of the Planning Act 2008 they are considered by the Planning Inspectorate. Pembrokeshire Coast National Park Authority, Pembrokeshire County Council and Carmarthenshire County Council are statutory consultees in this process.

5.4. The current proposed Atlantic Array is approximately 22 km from South Wales coast at its closest point on the Gower and 27km from the Pembrokeshire Coast National Park. It is further from the coast at Carmarthen Bay. It is around 27.5km long by 13.5km wide at its extremities. The draft layout consists of a maximum of 240 turbines 220m tall. These details may change as the proposals go through the planning process, but serve to illustrate the size of the proposals.

5.5. At present there is concern about the effects on the Pembrokeshire Coast National Park and its special qualities, particularly the effect on the feeling of tranquillity and remoteness along the coast and on views out to sea.

Information available

5.6. A regional seascape assessment[10] has been undertaken which identifies the key sensitivities of regional seascape units to offshore development. This is available on the Natural Resource Wales website. For each regional seascape unit, 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 seascape unit. Further work should then establish what cumulative effects there may be on the unit.

Approach

5.7. Bearing in mind the particular sensitivity of the coastline and seascape and various receptors along it, viewpoints should be selected in

[10] Welsh seascapes and their sensitivity to offshore developments, Briggs, J.H.W. & White, S, COUNTRYSIDE COUNCIL FOR WALES Policy Research Report No. 08/5, January 2009.

representative, sensitive and/or worse case locations. These should be located in all the relevant regional seascape units in the defined study area. Wirelines and/or photomontages should illustrate the wind turbines along with onshore 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.

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, Countryside Council For Wales Guidance Note 3 (2010) states that a CLVIA should describe and assess any significant cumulative effects potentially 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

