



Pennant Walters

GLANLLYNFI GARTH WIND FARM

Draft Environmental Statement

Appendix 6A - LVIA Methodology and Glossary



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1. Introduction

1.1 Purpose of this Appendix

1.1.1 This appendix describes the methodology used within the landscape and visual impact assessment (LVIA) for the proposed Glanllynfi Garth Wind Farm (the 'Proposed Development') which comprises eight turbines with a maximum blade tip height of up to 180m and associated infrastructure.

1.1.2 Appendix 6A has been structured as follows:

- **Section 1** Introduction;
- **Section 2:** Assessing Landscape Effects;
- **Section 3:** Assessing Visual Effects;
- **Section 4:** Assessing Cumulative Landscape and Visual Effects;
- **Section 5:** Evaluation of Significance;
- **Section 6:** Residential Visual Amenity Assessment;
- **Section 7:** Night-time Assessment; and
- **Section 8:** Production of Zones of Theoretical Visibility (ZTV) and Visualisations.

1.1.3 A glossary of terms and abbreviations is included in **Section 9**.

1.2 Overview of the LVIA Methodology

1.2.1 The LVIA assesses the likely effects of the Proposed Development on the landscape and visual resource, encompassing effects on landscape elements, characteristics and landscape character, designated landscapes, visual effects and cumulative effects.

1.2.2 Essentially, the landscape and visual effects (and whether they are significant) are determined by an assessment of the nature or 'sensitivity' of each receptor or group of receptors and the nature of the effect or 'magnitude of change' that would result from the Proposed Development. The evaluation of sensitivity takes account of the value and susceptibility of the receptor to the Proposed Development. This is combined with an assessment of the magnitude of change which takes account of factors such as the size and scale of the proposed change and the geographical extent. Other factors regarding the nature of the effect such as the duration of change and whether the effect is cumulative are also noted. By combining assessments of sensitivity and magnitude of change, a level of landscape or visual effect as well as the nature of that effect can be evaluated and the significance of the effect determined.

1.2.3 The resulting level of effect is described in terms of whether it is significant or not significant and the type or nature of effect is described as either direct or indirect;

temporary or permanent (reversible); cumulative; and positive, neutral or negative. The assessment has also considered the cumulative effects resulting from the Proposed Development in combination with other operational and consented wind farms, and wind farms at the planning application stage.

- 1.2.4 The time period for the assessment covers phases of development related to the construction of the Proposed Development and associated infrastructure, its operation for a period of 30 years, and decommissioning.
- 1.2.5 LVIA unavoidably involves a combination of both quantitative and subjective assessment and wherever possible a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

1.3 Data Sources and Site Survey

Technical guidance and best practice

- 1.3.1 The methodology for the LVIA accords with the Landscape Institute and IEMA *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition¹ (GLVIA 3), including Technical Guidance Note LITGN-2024-01². In addition to planning policy documents and other supporting technical guidance, the LVIA methodology includes, but is not limited to the following:
 - Using LANDMAP in Landscape and Visual Impact Assessments GN46³;
 - Technical Guidance Note 02/21 - Assessing landscape value outside national designations⁴
 - Visual Representation of Windfarms, Version 2.2⁵;
 - Technical Guidance Note 06/19: Visual Representation of Development Proposals⁶;

¹ Landscape Institute and the Institute of Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment*. 3rd edition. London. Routledge

² Landscape Institute (2024) *Technical Guidance Note LITGN-2024-01 Notes and Clarifications on Aspects of Guidelines for Landscape and Visual Impact Assessment Third edition (GLVIA3)*. (Online). Available at: https://www.landscapeinstitute.org/wp-content/uploads/2024/08/LITGN-2024-01-GLVIA3-NC_Aug-2024.pdf

³ Natural Resources Wales (2025) *Using LANDMAP in Landscape and Visual Impact Assessments GN46*. (Online). Available at: <https://naturalresourceswales.gov.uk/guidance-and-advice/business-sectors/planning-and-development/evidence-to-inform-development-planning/using-landmap-in-landscape-and-visual-impact-assessments-gn46/?lang=en>

⁴ Landscape Institute (2021) *Technical Guidance Note 02/21 - Assessing landscape value outside national designations*. (Online). Available at: <https://www.landscapeinstitute.org/publication/tgn-02-21-assessing-landscape-value-outside-national-designations/>

⁵ Scottish Natural Heritage (now NatureScot) (2017) *Visual representation of wind farms: Guidance. Version 2.2*. (Online). Available at: <https://www.nature.scot/doc/visual-representation-wind-farms-guidance>

⁶ Landscape Institute. (2019). *Technical Guidance Note 06/19 Visual Representation of Development Proposals*. (online). Available at: <https://www.landscapeinstitute.org/visualisation/>

- Guidance: Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments⁷;
- Nationally Significant Infrastructure: Advice on Cumulative Effects Assessment⁸;
- Technical Guidance Note 02/19: Residential Visual Amenity Assessment⁹;
- Special Landscape Qualities - Guidance on assessing effects¹⁰; and
- Guidance on Aviation Lighting Impact Assessment¹¹.

1.3.2 The landscape and visual effects of wind turbines can be directly experienced through the observation of existing wind farms within this area. Noticeably, wind farm development can co-exist with other features of the landscape, rather than replacing or removing them, as is the case of more conventional built development, although they can alter the landscape character of an area. Wind farm development is also visually permeable and although views may be interrupted, they are not blocked or prevented. Generally, wind farms have a 'small' development footprint that preserves much of the physical elements of the landscape, but entails the addition of tall structures, which are unavoidably visible over longer distances, leading to greater visual effects. A further, important difference is the reversibility of almost all of the landscape and visual effects as a result of the decommissioning stage.

1.3.3 Wind farms give rise to a wide range of opinions, from strongly negative to strongly positive. However, LVIA is not an assessment of public opinion, although a precautionary approach has been taken, which assumes that the nature of the effects would be adverse unless otherwise stated.

Defining the LVIA Study Area

1.3.4 Current NRW guidance³ advises that the LVIA Study Area for structures of a height of between 176 m to 225 m should extend to 26 km to 28 km distance from each of the proposed turbine locations. For this LVIA, which assesses a maximum turbine height of 180 m, a 28 km Study Area has been defined in accordance with the EIA Scoping Direction. This LVIA study area is illustrated in **Figure 6.1**.

1.3.5 It is important to note that the boundary of the LVIA Study Area is not the limit of potential visibility. Rather, it is an area to determine a suitable LVIA Study Area for

⁷ Scottish Natural Heritage (now NatureScot) (2012) *Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments*. (Online). Available at: <https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments#Introduction+and+scope+of+this+guidance>

⁸ Planning Inspectorate (2025) *Nationally Significant Infrastructure: Advice on Cumulative Effects Assessment* (Online). Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-cumulative-effects-assessment#stage-1-establishing-the-long-list-of-other-existing-and-or-approved-development>

⁹ Landscape Institute (2019). *Technical Guidance Note 02/19: Residential Visual Amenity Assessment*. (Online). Available at: <https://www.landscapeinstitute.org/technical-resource/rvaa/>

¹⁰ NatureScot (2025) *Special Landscape Qualities - Guidance on assessing effects*. (Online). Available at: <https://www.nature.scot/doc/special-landscape-qualities-guidance-assessing-effects>

¹¹ NatureScot (2024) *Guidance on Aviation Lighting Impact Assessment*. (Online). Available at: <https://www.nature.scot/doc/guidance-aviation-lighting-impact-assessment>

the assessment of wind farms which will contain all likely significant landscape and visual effects.

Desk-based and site survey work

- 1.3.6 The LVIA is informed by desk-based studies, site, and field survey work undertaken within the LVIA Study Area.
- 1.3.7 A preliminary desk-based assessment was undertaken of landscape and visual receptors using a range of map-based data and related computer and digital analysis including ZTV, digital and / or surface terrain modelling and wireframe and street view software. This information used to inform initial assessments and focus the site and field survey work and likely locations for viewpoint photography and sequential route assessment.
- 1.3.8 The field studies have included documented visits to all relevant landscape and visual receptors to assess the likely effects of the Proposed Development in the field, checking data, 'ground truthing' and examining landscape elements, characteristics / character, and views / visual amenity.
- 1.3.9 Site and field survey activities included:
- Field survey verification of the ZTV from landscape and visual receptor locations, transport, and recreational routes through the LVIA Study Area;
 - Micro-siting of viewpoint locations and recording of panoramic baseline photography and subsequent visual assessment from the assessment viewpoints; and
 - Field survey assessment and verification of likely landscape, visual and cumulative effects.
- 1.3.10 Site survey work was undertaken in fair weather conditions with a minimum Met Office Visibility: Good (i.e. between 10-20km¹²) where possible. Due to changing weather conditions on the day, this is not always achievable, but photography is taken to ensure at least the Site and its immediate context are visible from the particular viewpoint as a minimum.

1.4 Integrated Design and Assessment

- 1.4.1 Design is an integrated and iterative part of the LVIA process. In particular the advice from the relevant local planning authority and the following documents, is relevant to the design in terms of the turbine scale, location / layout and where required aviation warning lights:
- Designing for Renewable Energy in Wales¹³; and
 - Siting and Designing Wind Farms in the Landscape Guidance (Version 3a)¹⁴.

¹² <https://www.metoffice.gov.uk/services/data/datapoint/code-definitions>

¹³ Design Commission for Wales (2023) *Designing for Renewable Energy in Wales*. (Online). Available at: <https://www.gov.wales/sites/default/files/publications/2023-12/designing-for-renewable-energy-in-wales.pdf>

¹⁴ Scottish Natural Heritage (now NatureScot) (2017) *Siting and Designing Wind Farms in the Landscape Guidance (Version 3a)*. (Online). Available at: <https://www.nature.scot/doc/siting-and-designing-wind-farms-landscape-version-3a>

Potential effects during Construction

- 1.4.2 A range of potential effects on the landscape and visual resource are likely during the construction of the Proposed Development. An appraisal of the potential effects helps to define the scope of the LVIA and develop an integrated design and mitigation response which can be embedded into the Proposed Development. The potential effects likely to result from construction are described below.
- Landscape Effects:
 - ▶ Effects on landscape elements, features and patterns (including, but not limited to soils, landform, ground vegetation, hedgerows / field boundaries, trees / forestry and buildings) as a result of land preparation including site clearance and earthworks.
 - ▶ Effects on landscape character and key characteristics, including perceptual characteristics and qualities as a result of construction activities. The construction activities are likely to include the presence of construction staff and machinery, cranes, vehicle movements, contractors' facilities and site access associated with the Proposed Development.
 - ▶ Effects on the special landscape qualities and integrity of designated landscapes as a result of the above construction activities.
 - Visual Effects:
 - ▶ Effects on the views and visual amenity experienced by people undertaking various activities at various locations, distances and directions from the proposed land preparation and construction activities. These visual effects could be experienced from one location or sequentially as part of a route through the landscape such as a cycle route or long-distance footpath.
 - Cumulative effects:
 - ▶ Cumulative effects could occur as a result of multiple wind farm construction activities affecting a landscape or visual receptor.