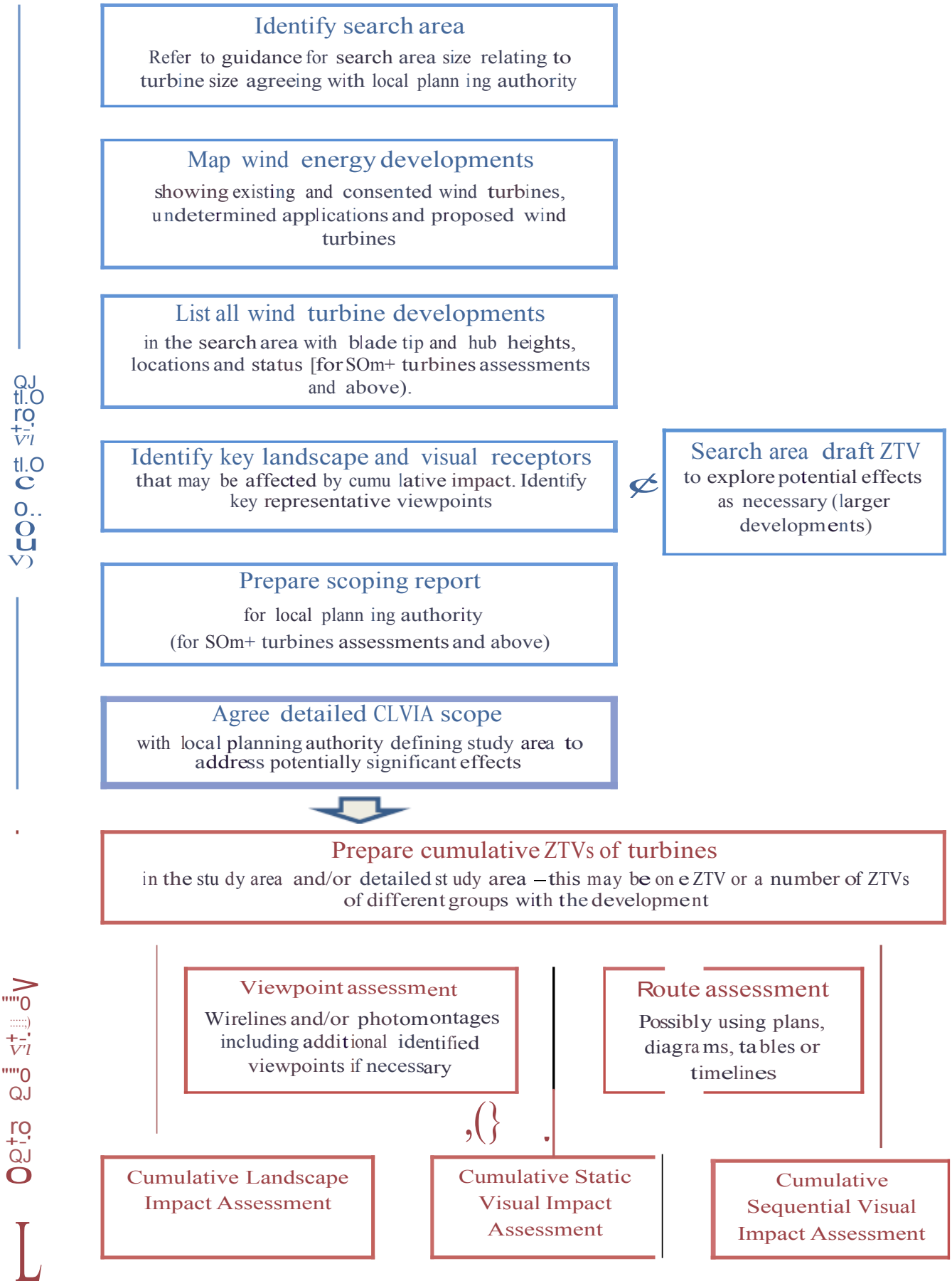
7. Step by step guide

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, 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 require a full CLVIA using Zones of Theoretical Visibility (ZTVs), wirelines and possibly photomontages and the scoping stage would be expected as part of this process.

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

Figure 5 Flowchart of process



8. Tools

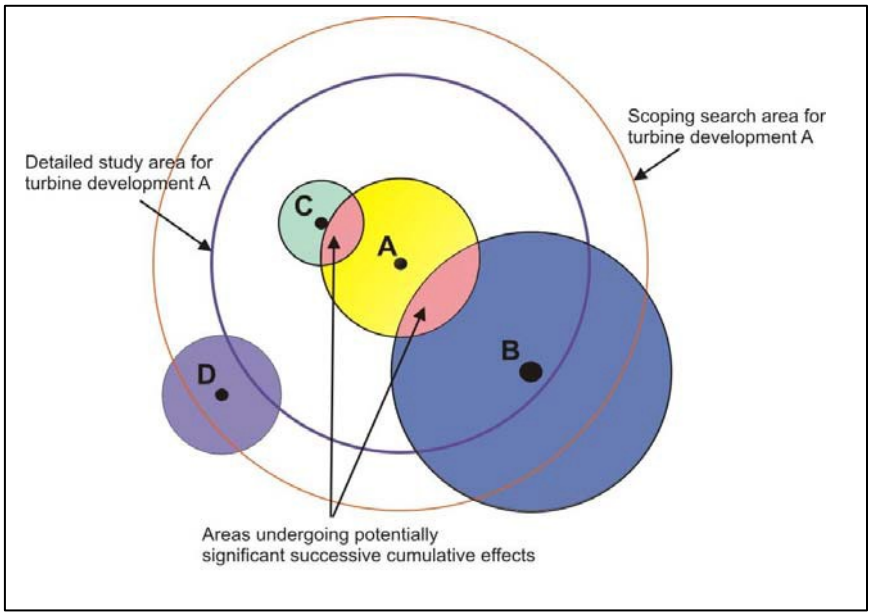
Overview

8.1. The key guidance on wind turbine development LVIAs and CLVIAs is set out in **Appendix B**. This includes the GLVIA3 and Scottish Natural Heritage guidance on cumulative effects and Visual Representation of Windfarms (2006). This guidance is taken as read in the context of this SPG 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 3.**

Figure 6 Diagrammatic Scoping and Study areas



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

Table 3: Recommended areas for cumulative assessment search and study

Proposed Turbine/s height to blade tip (m) unless otherwise stated	Scoping search area/ broad study area (km radius)	Detailed study area (km radius)
>15m to hub-35m	10km	5km
>35-50m	15km	7.5km
>50-80m	20km	10km
>80-109m	25km	10-15km
higher than 109m	30-60km	10-15km

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.

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.

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*, 2006, 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 , e.g. Profile data (10m grid) rather than Panorama data (50m grid), although a coarser grain may be acceptable beyond 5km from the proposal.

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

8.13. 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 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[11] as large as possible within practicalities.