- 1.4.3 Mitigation and design responses may include a range of design decisions about the location, form, process and timing of construction related infrastructure / operations to mitigate potential landscape and visual effects (avoid, reduce or compensate) as well as reference to a range of best practice behaviours and processes undertaken as part of construction site operation.

Potential Effects during Operation

- 1.4.4 The potential effects during operation relate principally to the presence of the Proposed Development and its on-going maintenance during the 30-year operational period. This is likely to lead to long-term (reversible) effects on landscape and visual receptors.
- 1.4.5 Mitigation and design responses may include landscape / architectural design strategies which aim to control the physical appearance of the Proposed Development in terms of its scale, form, colour and number of components. Examples include Landscape Mitigation Plans, choice of project colour scheme, or

focus on particular aspects such as a Lighting Strategy to reduce effects on the night-time environment.

- 1.4.6 Landscape Mitigation Plans illustrate and explain a range of landscape design and management techniques that may be employed to mitigate the effects of Proposed Development by enhancing and controlling its landscape setting and visual appearance. Examples include landscape planting and management plans, habitat management plans and integrated forestry design and management plans, all of which can relate to 'on-site' and off-site' interventions.

Potential Effects during Decommissioning

- 1.4.7 The Proposed Development would be decommissioned, giving rise to a temporary period during which effects would be similar to the construction period before the land is reinstated, leading to a whole or partial reversal of the landscape and visual effects.

2. Assessing Landscape Effects

2.1 Overview

- 2.1.1 Landscape effects are defined by the Landscape Institute in GLVIA3¹, paragraphs 5.1 and 5.2 as follows:

“An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. ... The area of landscape that should be covered in assessing landscape effects should include the site itself and the full extent of the wider landscape around it which the development may influence in a significant manner.”

2.2 Landscape effects

- 2.2.1 The potential landscape effects, occurring during the construction, operation and decommissioning periods of the Proposed Development may therefore include, but are not restricted to the following:
- Changes to landscape elements: the addition of new elements (wind turbines for example) or the removal of existing elements such as trees, vegetation and buildings and other characteristic elements of the host LANDMAP aspect areas;
 - Changes to landscape qualities: degradation or erosion of landscape elements and patterns and perceptual characteristics, particularly those that form key characteristic elements of host LANDMAP aspect areas or contribute to the landscape value;
 - Changes to landscape character: landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities (including perceptual characteristics) and the addition of new features, the magnitude of which is sufficient to alter the overall landscape character within LANDMAP aspect areas;
 - Changes to designated landscapes: including nationally and locally designated landscapes that would affect the special landscape qualities underpinning these areas and their integrity; and
 - Cumulative landscape effects: where more than one wind farm may lead to a cumulative effect.
- 2.2.2 Development may have a direct effect on the landscape as well as an indirect effect which would be perceived from the wider landscape, outside the immediate site area and its associated landscape character / designation. Landscape effects also have to be recognised in terms of natural and man-made processes which can change or alter the landscape over time.

2.3 Evaluating Landscape Sensitivity to Change

- 2.3.1 The sensitivity of the landscape to a particular development considers the susceptibility of the landscape and its value. The overall sensitivity is described as High, Medium, Low, or Very Low. Landscape sensitivity often varies in response to both the type of development proposed and the particular site location, such that landscape sensitivity needs to be considered on a case-by-case basis. This should not be confused with ‘inherent sensitivity’ where areas of the landscape may be referred to as inherently of ‘high’ or ‘low’ sensitivity. For example, a National Park may be described as inherently of high sensitivity on account of its designation, although it may prove to be less sensitive to particular development and/or of variable sensitivity across the geographical area of the National Park. Alternatively, an undesignated landscape may be of high sensitivity to a particular development regardless of the lack of local or national designation.
- 2.3.2 The main factors considered are discussed as follows:

Landscape Assessment: Susceptibility

- 2.3.3 Landscape susceptibility according to GLVIA3¹ means “*the ability of the landscape to accommodate the development without undue consequences for maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*”. In the case of wind farm development, there may be local or regional spatial strategies and/or landscape studies that can assist in broad scale judgements about the overall landscape capacity or sensitivity to wind farm development¹⁵. Attention, however, must be paid to the purpose, scope and methodology of these documents, as whilst providing assistance for strategic planning, they are not usually suitable for the assessment of specific wind farm proposals and should not be directly applied to individual applications. Rather, they provide broad information that should be considered as part of the more detailed landscape assessment.
- 2.3.4 Judgements on landscape susceptibility include references to both the physical and aesthetic landscape characteristics, and the potential scope for mitigation. Landscape susceptibility varies according to different areas of landscape character and whilst accepting that wind farm development is likely to lead to high levels of landscape change in most circumstances, factors that commonly indicate lower landscape susceptibility to wind farm development include landscape characteristics of larger scale, uniformity of land cover, simple landform and skylines with limited landscape features. Generally speaking, lower landscape susceptibility together with lower landscape value tends to indicate lower landscape sensitivity to development. Conversely, higher landscape susceptibility and value tend to indicate higher landscape sensitivity to development.

¹⁵ A good example is *Heads of the Valleys Smaller Scale Wind Turbine Development Landscape and Sensitivity Study Final Report* (April 2015) prepared by Gillespies.

2.3.5 Common indicators of landscape susceptibility¹⁶ to wind farm development are as follows:

- **Landscape Scale:** A large-scale landscape is generally considered to be less susceptible to wind farm development in comparison to a small-scale landscape.
- **Landform and Topography:** A simple landform with smooth, regular, rolling, undulating, or flowing landforms that might include plains, undulating or rolling lowlands, and plateaus that are generally considered to be less susceptible to wind farm development in comparison to more complex landforms which might include narrow glens, valleys, dramatic rugged and/or distinct landform features or pronounced undulations.
- **Openness and Enclosure:** Open landscapes are generally considered to be less susceptible to wind farm development, but could entail wider visibility, conversely enclosed landscapes could offer more screening potential, limiting visibility to a smaller area, but are also likely to be of smaller scale.
- **Land Cover Pattern:** Simple, regular landscapes with extensive areas of uniform ground cover (moorland / grassland, unenclosed land, forestry, large regular field patterns, parliamentary enclosures) are generally considered to be less susceptible to wind farm development in comparison to landscapes with more complex or irregular land cover (smaller fields, medieval enclosures, smaller scale 'patchwork' landscapes of mixed fields with small woodland copses).
- **Presence of Development:** Areas where there are existing large-scale developments including industry, mineral extraction, masts, pylons, other wind turbines (noting these turbines may be decommissioned in the lifetime of the Proposed Development), urban fringe / large settlement and major transport routes are generally considered to be less susceptible to wind farm development in comparison to areas characterised by smaller scale development (smaller, generally historic villages with dense settlement patterns and smaller scale associated buildings such as churches).
- **Landmarks:** Landscapes that contain large scale landmarks which may include other wind farms (noting wind turbines may be decommissioned in the lifetime of the Proposed Development), and infrastructure and large-scale developments are generally less susceptible to wind farm development although development needs to be carefully sited to manage landscape foci and avoid 'visual clutter' or cumulative impacts. Historic landmarks such as important views to distinctive church spires and towers, particular 'landmark' landforms (prominent hills or peaks) or 'land art' generally increase susceptibility.

¹⁶ Scottish Natural Heritage (2015). A Guide to Commissioning a Landscape Capacity Study (Online) Available at: <https://www.nature.scot/sites/default/files/2019-10/A%20Guide%20to%20Commissioning%20a%20Landscape%20Capacity%20Study%20Toolkit.pdf>

- **Settlement:** Landscapes which are un-settled or with lower levels of population are generally considered to be less susceptible to wind farm development in comparison to more densely populated areas.
- **Skyline:** Prominent and distinctive skylines, horizons (including indented ridges / peaks, key views and or vistas) or skylines with important landmark features that are identified in LANDMAP commentaries and responses, are generally considered to be more susceptible to wind farm development in comparison to broad, simple skylines which lack landmark features or contain other turbines / tall infrastructure features.
- **Change and Movement:** Landscapes which contain movement (traffic, wind turbines, other moving infrastructure and waves / tides) or are subject to high levels of change (large scale forestry operations, mineral extraction, man-made change and development) are generally considered to be less susceptible to wind farm development in comparison to landscapes that are still or appear to be unchanging and/or notably historic with notable 'time depth'.
- **Remoteness, Naturalness, Wildness / Tranquillity:** Notably wild or tranquil landscapes are generally considered to be more susceptible to wind farm development in comparison to cultivated or farmed / developed landscapes where perceptions of 'wildness' and tranquillity are less tangible. Landscapes which are either remote or natural may vary in their susceptibility to wind farm development.
- **Landscape Context and Adjacent Landscapes:** The location and visual connection to adjacent landscapes may also have a bearing on the overall susceptibility of the landscape to wind farm development. This consideration is pertinent to the ridgeline and valley topography that characterises the parts of south Wales including the defined study area.

Landscape Assessment: Value

- 2.3.6 This includes the consideration of a range of features which may include the presence or absence of landscape designation, special landscape qualities, rarity / representativeness, conservation interests, recreational value, perceptual qualities such as tranquillity and historical or cultural associations, as set out in the Landscape Institute's *Technical Guidance Note 02/21 - Assessing landscape value outside national designations*⁴. The importance attached to a landscape, often as a basis for designation or recognition, which expresses national or local consensus, because of its quality including cultural associations, scenic or aesthetic qualities. Landscape value may be indicated by the presence or absence of a landscape planning designation such as a National Park, National Landscape or Special Landscape Area (SLA) (higher value) indicating a landscape of national or local value accordingly or an undesignated landscape (lower value).
- 2.3.7 The absence of a landscape planning designation should not assume an area of 'low' landscape value and undesignated areas of landscape are often of some local value. Indications of this are likely to be present in the form of documented, locally valued, cultural / natural heritage and scenic or aesthetic qualities such as 'wildness' or the presence of viewing platforms or benches. The state of repair or condition of the elements of a particular landscape, its integrity and intactness and

the extent to which its distinctive character is apparent are also relevant. The value of a landscape element may be influenced by the degree to which it may contribute to the overall landscape character type/area (i.e., its role), its rarity, and its condition. Landscapes of lower value tend to include those under intensive agriculture, forestry or urban fringe situations where the landscape elements and patterns have been eroded, landscapes with man-made development such as infrastructure or other wind farms (noting wind turbines may be decommissioned in the lifetime of the Proposed Development), and areas of derelict or vacant land, areas of mineral extraction and / or land fill.