Cumulative photomontages

8.14. For larger developments and/or from sensitive viewpoints, cumulative photomontages can be helpful. Generally a minimum of 300mm viewing distance is acceptable although larger viewing distances are preferable.

[11] 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.

Table 4 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	15m and less hub height	-	-	1km approxi-mately	• In the information supporting the planning application, (eg 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	above 15m hub height-35m	10	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 (see 8.7). • 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 are necessary- say 2 unless in sensitive area	5	• Prepare a cumulative ZTV of all turbines in study area if necessary (see 8.8-8.12). • Prepare wirelines from key viewpoints if necessary (see 8.13). • Provide a brief assessment of combined and additional cumulative **landscape** effects (see Section 3.0) concentrating mainly on interaction with closest turbines eg 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 a brief assessment of combined and additional cumulative **visual** effects (see Section 4.0) concentrating mainly on interaction with closest turbines eg 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).

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
Small/ medium	>35-50m	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 (see 8.7). • 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 (see 8.8-8.12). • Prepare wirelines from key viewpoints if necessary (see 8.13). • Provide an assessment of combined and additional cumulative **landscape** effects (see Section 3.0) concentrating mainly on interaction with closest turbines eg 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 eg 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).

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
Medium	>50-80m	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 (see 8.7) 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 (see 8.8-8.12). • Prepare wirelines from key viewpoints if necessary (see 8.13). • Provide an assessment of combined and additional cumulative **landscape** effects (see Section 3.0) using standard CLVIA methods (eg 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 (eg 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).

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
Medium /large	>80-109m	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 that are operational, under construction, consented and 'in planning' i.e. undetermined planning applications. This information will be available from the LPA (see 8.7) 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.	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. Scenarios differentiating between existing/consented and 'in planning' would be helpful (see 8.8-8.12). • Prepare wirelines and/or photomontages from key viewpoints if necessary (see 8.13-8.14). • Prepare wirelines from key viewpoints. • Provide an assessment of combined and additional cumulative **landscape** effects (see Section 3.0) using standard CLVIA methods (eg 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 (eg 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.

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
Large	higher than 109m	30-60	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 (see 8.7) 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 around 10 to many of the viewpoints selected for the individual impact assessment.	10-15	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 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 (eg 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).

*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.

National legislation and guidance

10.2. Under the Planning Act 2008, the National Policy Statements EN-1 and EN-3 for Renewable Energy Infrastructure July 2011 applies to nationally significant onshore wind turbine developments in England and Wales i.e. above 50MW output. This forms the primary basis for decisions by the National Infrastructure Directorate which is part of the Planning Inspectorate. Planning authorities are only statutory consultees in relation to these developments.

10.3. The only location for such developments in the current planning framework in Wales are the Strategic Search Areas (SSAs) defined by TAN8 which includes Strategic Search Area G in Carmarthenshire (see below).

10.4. **Planning Policy Wales** Edition 5 November 2012 (PPW) sets out the land use planning policies of the Welsh Government. It states that renewable energy projects should generally be supported by local planning authorities. However, it also states that in determining applications LOCAL PLANNING AUTHORITYs should take into account:

'-the impact on natural heritage, the coast and the historic environment....

-the need to minimise impacts on local communities, to safeguard the quality of life for existing and future generations;

-ways to avoid, mitigate or compensate identified adverse impacts.....' (12.10)

10.5. **Technical Advice Note (TAN) 8**: **Planning Policy for Renewable Energy**, provides technical advice to supplement the policy set out in PPW. It sets out a spatial strategy and objectives for onshore wind turbine development concentrating large windfarms into strategic search areas. In relation to the effects on landscape it states:

'the implicit objective ... is to maintain the integrity and quality of the landscape within National Parks/Areas Of Outstanding Natural Beauty in Wales i.e. no change in landscape character from wind turbine development. In the rest of Wales outside the Strategic Search Areas the implicit objective is to maintain the landscape character ie no significant change in landscape character from wind turbine development. Within (and immediately adjacent to) the Strategic Search Areas, the implicit objective is to accept landscape change i.e. significant change in the landscape character from wind turbine development.' (Annex D 8.4).

Pembrokeshire Coast National Park Policies

10.6. 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.

10.7. The **Pembrokeshire Coast National Park Local Development Plan** was adopted in September 2010. It includes a number of policies relevant to wind turbines.

10.8. 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 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.'