Overall Landscape Sensitivity

2.3.8 Judgements on value and susceptibility are combined to determine overall landscape sensitivity which is informed by professional judgement and guided by the following matrix shown in **Table 6A.1**. In terms of landscape value, statutory landscape designations are generally accorded the highest assessment value.

Table 6A.1 Evaluation of Landscape Sensitivity

		<u>Susceptibility:</u>			
		High	Medium	Low	Very Low
Value:	High	High	High to Medium	Medium	Medium to Low
	Medium	High to Medium	Medium	Medium to Low	Low
	Low	Medium	Medium to Low	Low	Low to Very Low
	Very Low	Medium to Low	Low	Low to Very Low	Very Low

2.3.9 Further guidance on the evaluation of landscape sensitivity is provided in **Table 6A.2**.

Table 6A.2 Landscape Sensitivity

Examples of Landscape Sensitivity	
High	Landscape character, characteristics, and elements with no or limited landscape capacity or scope for landscape change and higher landscape value and susceptibility to the Proposed Development. Often includes landscapes which are nationally, internationally or regionally designated and have a high landscape value.

Examples of Landscape Sensitivity

In relation to landscape designations, the documented Special Landscape Qualities¹⁷ are such that there would be no or limited landscape capacity or scope for landscape change of the type posed by the Proposed Development.

Medium

Landscape character, characteristics, and elements with some landscape capacity or some scope for landscape change. Often includes landscapes of medium landscape value and quality as assessed in the relevant VSAA LANDMAP responses which may be locally designated or undesignated and have a medium landscape value.

In relation to landscape designations, the documented Special Landscape Qualities are such that there would be some landscape capacity or scope for change or accommodation.

Low

Landscape character, characteristics and elements which display greater landscape capacity or scope for landscape change to accommodate the proposed development as part of spatial strategy for example. Usually applies to landscapes which are undesignated with indicators of lower landscape susceptibility to development. May also apply to landscapes that may have been subject to intensive agriculture, blanket forestry or other man-made development and have a low landscape value.

Very Low

Landscape character, characteristics and elements where there is a high landscape capacity or a planned desire for landscape change of the type proposed as part of spatial strategy for example. Usually applies to landscapes with a lower landscape susceptibility to development. May also apply to derelict landscapes, or vacant land, areas of mineral extraction and / or land fill for example.

2.4 Evaluating the Magnitude of Landscape Change

- 2.4.1 The 'magnitude' or 'degree of change' resulting from a particular development is described as Very High, High, Medium, Low, Very Low or Zero. This is assessed by considering the scale, geographical extent and duration of the proposed change, which may include the loss or addition of particular features (primarily wind turbines), changes to landscape quality and changes to landscape character. As such, this needs to be considered on a case-by-case basis. It may be possible for some mitigation measures to reduce the magnitude of change and consequently the residual landscape effects, and for these reasons the landscape design of the wind farm should form an iterative part of the assessment process. The main factors to be considered are discussed as follows.

¹⁷ As set out in a National Park Management Plan or the several Special Landscape Area reviews that have been commissioned by individual or consortia of local authorities in south Wales.

- **Loss, Alteration, or Addition to Landscape Elements:** Development may result in the loss, alteration, or addition of landscape elements such as trees, hedgerows, or development components such as wind turbines anemometry masts and new access tracks. These can be quantified objectively;
- **Loss, Alteration, or Addition to Landscape Characteristics / Quality:** Development may result in the loss, alteration, or addition of physical landscape characteristics, such as wooded areas, landscape patterns, or development components such as wind turbines, which can be quantified objectively. Perceptual characteristics and effects on scenic quality or wildness also need to be considered, albeit subjectively, with reference made to objective and documented opinion; and
- **Change to Landscape Character (as represented by LANDMAP Aspect Areas):** All landscapes change over time and much of that change is managed or planned. Often landscapes will have management objectives for 'protection' or 'accommodation,' meaning that they may accommodate wind farm development and 'change' whereby the landscape character could be altered to create new landscapes for the accommodation of wind farm development and / or forestry or to provide areas or development resulting in townscape or peri-urban development. The scale of change may be localised, or occurring over parts of an area, or more widespread affecting whole landscape character areas and their overall integrity.

2.4.2 In addition to the scale or magnitude of the effect, GLVIA3¹ advises that consideration should also be given to the following aspects of a landscape effect:

Geographical Extent

2.4.3 Landscape effects should be described in terms of the geographical extent or physical area that would be affected (described as a linear or area measurement e.g., spatial extent of the hub height and/or blade tip ZTVs). This should not be confused with the scale of the Proposed Development or its physical footprint. Landscape effects occurring over a larger geographical extent and over a higher proportion of a landscape designation or LANDMAP aspect area are more likely to be regarded as very high.

Duration and Reversibility

2.4.4 Landscape effects should also be described in terms of the duration of the effect and whether this would be permanent, temporary or reversible. Duration can be considered as ranging between temporary (short to long term¹⁸ and time limited) or permanent. Although 'long term' some development such as housing should be regarded as permanent, whilst mineral extraction works usually entail several phases of development, followed by restoration to a 'new' landscape character. Wind farm development usually operates for a long term, time limited operational period, in the case of the proposed Glanllynfi Garth Wind Farm, 30 years followed

¹⁸ Paragraph 5.51 of GLVIA3¹ notes that there "*is no fixed rule*" with regard to the definitions of short-term, medium-term and long-term. For the purposes of this assessment, short-term is considered to be a duration of 0-2 years, with medium-term being 2-10 years and long-term is judged to be 10+ years.

by a decommissioning period that would allow the landscape effects to be reversed.

Summary

- 2.4.5 Further guidance on the evaluation of landscape sensitivity and magnitude are provided in **Table 6A.3**.

Table 6A.3 Magnitude of landscape change

Examples of Landscape Magnitude	
Very High	Fundamental landscape change that would include the loss of several key landscape characteristics / special qualities or the addition of new highly uncharacteristic features or elements, that would become the dominant characteristics of the landscape, and change the overall landscape quality, and character over an expansive area.
High	A large-scale change and / or extent that may include the loss of key landscape characteristics / special qualities or the addition of uncharacteristic new features or elements, that would become prominent new characteristics of the landscape over a large area.
Medium	A medium-scale change of limited scale and extent including the loss of some key landscape characteristics / special qualities or elements, or the addition of some uncharacteristic new features or elements that would potentially change the landscape quality and character of a localised area or part of a landscape character type/area.
Low	A low-scale change affecting small areas of landscape character / special qualities, including the loss of lower value landscape elements, or the addition of new features or elements of limited characterising influence.
Very Low	A very low change affecting smaller areas of landscape character and quality, including the loss of some landscape elements or the addition of features or elements, which are either of low value or hardly noticeable in terms of their contribution to the landscape character.
Zero	There would be no change to the receptor.

2.5 Evaluating landscape effects and significance

- 2.5.1 The level of landscape effect is evaluated through the combination of landscape sensitivity and magnitude of change, a process assisted by the matrix in **Table 6A.7**, which is used to guide the assessment. In those instances where there would be no change to the landscape, the magnitude has been recorded as 'Zero' and the level of effect as 'None.'
- 2.5.2 Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' as required by the relevant EIA Regulations. Further information is also provided about the nature of the effects (whether these would be direct / indirect, temporary / permanent / reversible, cumulative, or beneficial, neutral, or adverse).

- 2.5.3 In describing the level of landscape effect, the assessment text clearly and transparently sets out the professional judgements that have been made in determining sensitivity and how the value and susceptibility of the landscape receptor has been assessed; and in determining magnitude and how the size and scale, geographical extent and duration of the effect has been considered.

Significant Landscape Effects

- 2.5.4 A significant effect would occur where the combination of the variables results in the Proposed Development having a defining effect on the landscape receptor, or where changes of a lower magnitude affect a landscape receptor that is of particularly high sensitivity. A major loss or irreversible effect over an extensive area of landscape character, affecting landscape elements, characteristics and / or perceptual aspects that are key to a nationally valued landscape are likely to be significant as described in GLVIA3¹ paragraph 5.56.

Non-Significant Landscape Effects

- 2.5.5 A non-significant effect would occur where the effect of the Proposed Development is not defining, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics. Equally a small-scale change experienced by a receptor of high sensitivity may not significantly affect the special landscape quality or integrity of a designation. Reversible effects, on elements, characteristics and character that are of small-scale or affecting lower value receptors are unlikely to be significant as described in GLVIA3¹ paragraph 5.56.

3. Assessing Visual Effects

3.1 Overview

- 3.1.1 Visual Effects are concerned wholly with the effect of the development on views, and the general visual amenity and are defined by the Landscape Institute in GLVIA3¹, paragraphs 6.1 as follows:

“An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern here is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views as a result of the change or loss of existing elements of the landscape and / or introduction of new elements.”

- 3.1.2 Visual effects are identified for different receptors (people) who will experience the view(s) at their places of residence, during recreational activities, at work, or when travelling through the area. The visual effects may include the following:
- Visual effect: a change to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view(s); and
 - Cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.
- 3.1.3 The level of visual effect (and whether this is significant) is determined through consideration of the ‘sensitivity’ of each visual receptor (or range of sensitivities for receptor groups) and the ‘magnitude of change’ that would be brought about by the construction and operation proposed development. Visual assessment unavoidably involves a combination of both quantitative and subjective assessment and wherever possible a consensus of professional opinion is sought through consultation and internal peer review.

3.2 Zone of Theoretical Visibility (ZTV)

- 3.2.1 Plans mapping the Zone of Theoretical Visibility (ZTV) are used to analyse the extent of theoretical visibility of development or part of a development, across the defined and detailed LVIA Study Areas and to assist with viewpoint selection. For proposed wind farm developments ZTVs are calculated for the turbines’ hub heights and their blade tips. The ZTVs does not take account of the screening effects of buildings, localised landform and vegetation. As a result, there may be views experienced by residents in settlements and users of roads, footpaths, and other receptors within the LVIA study area which, although the receptors are indicated as falling within the ZTV, views in reality would be fully or partially screened or filtered by built form and vegetation.
- 3.2.2 The ZTVs provide a starting point in the assessment process and accordingly tend towards giving a ‘worst case’ or greatest calculation of the theoretical visibility.

3.3 Viewpoint Analysis

- 3.3.1 Viewpoint analysis is used to assist the assessment and is conducted from selected viewpoints identified and agreed upon with consultees within the LVIA Study Area. The purpose of this is to assess both the level of visual impact for particular receptors and to help guide the design process and focus the LVIA. A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect would occur. By arranging the viewpoints in order of distance it is possible to define a threshold or outer geographical limit, beyond which there would be no further significant visual effects.
- 3.3.2 The turbines are always viewed as though facing towards the viewer to provide maximum potential visibility, although during operation, the turbines would face into the wind. The prevailing wind direction, likely to occur during the operational period is therefore also informative to the assessment, particularly if this tends to be variable or directional. In South Wales, the prevailing wind direction is from the south-west.
- 3.3.3 The viewpoint analysis for the Proposed Development is contained within **Appendix 6K**.

3.4 Evaluating Visual Sensitivity to Change

- 3.4.1 In accordance with paragraphs 6.31-6.37 of GLVIA3¹, the sensitivity of visual receptors takes account of the susceptibility of the receptor to visual change and the value of the baseline view available to them. Sensitivity is assessed as High, Medium, Low, or Very Low, although in practice 'Very Low' sensitivity is not used.

Visual Assessment: Susceptibility

- 3.4.2 The main factors to consider are the activity or occupation of the receptor at the viewpoint or receptor location and the extent to which their attention or interest may be focused on the view and visual amenity of the surrounding landscape. Whilst it is accepted that people will undertake a range of different activities, their visual experience of a development will change according to where they are, and what they are doing, and susceptibility is assessed as follows:
- People at nationally recognised viewpoints, people at views/vistas attached to heritage features (such as Registered Parks and Gardens) or other locations recognised nationally in art or literature, are assessed as of high susceptibility. People in their communities including those engaged in outdoor recreation (e.g., users of public open spaces), where the focus of the activity is on enjoyment of the landscape and there is a high frequency of use, are also considered to be of high susceptibility;
 - People on local footpaths routed through undesignated landscapes that may be of lower scenic quality, and people engaged in sport, or travelling / commuting, especially on motorways, trunk roads and other 'A' roads are considered as to be of less susceptibility (medium); and
 - People at their place of work where views are not an important contributor to the quality of working life possess the least (low) susceptibility.

Visual Assessment: Value

- 3.4.3 In relation to value, consideration is given to the value of the view(s) through reference to local or national scenic landscape designation. Other factors to consider include the importance or popularity of the view(s) and/or the likely numbers of viewers and the location and context of the viewpoint. The visual experience from a tourist destination, for example, could involve either the key views to, or from the main attraction, or those from the car-park / service area, and this context will affect the sensitivity and value of the views. Whilst views from car-parks / service areas may still be experienced by receptors of inherently higher sensitivity; these types of views should not be considered of higher value or sensitivity.
- 3.4.4 Landmarks / tourist attractions and national trails visited and used by large numbers of people are likely to be of higher value and more sensitive than those which are less visited. Occasionally there may be exceptions such as motorways where, although there are higher numbers of receptors these are generally considered to be of lower value. Conversely some less well visited footpaths within remote areas, may be of higher value precisely because of the lower visitor numbers.

Overall Visual Sensitivity

- 3.4.5 Judgements on value and susceptibility are combined to determine overall visual sensitivity which is informed by professional judgement and guided by the following matrix shown in **Table 6A.4**.

Table 6A.4 Evaluation of Visual Sensitivity

		<u>Susceptibility:</u>		
		High	Medium	Low
<u>Value:</u>	High	High	High to Medium	Medium
	Medium	High to Medium	Medium	Medium to Low
	Low	Medium	Medium to Low	Low

- 3.4.6 Further guidance on the evaluation of visual sensitivity is provided in **Table 6A.5**.

Table 6A.5 Visual Receptor Sensitivity

Examples of Visual Sensitivity	
High	People in their communities and on long distance, strategic footpaths or popular footpaths and tourist destinations, viewing important landscape features, beauty spots and picnic areas, where the activities are focused on the landscape. Receptors include groups of high susceptibility to change such as residents, tourists

Examples of Visual Sensitivity

	/ visitors, and walkers travelling through the landscape, viewing and experiencing landscapes of high value and quality.
Medium	People within outdoor sports based recreational spaces such as golf courses, using local or less well used recreational routes of viewing landscapes of high or medium value. Receptors include groups of medium susceptibility to change receptors such as some walkers, cyclists, road users, and other recreational receptors travelling through the landscape / seascape. Viewing and experiencing landscapes of medium value and quality.
Low	People working on the land or sea, at their place of work, or taking part in activities such as team sports that do not involving an appreciation of the landscape, including vehicular receptors travelling on motorways and other busy trunk and 'A' roads. Often viewing and experiencing landscapes of medium to low value and quality.
Very Low	Not used.

3.5 Evaluating the Magnitude of Change to the View

- 3.5.1 The visual magnitude of change is an expression of the scale of change that would result from the visibility of the Proposed Development and is described as Very High, High, Medium, Low, or Very Low. For visual receptors for whom the Proposed Development would not be visible and there would be no change to their view, the magnitude has been recorded as 'zero' and the level of effect as 'no view.'
- 3.5.2 In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. as short / medium / long-term and temporary / permanent).

Size or Scale of Change

- 3.5.3 An assessment is made of the size or scale of change in the view that is likely to be experienced as a result of the Proposed Development, based on the following criteria:
- **Distance:** The distance between the visual receptor / viewpoint and the Proposed Development. Generally, the greater the distance, the lower the magnitude of change, as the Proposed Development would constitute a smaller-scale component of the view due to the effects of perspective.
 - **Size:** The amount and size of the Proposed Development that would be seen. Visibility may range from small or partial to whole visibility of the Proposed Development. Generally, the larger and greater number of elements (wind

turbines and access tracks) of the Proposed Development that appear in the view, the higher the magnitude of change.

This is also related to the degree to which development may be wholly or partly screened by landform, vegetation (seasonal) and / or built form. Conversely open views are likely to reveal more of a development, particularly where this is a key characteristic of the landscape.

- **Scale:** The scale of the change in the view, with respect to the loss or addition of features in the view and changes in its composition. The scale of the Proposed Development may appear larger or smaller relative to the scale of the receiving landscape.
- **Field of View** The vertical / horizontal field of view (FoV) and the proportion of view that is affected by the Proposed Development. Generally, the more of the proportion of a view that is affected, the higher the magnitude of change would be. If the Proposed Development extends across the whole of the view, the magnitude of change would generally be higher as the full view would be affected. Conversely, if the Proposed Development extends over a narrow part of an open view, the magnitude of change is likely to be reduced as the Proposed Development would not affect the whole view or outlook. This can in part be described objectively by reference to the horizontal / vertical FoV affected, relative to the extent and proportion of the available view.
- **Contrast:** The character and context within which the Proposed Development would be seen and the degree of contrast or integration of any new features with existing landscape elements, in terms of scale, form, mass, line, height, colour, luminance and motion. Developments which contrast or appear incongruous in terms of colour, scale and form are likely to be more visible and have a higher magnitude of change.
- **Consistency of image:** The consistency of image of the Proposed Development in relation to other developments. The magnitude of change for the Proposed Development is likely to be lower if it appears broadly similar to other developments in the landscape in terms of its scale, form and general appearance. New development is more likely to appear as logical components of the landscape with a strong rationale for their location.
- **Speed of Travel:** The speed at which the Proposed Development may be viewed will affect how long the view is experienced and the likelihood of the Proposed Development being particularly noticed by people travelling in cars compared to those who may be walking and able to stop and 'take in' a view.
- **Angle of View (AoV):** The AoV from the main viewing direction may be considered in terms of whether the Proposed Development is experienced directly or at an oblique angle from the visual receptors' main viewing direction. Road users are generally more aware of the views in the direction of travel, whilst train passengers are more aware of views perpendicular to their direction of travel. Elevated views are likely to reveal more of the Proposed Development, whereas low level views are more likely to be screened by intervening built form and vegetation.
- **Screening:** The Proposed Development may be wholly or partly screened by landform, vegetation (seasonal) and or built form. Conversely open views,

particularly from landscapes where LANDMAP identifies their availability as a characteristic, are likely to reveal more of a development.

- **Skyline / Background:** Whether the Proposed Development would be viewed against the skyline or a background landscape may affect the level of contrast and magnitude. For example, skyline developments may appear more noticeable, particularly where they affect open and undeveloped horizons. Conversely, development may also appear more noticeable when viewed against a darker background landscape, such as forestry. In these cases, the magnitude of change would tend to be higher.

If the Proposed Development adds to an already developed skyline the magnitude of change would tend to be lower.

- **Nature of Visibility:** The nature of visibility, whether this is subject to various phases of development change and the manner in which the development may be viewed such as intermittently or continuously, and / or seasonally, due to periodic management or leaf fall, is a further factor for consideration.

Geographical Extent

- 3.5.4 A visual effect is also considered in terms of the geographical extent, physical area or location over which it would be experienced (described as a linear or area measurement). Visual effects affecting a large geographical area are more likely to be regarded as significant.

Duration and Reversibility

- 3.5.5 A visual effect is also considered in terms of the duration over which the effect would be experienced and whether this would be permanent, temporary or reversible. Duration can be considered as ranging between temporary (short to long term¹⁸ and time limited) or permanent. Although 'long term' some development such as housing should be regarded as permanent, whilst mineral extraction works usually entail several phases of development, followed by restoration. Wind farm development usually operates for a long term, time limited period, followed by a decommissioning period that would allow the visual effects to be reversed. Reversibility is only assessed as part of the decommissioning stage and cannot factor into the assessment of the time limited operational effects. Permanent visual effects (not time limited) are more likely to be regarded as significant.

Summary

- 3.5.6 Further guidance on the magnitude of visual change is provided in **Table 6A.6**.

Table 6A.6 Magnitude of visual change

Examples of Visual Magnitude	
Very High	A major change and/or obstruction of a view that is directly visible, appearing as the dominant and contrasting feature appearing in the fore ground and potentially the middle ground of the view.
High	A substantial change that may be directly visible, appearing as a highly prominent and contrasting feature appearing in the fore or middle ground.
Medium	A prominent change or partial view of a new element within the view that may be readily noticeable, directly or obliquely visible including glimpsed, partly screened or intermittent views, appearing as a prominent feature in the middle ground or background landscape.
Low	A noticeable or small level of change, affecting a small part of the view that may be obliquely viewed or partly screened and/or appearing in the background landscape although noticeable. May include views experienced whilst travelling at speed.
Very Low	A small or intermittent change to the view that may be obliquely viewed and mostly screened and/or appearing in the distant background or viewed at high speed over short periods and capable of being missed by the casual observer.
Zero	There would be no change to the view.

3.6 Evaluating Visual Effects and Significance

- 3.6.1 The level of visual effect is evaluated through the combination of visual sensitivity and magnitude of change. Once the level of effect has been assessed, and the nature of the effect determined (whether this is direct / indirect; its duration, whether this is temporary / permanent; and whether it is beneficial / neutral / adverse or cumulative) a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix illustrated in **Table 6A.7** which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the Proposed Development and their conclusion, is presented in a comprehensive, clear and transparent manner.