10.9. Policy 15: Conservation 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) being insensitively and unsympathetically sited within the landscape; and/or

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

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

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

10.10. Pembrokeshire Coast National Park Local Development Plan Policy 33: Renewable Energy, states that:

'Small scale renewable energy schemes will be considered favourably, subject to there being no over-riding environmental and amenity considerations. Medium scale schemes also offer some potential and will be permitted subject to the same considerations. Large scale renewable energy schemes will only be permitted where they do not compromise the special qualities of the National Park. Where there are other renewable energy schemes already in operation in the area, cumulative impacts will be an important consideration.....'

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

'On wind energy developments: there is potential for small-scale proposals (10 kW-50 kW) and to a lesser degree medium scale proposals (50 kW -330 kW). Finally, there are extremely limited opportunities from large-scale proposals (> 330 kW-3 MW).' (4.148 f).

10.12. A **Landscape Character Assessment SPG** for Pembrokeshire Coast National Park was completed in 2006 and updated in 2011. 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.

10.13. The Pembrokeshire Coast National Park Authority **Renewable Energy SPG 2011** 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- 65-125m; 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. These should be taken into consideration in any CLVIA where the landscape impact assessment study area includes the National Park.

10.14. 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 Policies

10.15. Pembrokeshire County Council adopted their Local Development Plan covering the county excluding the Pembrokeshire Coast National Park on 28 February 2013.

10.16. The Local Development Plan sets out a strategic policy for the provision of renewable developments. This includes:

10.17. Policy GN.4: Resource Efficiency and Renewable and Low-carbon Energy Proposals is a general policy on renewable energy. It 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 the supply of renewable energy through environmentally acceptable solutions will be supported.

10.18. Supporting text goes on to state:

6.31 Landscape impact, alone and in-combination, will be a material consideration in the evaluation of renewable energy proposals, with LANDMAP providing a valuable landscape analysis tool.

10.19. Other relevant polices include GN.1 General Development Policy, GN.2 Sustainable Design and in some cases SP.2 Port and Energy related development.

10.20. Pembrokeshire County Council has produced **'Wind Energy Planning Applications - Guidelines for Landscape and Visual Impact Assessment Requirements'** (August 2012) as a practice note. This gives guidance on the preparation of landscape and visual impact assessment (LVIA) requirements for wind energy planning applications. It cites appropriate good practice guidance and sets out a broad framework for information required to support LVIAs and CLVIAs.

10.21. The guidance categorizes the type of assessment which will be required in respect of turbine sizes, including turbines of less than 15m, 15-50m, and over 50m (to blade tip). For small turbines of less than 15m and outside national designated landscape areas a formal visual impact assessment is less likely to be required. For turbines of between 15m and 50m height a basic level of Landscape and Visual Impact Assessment is likely to be required with a Zone of Theoretical Visibility (ZTV) of 15km recommended. For turbines over 50m in height a more detailed Landscape and Visual Impact Assessment with a ZTV of 20-35km as recommended is likely to be required.

10.22. Pembrokeshire County Council is to prepare SPG on Renewable Energy and Landscape.

Carmarthenshire County Council Policies

10.23. The Brechfa Forest Strategic Search Area (SSA) is defined with a buffer area of land within 5km of the boundary of the Strategic Search Area. Supplementary Planning Guidance (SPG) for Major Wind Farm Development in the Brechfa Forest Area was approved by Carmarthenshire County Council in July 2008 and included a refined area for development.

10.24. The SPG recognises that *'development within, and immediately adjacent to, Strategic Search Areas is expected to cause a significant change in landscape character.'* It gives guidance on the preparation of an EIA, and refers to selected Carmarthenshire Unitary Development Plan Policies.

10.25. The key policies are:

CUDP 14 *It is the policy of Carmarthenshire County Council to support proposals for renewable energy schemes and developments, which minimise energy and resource requirements, where appropriate.*

UT6 *It is the policy of Carmarthenshire County Council that proposals for wind turbines, wind farms or groups of wind turbines will be*

permitted provided that the following criteria are met in full:

i. proposals either individually or cumulatively would not cause demonstrable harm by virtue of having a significant adverse impact on the quality of the local environment, or to sites of nature conservation, historical or archaeological importance, agricultural value, areas designated for their landscape value, or to species of nature conservation and ecological value;

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

iii. proposals that do not give rise to problems of highway safety or place unacceptable demands on the provision of public services;

iv. ancillary works, buildings and structures are kept to a minimum and sited unobtrusively within the landscape;

v. proposals should not lead to a significant adverse increase in risk or nuisance to, and impacts on the amenities of, nearby residents or other members of the public arising from wind turbine operation, shadow flicker, safety risk, radio or telecommunications interference;

vi. no turbine should cause demonstrable harm to the amenity of any residents;

vii. new connections to the local electricity distribution network should accord with policy UT2.