Significant Visual Effects

- 3.6.2 A significant effect is more likely to occur where a combination of the variables results in the Proposed Development having a defining effect on the view or visual amenity or where changes affect a visual receptor that is of high sensitivity as described in GLVIA3¹ paragraph 6.44.

Non-Significant Visual Effects

- 3.6.3 A non-significant effect is more likely to occur where a combination of the variables results in the Proposed Development having a non-defining effect on the view or visual amenity or where changes affect a visual receptor that is of low sensitivity as described in GLVIA3¹ paragraph 6.44.

4. Assessing Cumulative Landscape and Visual Effects

4.1 Overview

- 4.1.1 The assessment of cumulative effects is essentially the same as for the assessment of the primary landscape and visual effects, in that the level of landscape and visual effect is determined by assessing the sensitivity of the landscape or visual receptor and the magnitude of change. The cumulative assessment, however, considers the magnitude of change posed by multiple developments.
- 4.1.2 Detailed guidance on the cumulative assessment of wind farm development is provided in the NatureScot document 'Guidance: Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments'⁷ and the Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment⁸. This assessment distinguishes between 'additional' cumulative effects that would result from adding the Proposed Development to other cumulative wind farm development and 'combined' cumulative effects that assess the total cumulative effect of the Proposed Development and other cumulative wind farm development. In the latter case a significant cumulative effect may result from the Proposed Development or one of more other operational, under-construction or consented wind farms, or other wind farm applications. In those cases, the main contributing wind farm(s) is identified in the assessment.
- 4.1.3 Types of cumulative effect are defined as follows:
- Cumulative Landscape Effects: Where more than one wind development may have an effect on a landscape designation or particular area of landscape character;
 - Cumulative Visual Effects: the cumulative or incremental visibility of similar types of development that may combine to have a cumulative visual effect. These can be further defined as follows:
 - ▶ Simultaneous or combined: where two or more developments may be viewed from a single fixed viewpoint simultaneously, within the viewer's field of view and without requiring them to turn their head¹⁹;
 - ▶ Successive or repetitive: where two or more developments may be viewed from a single viewpoint successively as the viewer turns their head or swivels through 360°; and

¹⁹ Note: A person's field of view is variable but is approximately 90° when facing in one direction.

- ▶ Sequential: where a number of developments may be viewed sequentially or repeatedly at increased frequency, from a range of locations when travelling along a route within the LVIA Study Area.

4.1.4 The SNH document *Siting and Designing Wind farms in the Landscape (Version 3a)*¹⁴ explains that the development of multiple wind farms within a particular area may create different types of cumulative effect, that can be described as follows:

- *“The wind farms are seen as separate isolated features within the landscape character type, too infrequent and of insufficient significance to be perceived as a characteristic of the area;*
- *The wind farms are seen as a key characteristic of the landscape, but not of sufficient dominance to be a defining characteristic of the area; [a landscape with wind farms] and*
- *The wind farms appear as a dominant characteristic of the area, seeming to define the character type as a ‘wind farm landscape character type.’*

4.1.5 Wind farm development that results in the creation of a ‘wind farm landscape’ as opposed to a ‘landscape with wind farms’ or ‘landscape with occasional wind farms’ is likely to be assessed as significant. Equally the ‘additional effect’ of wind farm development, adding to a scenario where there are already a number of other operational or consented wind farms, may be less than the effect of the Proposed Development either on a ‘solus’ or primary basis or in an area where there are few or no wind farms operational. This is because wind farm development has already been established as a characterising influence and the additional effect of further development may or may not alter this.

4.1.6 Whilst the Cumulative LVIA (CLVIA) considers other wind farm development, it should not be considered as a substitute for individual LVIA assessment in respect of each of the other cumulative developments included in the CLVIA.

4.2 Defining the Cumulative Study Area

4.2.1 The cumulative study area is the same as the LVIA Study Area as illustrated in **Figure 6.1**. Other existing, consented, planning application and scoping wind energy sites included within this study area are noted and considered in terms of their likely relevance to the CLVIA.

4.2.2 Sites within the Cumulative Search Area which are considered likely to contribute to a significant cumulative effect in ‘addition’ or in ‘combination’ with the Proposed Development are included in the CLVIA.

4.3 Predicting Cumulative Landscape Effects

4.3.1 The CLVIA considers the extent to which the Proposed Development, in combination with other existing, consented or proposed wind farm may change landscape character through either an ‘additional’ or ‘in combination’ effect on characteristic elements, landscape characteristics and quality of the baseline landscape character as defined in LANDMAP. Identified cumulative landscape effects are described in relation to each individual scoped in LANDMAP Aspect

Area and for any scoped in designated landscape areas assessed within the LVIA Study Area.

4.4 Predicting Cumulative Visual Effects

- 4.4.1 The assessment of cumulative visual effects involves reference to the cumulative visibility ZTV maps and the cumulative viewpoint analysis. The cumulative visibility of other operational and consented wind energy developments and applications is established in the first instance using the computer programme (ArcGIS Pro© software) to identify areas where wind energy developments are theoretically visible. Cumulative visibility maps are analysed to identify the visual receptor locations and routes where cumulative visual effects on the landscape and people may occur as a result of the Proposed Development.
- 4.4.2 With potential receptor locations identified, cumulative effects on individual receptor groups are then explored through viewpoint analysis, which involves site visits informed by wireline illustrations that include other wind energy developments. The computer programme itself can also be used to 'drive' particular routes to assess the visibility of different wind energy developments and inform the assessment of sequential cumulative effects that may occur along a route or journey and compared to actual visibility experienced along a route on site.

4.5 Evaluation of Cumulative Landscape and Visual Effects

- 4.5.1 The evaluation of cumulative effects is assisted by the matrix in **Table 6A.7**, which is used to guide the assessment.
- 4.5.2 The cumulative assessment has been prepared to ensure that, as well as the primary effect of the Proposed Development (LVIA) the 'additional' cumulative effects and the 'combined' cumulative effect (CLVIA) is also reported to account for two cumulative Scenarios as follows:
- **Proposed Development:** Assessed on an individual basis (the LVIA). This part of the assessment may take account of other operational forms of wind farm development that may be present in the landscape, whilst recognising that their influence on landscape character is likely to be time limited. It does not consider the additional or combined cumulative effects and only reports of the effect of the Proposed Development alone;
 - **Scenario 1: Operational + Consented + the Proposed Development:** The additional and combined cumulative effects of the operational and consented wind energy developments with the Proposed Development are assessed; and
 - **Scenario 2: Existing + Consented + Applications + Scoping Schemes + the Proposed Development:** The additional and combined cumulative effects of the existing and consented wind energy developments and any live applications (which would include schemes at scoping), with the Proposed Development are assessed.
- 4.5.3 Due to the numbers of other wind energy developments scoped into the CLVIA, the overall cumulative effects may be greater than for the primary effect or

additional effect for the Proposed Development assessed in the main LVIA. The resulting level of cumulative effect may remain at the same level of effect or increase to a higher level of effect. The point at which these effects become significant or not significant in landscape and visual terms is still a matter for professional judgement, although four scenarios or combinations of cumulative effect, taking account of other wind energy development can occur as follows:

- A significant effect from the Proposed Development is predicted in addition or combination with another significant effect attributed to other development(s). The effect is still termed significant and cumulative but is a greater level of effect than for either development individually.
- A significant effect from the Proposed Development is predicted in addition or combination with another non-significant effect attributed to other development(s). The effect is still termed significant and cumulative but is attributed to the Proposed Development and is a greater level of effect than for either development individually.
- A non-significant effect from the Proposed Development is predicted in addition or combination with another significant effect attributed to other development(s). The effect is still termed significant and cumulative but is attributed to the other wind energy development(s) and is a greater level of effect than for either development individually.
- A non-significant effect from the Proposed Development is predicted in addition or combination with another non-significant effect attributed to other development(s). The effect is still termed cumulative and is a greater level of effect than for either development individually; the combined effect, however, may or may not be significant.

4.5.4 The nature of a cumulative effect may also be described as direct / indirect, temporary / permanent, or beneficial / adverse. The probability of a cumulative effect occurring may also be described (certain, likely or uncertain / unknown) according to whether the developments in question are operational / under construction, consented or at the application stage.

5. Evaluating Landscape and Visual Effects

5.1 Determining the Significance of Effects

- 5.1.1 The matrix presented in **Table 6A.7** is used as a guide to illustrate the LVIA process. In line with the emphasis placed in GLVIA3¹ upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor. Such narrative assessments provide a level of detail over and above the outline assessment provided by use of the matrix alone.
- 5.1.2 The landscape and visual assessment unavoidably, involves a combination of quantitative and qualitative assessment and wherever possible cross references will be made to objective evidence, baseline figures and / or to photomontage visualisations to support the assessment conclusions. Often a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach. Importantly each effect results from its own unique set of circumstances and have been assessed on a case-by-case basis. The matrix should therefore be considered as a guide and any deviation from this guide will be clearly explained in the assessment.
- 5.1.3 In accordance with the relevant EIA Regulations, it is important to determine whether the effects, assessed as a result of the Proposed Development, are likely to be significant. Significant landscape and visual effects will be highlighted in **bold** in the text and in most cases, relate to all those effects that result in a '**Major**' or '**Major/Moderate**' effect as indicated in **Table 6A.7**. '**Moderate**' levels of effect also have the potential, subject to the assessor's opinion, to be considered as significant and these exceptions are also highlighted in bold and explained as part of the assessment, where they occur.
- 5.1.4 In accordance with the overall significance matrix used for the EIA, some moderate, moderate/minor, minor and negligible effects, are determined as 'not significant.' In those instances where there would be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'No Effect.'

Table 6A.7 Evaluation of Landscape and Visual Effects

		Landscape and Visual Sensitivity			
		High	Medium	Low	Very Low
Magnitude of Change	Very High	Major (Significant)	Major (Significant)	Major/Moderate (Significant)	Moderate (Potentially Significant)
	High	Major (Significant)	Major/Moderate (Significant)	Moderate (Potentially Significant)	Moderate/Minor (Not Significant)
	Medium	Major/Moderate (Significant)	Moderate (Potentially Significant)	Moderate/Minor (Not Significant)	Minor (Not Significant)
	Low	Moderate (Potentially Significant)	Moderate/Minor (Not Significant)	Minor (Not Significant)	Negligible (Not Significant)
	Very Low	Moderate/Minor (Not Significant)	Minor (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)
	Zero	None / No View			

5.2 Nature of Effect

- 5.2.1 In accordance with the EIA Regulations the type or nature of effect is also described in terms of whether it is direct or indirect; its duration (temporary / permanent or reversible) cumulative; and whether the effect is positive, neutral or negative.