10.26. Other policies of relevance are:

CUDP 9 It is the policy of Carmarthenshire County Council to enhance the natural environment safeguard it from inappropriate development.

GDC 3 It is the policy of Carmarthenshire County Council that development in the countryside will not be permitted except for the following (selected) purposes:

....(vi) other uses which are appropriate to the character of the rural area, and which cannot be provided in a nearby settlement;

(vii) operational development by statutory undertakers and renewable energy schemes subject to their compliance with other policies within this plan; .....

10.27. **EN 16** It is the policy of Carmarthenshire County Council that in areas designated as **Special Landscape Areas**[12] ... priority will be given to the conservation and enhancement of the landscape, while new development that would result in harm to their character and appearance will not be permitted.

[12] Special Landscape Areas 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), Coastal plain (salt marsh, sand dunes, beach and mudflats)

APPENDIX B

Useful References

Appendix B: Useful References

Landscape and visual impact assessment and cumulative landscape and visual impact assessment

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APPENDIX C

Glossary

Appendix C: 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 in the seascape/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.
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 seascape into areas of distinct, recognisable and consistent common character in grouping areas of similar character together. It requires the identification of patterns in the seascape, created by the way the natural and human influences interact and are perceived and experienced to create character in the seascape.*
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 and effects	the observer is able to see two or more developments from 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.
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.
Term	*Definition*
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, cliff, coastal vegetation, watercourses, drainage
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 wind energy proposal.
Environmental Statement	the document supporting a planning application that sets out 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.
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.
Term	*Definition*
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 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	landscape character is a distinct and recognisable pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape character assessment (LCA)	LCA is 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 seascape distinctive. *

Term	*Definition*
Landscape character areas	these are single unique areas which are discrete geographical areas of a particular landscape character. Each has its own individual character and identity.
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 and landcover characteristics.
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	the ability of the landscape to respond to and accommodate change. It reflects character, the nature of change and the way both are perceived and experienced by people.
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 and LANDMAP aspects. A landscape may be valued by different communities of interest for many different reasons. These can include scenic beauty, tranquillity, wildness, special cultural associations, the presence of conservation interests, rarity or the existence of a consensus about importance, either nationally or locally. Some areas will be designated to express their value. Value is also attributed to each LANDMAP aspect using a variety of criteria. An indication of how an area is valued may also be gained from observation of how it is used- e.g. a popular path to a hilltop viewpoint.
Landscape and Visual Impact Assessment (LVIA)	is an established methodology which is used to assess the impact of the development or other use change on seascape, landscape and visual amenity. It includes analysis of the effects during the construction, operation and decommissioning phases of the development, including any restoration or after uses.
Magnitude of effect	degree of change
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	people in different situations who can experience views within an area and who may be affected by change or development. Receptors can include users of public rights of way, open access land, people in and around their own homes and tourists.
Receptor, seascape/landscape	seascape/landscape character areas, designations, elements or features which may be affected by development.
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, 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.
Sensory	that which is received through the senses i.e. sight, hearing, smell, touch.
Scenic quality	seascape/landscape with scenes of a picturesque quality with aesthetically pleasing elements in composition (*derived from LANDMAP visual and sensory aspect*).
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*
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 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	the likely visual effects undergone by people that would result from a development proposal or change in land management.
Wind Energy Development	development consisting of one or more wind turbines, access tracks, ancillary buildings, substation, anemometer masts and supporting infrastructure.
ZTV	ZTV or ZVI (Zone of Visual Influence) analysis is the process of determining the visibility of an object in the surrounding landscape. The process is objective in which areas of visibility or non-visibility are determined by computer software using a digital elevation dataset. The output from the analysis is used to create a map of visibility.

*Natural England, Scottish Natural Heritage and the Countryside Council for Wales (2011), Landscape Character Assessment Guidance (consultation draft).