Direct and indirect effects

- 5.2.2 GLVIA3¹, paragraph 5.2 notes that landscape may be directly and indirectly affected by development and defines indirect effects as “*Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects*”.
- 5.2.3 Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor. Indirect landscape effects may also affect the host landscape as well as other landscapes, often separated by distance from the Proposed Development, as a consequence of views that affect the perceptual aspects of their character and key characteristics.
- 5.2.4 Visual effects are generally all considered as direct effects. An indirect visual effect may however be used to define a visual effect on a view that is not in the direction of the main view of the viewer as described by the following examples:

- Road users generally face the road directly ahead in the direction of travel and visual effects affecting those views may be described as direct effects. Where the visual effect is experienced in views oblique to the direction of travel, they may be described as indirect; and
- Designed landscapes and vistas / viewpoints may be orientated in a particular direction and visual effects affecting those views may be described as direct effects. Where the visual effect is experienced in views oblique to the direction of the designed or main / primary view, they may be described as indirect.

5.2.5 Secondary effects (or effects subsequent to an initial effect) are covered in the assessment by indirect effects.

Beneficial and adverse effects

5.2.6 Wind farms give rise to a wide range of opinions, from strongly adverse to strongly beneficial. However, LVIA is not an assessment of public opinion, although a precautionary approach has been taken, which assumes that the nature of the effects would be adverse or neutral unless otherwise stated.

5.2.7 Guidance provided by the in GLVIA3¹ on the nature of effect (i.e. beneficial or adverse) states that *“in the LVIA, thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity”*, but it does not provide guidance as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

5.2.8 In relation to many forms of development, the LVIA will identify ‘beneficial’ and ‘adverse’ effects by assessing these under the term ‘Nature of Effect’. The landscape and visual effects of large-scale infrastructure are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which the effects can be measured as being categorically ‘beneficial’ or ‘adverse’. In some disciplines, such as noise or ecology, it is possible to quantify the effect in numeric terms, by objectively identifying or quantifying the proportion of a receptor that is affected and assessing the nature of that effect in justifiable terms. However, this is not the case in relation to landscape and visual effects where the approach combines quantitative and qualitative assessment.

5.2.9 As a starting point, unless stated otherwise, the effects considered in the assessment will be considered to be adverse. Beneficial or neutral effects may, however, arise in certain situations and are stated in the assessment where relevant, based on the following definitions:

- Beneficial effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The Proposed Development contributes to the landscape by virtue of good design or the introduction of new landscape planting. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components.
- Neutral effects occur where the Proposed Development fits with the existing landscape character or visual amenity. The Proposed Development neither

contributes to or detracts from the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, or where the effects are so limited that the change is hardly noticeable (very low magnitude). A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation.

- Adverse effects are those that detract from the landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

Probability of Effect

- 5.2.10 The probability of cumulative effects is variable. Those effects related to operational wind energy development and those under construction are considered as certain; effects related to development with planning consent are considered as likely. Wind energy development sites for which there is a submitted planning application are considered as uncertain with an even greater level of uncertainty attached to pre-planning application sites.

6. Residential Visual Amenity Assessment

6.1 Overview

- 6.1.1 The assessment of Residential Amenity is a planning matter that involves consideration of a number of effects (such as noise and shadow flicker), of which residential visual amenity is a single component. The RVAA is limited to the consideration of visual effects on the residential amenity of residential properties. Visual amenity is defined in GLVIA3¹ as:

“the overall pleasantness of the views they enjoy of their surroundings”.

- 6.1.2 Residential Visual Amenity means: *“the overall quality, experience and nature of views and outlook available to occupants of residential properties, including views from gardens and domestic curtilage. Residential Visual Amenity is one component of ‘Residential Amenity’”*⁹.

- 6.1.3 Planning law contains a widely understood principle that the outlook or view from a private property is a private interest and not therefore protected by the UK planning system. However, the planning system also recognises situations where the effects on residential visual amenity are so serious as to become a matter of public interest. This matter has been examined at a number of public inquiries in the UK where the key determining issue was not the identification of significant effects on views, but whether the Proposed Development would have an effect on the residential visual amenity through an ‘overbearing’ and / or ‘dominating’ effect resulting in unsatisfactory living conditions, leading to a property being regarded, objectively, as an unattractive (as opposed to a less attractive) place in which to live. The effects on residential amenity are subsequently considered as part of the planning balance as part of the consent process.

- 6.1.4 Consequently, the RVAA methodology provides for a much more detailed assessment of the closest residential properties to the Proposed Development. This allows the assessor and consequently the determining authority to make a judgement as to whether the residents at these residential properties would be likely to sustain unsatisfactory living conditions which it would not be in the public interest to create. Reviews of decisions demonstrate that significant visual effects or changes to the views available from a residential property and its curtilage are not the decisive consideration, rather it is the residential amenity and, in this case, residential visual amenity that is determinate.

- 6.1.5 The methodology for RVAA accords with the advice in GLVIA3¹, and the Landscape Institute’s Residential Visual Amenity Assessment Technical Note 2/19⁹. It involves a four-step process as follows:

- *“1: Definition of the study area and scope of the assessment.*
- *2: Evaluation of baseline visual amenity at properties to be included having regard to the landscape and visual context and the development proposed.*

- *3: Assessment of likely change to visual amenity of included properties in accordance with GLVIA3 principles and processes.*
- *4: Further assessment of predicted change to visual amenity of properties to be included forming a judgement with respect to the Residential Visual Amenity Threshold.”⁹*

6.1.6 Other factors affecting residential amenity such as noise and shadow flicker are not considered as part of this assessment and can be found in **Chapter 13: Noise** and **Chapter 14: Shadow Flicker**.

6.2 Step 1: Scope of Assessment

- 6.2.1 Based on the Landscape Institute’s guidance, a study area of 2 km distance from the proposed turbines has been selected for the RVAA. This study area is then reviewed against the site-specific conditions of the Proposed Development and the ZTV which may indicate a slightly smaller or larger study area is required.
- 6.2.2 A residential property, for the purposes of EIA, should be one that was designed and built/converted for that purpose and currently (at the time of the assessment) remains in a habitable condition (is of a safe construction, wind and watertight with appropriate vehicle access, and services such as drinking water, sanitation, and power supply). Other buildings such as barns/ outbuildings, garages, sheds and derelict properties should generally be excluded from the assessment, unless they form part of the curtilage of an existing residence.
- 6.2.3 The assessment of residential properties or clusters of residential properties has been limited to those which appear on the Ordnance Survey 1:25,000 scale map and are overlapped by the blade tip ZTV. The assessment has been informed by site visits, observing the properties from public locations and through the examination of publicly available aerial and ground level photography as well as map-based data, the production of ZTV plots and visualisations such as wirelines. Some of the properties are accessed via private or gated roads and due to these access limitations, they have been assessed from the nearest public road or footpath which may be at greater distance from the property. As such the assessment represents an informed judgement of the likely visual effects and the consequential effects on residential visual amenity.
- 6.2.4 Planning permissions for new residential properties and conversions which have not been built at the time of the assessment have not been included.

6.3 Step 2: Site Survey and Baseline Reporting

- 6.3.1 The assessment has been informed by site visits, observing the properties from public locations and through the examination of publicly available aerial and ground level photography as well as map-based data, the production of ZTV plots and visualisations such as wirelines. As such the assessment represents an informed judgement of the likely visual effects and the consequential effects on residential visual amenity.
- 6.3.2 Each property including in the RVAA has been described in terms of the type, nature, extent and quality of the views that may be experienced ‘in the round’ from

the dwelling itself and the domestic curtilage which includes the main living areas, usually the ground floor and the main garden and immediate driveway. The relationship of the property with the surrounding landscape and a description of the views in terms of whether they may be considered as primary, secondary or peripheral views.

6.3.3 The assessment allows for the screening effects of vegetation with the following caveats:

- Forestry screening is subject to forestry management, and the assessment allows for either no forestry screening or maximum forestry screening, representing the two extremes likely to affect the view during the 30-year operational period of the Proposed Development.
- Woodland and hedgerow screening – Where this includes mature, long standing mixed or broadleaved woodland a degree of permanence has been assumed in the assessment.
- Individual trees – Where these are mature a degree of permanence has been assumed in the assessment. However, this is subject to the long-term retention of individual trees that would need to be assessed on a case-by-case basis, which is beyond the scope of this assessment.
- Garden vegetation has been assumed to have a degree of permanence. In the event that it is removed and replanted, most garden shrubs / hedges are reasonably quick to re-establish or are replaced on a piecemeal basis.

6.3.4 The assessment takes account of the likely views from the ground floors of properties and main garden areas but excludes upper floors and other land that may relate to the property and is not part of the main living areas.

6.4 Step 3: Visual Assessment

6.4.1 A visual assessment is undertaken to identify those properties where a significant visual effect on a view from the property is likely to occur. The methodology for this is set out previously under visual assessment and combines an assessment of 'sensitivity' with an assessment of 'magnitude.'

6.4.2 The sensitivity of individual residential receptors has been assessed as 'High' in each case due to the high susceptibility of residents in accordance with GLVIA3¹, paragraph 6.33. The value of the view is also likely to be regarded as high by the residents themselves, but the views in this area are not nationally designated for their scenic value and accord a medium value in this respect.

6.4.3 The assessment is supported by aerial and ground level photography as well as map-based data, the production of ZTV plots and visualisations such as wirelines and photographs where appropriate, which are illustrated for each property.

6.5 Step 4: Residential Visual Amenity Assessment

6.5.1 The second stage is to consider the residential visual amenity and whether, in terms of the wider public interest, the visual effects would result in unsatisfactory living conditions, leading to a property being regarded, objectively, as an

unattractive (as opposed to a less attractive) place in which to live. Relevant information considered as part of the assessment may include, but is not limited to the following:

- Scale of Wind Farm:
 - ▶ Number and height of visible turbines;
 - ▶ The horizontal extent or Angle of View (AOV) of the visible turbine array; and
 - ▶ Separation distance (closest and furthest visible turbines).
- Description of Property, as far as this can be ascertained:
 - ▶ Orientation and size of property and whether views from the property towards the wind farm would be direct or oblique;
 - ▶ Location of principal rooms and main living areas such as living/dining rooms, kitchens and conservatories, as opposed to upstairs rooms (bedrooms / bathrooms), working areas such as farm buildings and utility areas;
 - ▶ Location of principal garden areas which may include patios and seating areas as opposed to less well used areas such as paddocks or garages; and
 - ▶ The effects of any screening by landform, vegetation or nearby built development.
- Location and Context:
 - ▶ The aspect of the property in terms of the overall use and relationship to the garden areas and surrounding landscape;
 - ▶ The principal direction of main views and visual amenity;
 - ▶ The context and nature of any intervening structures e.g., other existing wind farm development, farm buildings or forestry.

6.5.2 A final assessment is then made to determine if, in the assessor's opinion, the residential visual amenity threshold would be breached by the proposed development and as such should be considered further as part of the planning balance.

6.5.3 The RVAA will be reported in **Appendix 6L** of the Final ES.

7. Night-time Assessment

7.1 Overview

- 7.1.1 The night-time assessment is supported by a baseline night-time environment or darkness survey and ZTV plots, baseline photography, wirelines and photomontages from selected viewpoints. These visualisations help to assess both the level of night-time visual impact for particular receptors and focus the assessment.
- 7.1.2 The night-time assessment will be reported in **Appendix 6M** of the Final ES.

7.2 Night-time Viewpoint Analysis

- 7.2.1 A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect would occur. By arranging the viewpoints in order of distance it is possible to define a threshold or outer limit, beyond which there would be no further significant effects.
- 7.2.2 The night-time viewpoint analysis involves visiting the agreed night-time viewpoint locations during periods between dusk and dawn and viewing wirelines and photomontages prepared for each viewpoint location. The proposed locations of three night-time viewpoints were set out in the Scoping Report for agreement with consultees and are highlighted in **Table 6.8** of **Chapter 6 Landscape and Visual**. The fieldwork is conducted in periods of fine weather with clear skies and considers seasonal changes such as reduced leaf cover or hedgerow maintenance. The night-time photography will be included in **Appendix 6M** of the Final ES.

7.3 Baseline Night-time Environment or Darkness Survey

- 7.3.1 During site visits, a baseline night-time environment survey or 'darkness survey' is carried out at each viewpoint location. The purpose of the darkness survey is to establish the existing light levels perceived by the landscape architects at the viewpoints and determine their sensitivity to change. The following observations are recorded:
- Areas of darkness with no artificial light;
 - Direct artificial lighting (where the light source is directly visible from the viewpoint);
 - Indirect artificial lighting (where the light source is not visible but the light emanating from the light source is visible as in the case of 'sky glow');
 - Static lighting, for example emanating from a residential property or street light; and
 - Mobile or transient lighting, for example associated with moving vehicles, trains or aircraft.

- 7.3.2 Baseline photographs at each of the night-time assessment viewpoints are recorded.

7.4 Assessment of Night-time Sensitivity

- 7.4.1 In terms of landscape effects, a key determinant of the value and susceptibility of a landscape is the degree to which the landscape character can be discerned at night and the quality of the baseline 'darkness' – essentially, is the area unlit or lit? There is a limited period of the night, during the twilight periods just after sunset or just before dawn when the landscape character maybe partially perceived and during periods when there are clear skies and under conditions such as a full moon. During these limited periods it may be possible to discern sufficient number of the key landscape characteristics, in particular, topography / skyline and some of the perceptual qualities, although other features such as colour, pattern, texture will be muted or not discernible. As darkness progresses these features cease to be visible. The susceptibility of the landscape at night is therefore variable and reduces from its highest or most susceptible during the day, through the twilight period, until the night when susceptibility would be at its lowest, during periods of greatest darkness.
- 7.4.2 The value of the landscape at night is recognised in designations that include National Parks and Dark Sky Parks and more rarely in relation to local landscape designations and particular landscape character types, although the landscape value of non-designated landscapes is usually lower.
- 7.4.3 In terms of visual effects, the susceptibility of the receptor is primarily influenced by the activity of the viewer. A number of tourist locations are likely to be closed to the public during the hours of darkness, residents are most likely to be indoors, and people in settlements and road users may be influenced by the streetlights and vehicle lights, reducing their sensitivity. Hill walkers and people viewing the landscape from recognised viewpoints are less likely or unlikely to be present at those locations during the night. This small group of receptors, however, could be considered as of High sensitivity, particularly in locations such as dark sky park viewpoints.
- 7.4.4 The value of the specific views and visual amenity at night is also recognised in designations that include National Parks and Dark Sky Parks but more rarely documented in local landscape designations, although in all cases the value is likely to be high.
- 7.4.5 Factors affecting the susceptibility and value of landscape and visual receptors are combined to determine the sensitivity of the receptor in a similar manner to that set out in **Tables 6A.1 and 6A.3**.

7.5 Assessment of Night-time Magnitude

- 7.5.1 The magnitude of change assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e. short / medium / long-term and temporary or permanent).

- 7.5.2 Mitigating factors such as an approved Lighting Design Strategy and the specification of particular aviation warning light attributes are documented as part of the Project Description within the night-time assessment.
- 7.5.3 The number of lights likely to be visible as well as their intensity can be described in objective terms and ZTVs indicating the theoretical visibility of numbers of lights and their intensity is mapped in order to assist the assessment process. Other objective factors include the FoV and the distance over which the lights may be seen. More subjectively the Proposed Development is considered against the baseline or darkness survey in terms of whether the proposed lighting would contrast with an unlit area or assimilate with other lights in a landscape or view that may already have multiple light sources. In this manner the assessment has to consider the degree to which the Proposed Development would affect the landscape character or designation, as far as that can be perceived at night.
- 7.5.4 In visual terms, a further consideration is the numbers of viewers which are likely to experience the views and visual amenity at night. It is reasonable to assume that the numbers of tourists and hill walkers, viewing the landscape at night for example, will tend to be few in number or rare, with most tourist destinations closed during the hours of darkness for example. Exceptions may include specific viewpoints within a Dark Sky Park. Walkers and road users out at night, will also themselves tend to be sources of light from torches and vehicle headlights and thus affect the baseline or darkness survey.
- 7.5.5 The 'magnitude' or 'degree of change' resulting from the Proposed Development is described as 'Very High', 'High', 'Medium', 'Low', 'Very Low' or 'Zero', in similar terms to the descriptions set out in **Tables 6A.3** and **6A.6**.

7.6 Evaluation of Night-time Level of Effects and Significance

- 7.6.1 The level effect is evaluated through the combination of sensitivity and magnitude of change. Once the level of effect has been assessed, and the nature of the effect is determined (whether this is direct / indirect; its duration, temporary / permanent; and whether it is beneficial / neutral / adverse or cumulative) a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix illustrated in **Table 6A.7** which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the Proposed Development and their conclusion, is presented in a comprehensive, clear and transparent manner.

8. Production of Zones of Theoretical Visibility (ZTVs) and Visualisations

8.1 Overview

- 8.1.1 Zones of Theoretical Visibility (ZTVs) and visualisations (wirelines / wirelines and photomontages) are graphical images produced to assist and illustrate the LVIA and the CLVIA. The methodology accords with the SNH guidance Visual Representation of Wind Farms, Version 2.2⁵. Further, additional guidance is provided by the Landscape Institute (LI) Technical Guidance Note (TGN) 06/19: Visual Representation of Development Proposals⁶. Paragraph 4.5.14 of TGN 06/19 states that “*The SNH 2017 guidance is endorsed by the LI for windfarms and similar projects which are viewed in expansive landscapes over medium to far distances*”.

8.2 Methodology for Production of ZTVs

- 8.2.1 The ZTVs are calculated using ArcGIS Pro© software to generate the zone of theoretical visibility of the Proposed Development. This software creates a 3D computer model of the existing landscape and the Proposed Development using digital terrain data as follows:
- Ordnance Survey Terrain 50: Used to produce the main or standard ZTV plot and wirelines, these tiles provide a digital record of the existing landform of Great Britain, or Digital Terrain Model (DTM) at 10m elevation intervals based on 50m grid squares and models representing the specified geometry and position of the proposed turbines. The computer model includes the entire LVIA Study Area and takes account of the effects caused by atmospheric refraction and the Earth's curvature; and
 - Ordnance Survey Terrain 5: Used to produce a more detailed ZTV plot or wireline for limited areas, often used where there are small undulations or crags within the landscape. These tiles provide a digital record of the existing landform of Great Britain based on 5m grid squares and models representing the specified geometry and position of the proposed turbines. The computer model includes the central LVIA Study Area and takes account of atmospheric refraction and the Earth's curvature.
- 8.2.2 The resulting ZTV plots are overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing/graphic design software.
- 8.2.3 The same computer software is also used to calculate cumulative ZTV plots based on the intervisibility of the Proposed Development with other operational, consented and application wind farms included in the CLVIA. In addition to the methods as described above, the layouts and geometries of the surrounding operational, consented and application wind farms are loaded into the same computer programme.

8.3 Methodology for Baseline Photography

- 8.3.1 Once a viewpoint has been selected, it is visited, confirmed, and assessed with the aid of a wireline or similar visualisation in the field. A photographic record is taken to record the view, and the details of the viewpoint location and associated data are recorded to assist in the production of visualisations and to validate their accuracy. All site photography included in the LVIA is taken in accordance with Visual Representation of Development Proposals Technical Guidance Note 06/19⁶.
- 8.3.2 The following photographic information is recorded:
- Date and time;
 - GPS recorded 10 figure (British National Grid) grid reference accurate to ~5 m;
 - GPS recorded elevation data; and
 - The focal length of lens is confirmed.
- 8.3.3 All photographs included in this assessment were recorded with a digital SLR camera set to produce photographs equivalent to that of a manual 35 mm SLR camera with a fixed 50mm focal length lens.
- 8.3.4 All the resulting visualisations have been prepared to show other cumulative wind energy development in order that they may assist the CLVIA as well as the LVIA.
- 8.3.5 Whilst no two-dimensional image can fully represent the real viewing experience, the visualisation aims to provide a realistic representation of the Proposed Development, based on current information and photomontage methodology.

Weather Conditions

- 8.3.6 GLVIA3¹para 8.22 states:
- “In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*
- *representative of those generally prevailing in the area; or*
 - *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible.”*
- 8.3.7 In preparing photomontages for the LVIA, photographs have been taken in fair weather conditions, that are representative of the weather conditions generally.

8.4 Methodology for Production of Visualisations

- 8.4.1 Each view has been illustrated with a photograph, a wireline and / or a photomontage indicating the Proposed Development. Definitions of each of these are described as follows:
- Baseline photograph: A photograph of the existing view recorded in fair weather conditions and usually presented as a panorama in line with the relevant SNH guidance⁵.

- Wireline or Wireframe: A computer-generated model of the landscape and the Proposed Development.
- Photomontage is a visualisation which superimposes an image of a Proposed Development (in this case the wireline or wireframe) upon the baseline photograph, which is then rendered by computer software to produce an image of how the Proposed Development would appear from that viewpoint. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed.

Baseline Photograph Production

- 8.4.2 Photographs are then taken using a digital SLR camera in combination with a panoramic head equipped tripod. Detailed information is then recorded on site to enable the accurate alignment of the photographs with the wireline model (data such as: GPS grid co-ordinates; ground level information; compass bearings; and any other known references and viewpoint information).
- 8.4.3 To create the baseline panorama, the photographs from the viewpoint are then digitally joined using PTGui software to form a planar or cylindrical projection image or panorama using computer software to remove 'barrel distortion' caused by the camera lens. There are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day or from location that avoid foreground clutter or other vertical features such as telegraph poles, particularly where this is a true representation of the view from that viewpoint area.

Wireline or Wireframe Production

- 8.4.4 The wirelines and photomontages are produced using ReSoft WindFarm© software to generate a perspective view of the wind farm. This software creates a 3D computer model of the existing landscape and the Proposed Development using digital terrain data and models representing the specified geometry and position of the proposed turbines. The computer model includes the entire LVIA Study Area, and all visualisations take account of the effects caused by atmospheric refraction and the Earth's curvature. The computer model does not take account of the screening effects of any intervening objects and forestry, unless specified (see individual figures).
- 8.4.5 A wireline of the Proposed Development and the existing landform is generated for each viewpoint within the LVIA Study Area. These wirelines are used to assist the assessment on location at each viewpoint, the position of which, if required, is adjusted on site to achieve the most visible vantage-point of the Proposed Development (e.g. to avoid buildings, forestry, other features, potentially interfering with the view).

Photomontage Production

- 8.4.6 Visualisations are produced for the agreed viewpoints identified in the LVIA and photomontages I aim to provide a photorealistic image of the appearance of the Proposed Development. 3D model representations are combined with the baseline

view photographs to create a photorealistic rendered photomontage image of the development.

- 8.4.7 Visualisations that illustrate the Proposed Development are produced using a range of computer software, most commonly in this case ReSoft WindFarm©. Others such as True View and 3D AutoCAD or Studio Max are also used for example.
- 8.4.8 The photomontage is produced by digitally combining or superimposing the wireline / wireframe or computer generation 3D model of the landscape and the Proposed Development onto the baseline photograph and rendering this in order to add colour, texture and lighting effects.
- 8.4.9 To produce the photomontage, the wireline turbines are rendered to appear 'life-like' taking into account the time of the photography and weather conditions occurring on the day.
- 8.4.10 The completed panoramas, wirelines, photomontages and accompanying data are then presented as figures using desktop publishing/graphic design software.

Limitations of Visualisations

- 8.4.11 The photomontage visualisations used in the LVIA are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs. SNH guidance advises that beyond 20 km, the visibility of turbines in the printed photomontages is difficult to see or reproduce realistically.
- 8.4.12 The photomontage visualisations of the Proposed Development have a number of limitations when using them to form a judgement on visual effect. These include:
 - A visualisation can never show exactly what a Proposed Development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
 - The images provided give a reasonable impression of the scale and the distance to the Proposed Development but can never be 100% accurate to the as constructed effect;
 - A static image cannot convey movement such as turbine blade rotation or other features such as the movement of water or the reflection from the sun. The assessment however will take account of turbine movement by examining animated versions of the photomontages on screen and / or other examples of operational wind farm development on site;
 - The viewpoints illustrated are representative of views in the area but cannot represent visibility at all locations;
 - To form the best impression of the effects, these images are best viewed at the viewpoint location shown;
 - The visualisations must be printed and viewed at the correct size as indicated on the figures; and

- Images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression.

8.4.13 It is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression.

9. Glossary of Terms and Abbreviations

9.1.1 Note: Those descriptions marked with an asterisk are as per the terminology provided in the GLVIA3¹ glossary.

Term/abbreviation	Definition
AOD	Above Ordnance Datum
AoV / FoV	Angle of View / Field of View
Artificial light	Light produced by electrical means.
BT	Blade Tip
Candela	A unit of measure of luminous intensity, in a given direction.
CLVIA	Cumulative Landscape and Visual Impact Assessment
Constant light	Uninterrupted light source over a given time period.
Cumulative effects	Additional changes caused by a Proposed Development in conjunction with other similar developments or as a combined effect of a set of developments, taken together.
Cumulative landscape effects	Effects that 'can impact on either the physical fabric or character of the landscape, or any special values attached to it' (NatureScot, 2021)
Cumulative visual effects: In combination In succession Sequentially	Effects that can be caused by combined visibility, which 'occurs where the observer is able to see two or more developments from one viewpoint' and/or sequential effects which 'occur when the observer has to move to another viewpoint to see different developments' (NatureScot, 2021) • In combination: Where two or more developments are or would be within the observer's arc of vision at the same time without moving his/her head (GLVIA3¹, Table 7.1). • In succession: Where the observer has to turn his/her head to see the various developments – actual and visualised (GLVIA3¹, Table 7.1). • Sequential cumulative effect. Occurs where the observer has to move to another viewpoint to see the same or different developments. Sequential effects may be assessed for travel along regularly used routes such as major roads or popular paths (GLVIA3¹, Table 7.1).
Darkness survey	Visual survey the night-time environment and the identification of artificial light sources.
Development*	Any proposal that results in change to the landscape and/or visual environment.

Term/abbreviation	Definition
Degree of change	A combination of the scale, extent and duration of an effect also defined as 'magnitude'.
Designated Landscape*	Areas of landscape identified as being of importance at international, national or local levels, either defined by statute or identified in development plans or other documents.
Direct light	The artificial light source is visible. Note that light emanating from the window of a building is considered to be a 'direct' light source.
DSM	Digital Surface Model
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
Elements*	Individual parts which make up the landscape, such as, for example, trees, hedges and buildings.
Enhancement*	Proposals that seek to improve the landscape resource of the site and its wider setting beyond its baseline condition.
Environmental fit	The relationship of a development to identified environmental opportunities and constraints in its setting.
Feature*	Particularly prominent or eye-catching elements in the landscape such as tree clumps, church towers or wooded skylines OR a particular aspect of the project proposal.
FoV	Field of View – the horizontal angle of the view illustrated in a visualisation.
Geographical Information System (GIS)	A system that captures, stores, analyses, manages and presents data linked to location. It links spatial information to a digital database.
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition, published jointly by the Landscape Institute and Institute of Environmental Management and Assessment, 2013.
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
HH	Hub Height
Historic Landscape Characterisation (HLC)	Historic characterisation is the identification and interpretation of the historic dimension of the present-day landscape or townscape within a given area.
Indirect effects*	Direct effects relate to the host landscape and concern both physical and perceptual effects on the receptor. Indirect effects relate to those landscapes and receptors which separated by distance or remote from the development and therefore are only affected in terms of visual or perceptual effects. The Landscape Institute also defines indirect effects as those which are not a direct

Term/abbreviation	Definition
	result of the development but are often produced away from it or as a result of a complex pathway.
Indirect light	The light source is not visible but the light emanating from the source is apparent.
Infrared light	A type of light not visible to the human eye.
Iterative design process	The process by which project design is amended and improved by successive stages of refinement which respond to growing understanding of environmental issues.
Key characteristics	Those combinations of elements which are particularly important to the current character of the landscape and help to give an area its particularly distinctive sense of place.
LANDMAP	LANDMAP is a whole landscape approach that covers all landscapes, designated and non-designated, it covers the natural, rural, peri-urban and urban areas in Wales, (excluding the Cities of Cardiff and Swansea), it includes inland waters and coastal areas to the low water mark. LANDMAP is an all-Wales GIS (Geographical Information System) based landscape resource where landscape characteristics, qualities and influences on the landscape are recorded and evaluated into a nationally consistent data set. In Wales, LANDMAP is the formally adopted methodology for landscape assessment and is advocated by Planning Policy Wales.
Land cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it. Related to but not the same as land use.
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significance of the 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.
Landscape capacity	The amount of specified development or change which a particular landscape and the associated visual resource is able to accommodate without undue negative effects on its character and qualities. (NE, 2019)
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.
Landscape Character Area (LCA)*	These are single unique areas which are the discrete geographical areas of a particular landscape type.
Landscape Character Assessment	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 landscapes distinctive. The process results in the production of a Landscape Character Assessment.
Landscape Character Types (LCTs)*	Distinct types of landscape which are relatively homogenous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and

Term/abbreviation	Definition
	historical land use and settlement patterns, and perceptual and aesthetic attributes.
Landscape classification	A process of sorting the landscape into different types using selected criteria but without attaching relative values to different sorts of landscape.
Landscape constraints	Components of the landscape resource such as views or mature trees recognised as constraints to development. Often associated with landscape opportunities.
Landscape effects*	Effects on the landscape as a resource in its own right. An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern here is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. (GLVIA3¹, Para 5.1).
Landscape fit	The relationship of a development to identified landscape opportunities and constraints in its setting.
Landscape patterns	Spatial distributions of landscape elements combining to form patterns, which may be distinctive, recognisable and describable e.g. hedgerows and stream patterns.
Landscape quality (condition)*	A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape qualities	A term used to describe the aesthetic or perceptual and intangible characteristics of the landscape such as scenic quality, tranquillity, sense of wildness or remoteness. Cultural and artistic references may also be described here.
Landscape receptors *	Defined aspects of the landscape resource that have the potential to be affected by a proposal
Landscape resource	The combination of elements that contribute to landscape context, character, and value.
Landscape sensitivity	The sensitivity of the landscape to a particular development considers the susceptibility of the landscape and its value.
Landscape strategy	The overall vision and objectives for what the landscape should be like in the future, and what is thought to be desirable for a particular landscape type or area as a whole, usually expressed in formally adopted plans and programmes or related documents.
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. The value of the landscape units that may be affected, based on review of any designations at both national and local levels, and, where there are no

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	designations, judgements based on criteria that can be used to establish landscape value.
Level of effect	Determined through the combination of sensitivity of the receptor and the proposed magnitude of change brought about by the development.
Lux	A unit of illumination, the amount of light on a surface per unit area.
Magnitude (of effect)*	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short term or long term in duration.
Mitigation	Measures which are proposed to prevent, reduce and where possible offset any significant adverse effects (or to avoid, reduce and if possible, remedy identified effects (GLVIA3 ¹ , Para 3.37).
Natural light	Light supplied by the sun, directly or indirectly, the moon and stars.
NRW	Natural Resources Wales
Perception	Combines the sensory (that we receive through our senses) with the cognitive (our knowledge and understanding gained from many sources and experiences).
Perceptual Aspects	A landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity (GLVIA3 ¹ , Box 5.1)
Photomontage*	A visualisation which superimposes an image of the Proposed Development upon a photograph or series of photographs.
Beneficial or Adverse Types of Landscape Effect	The landscape effects may be beneficial, neutral, or adverse. In landscape terms – a beneficial effect would require development to add to the landscape quality and character of an area. Neutral landscape effects would include low or negligible changes that may be considered as part of the ‘normal’ landscape processes such as maintenance or harvesting activities. An adverse effect may include the loss of landscape elements such as mature trees and hedgerows as part of construction leading to a reduction in the landscape quality and character of an area.
Beneficial or Adverse Types of Visual Effect	The visual effects may be beneficial, neutral, or adverse. In visual terms – beneficial or adverse effects are less easy to define or quantify and require a subjective consideration of a number of factors affecting the view, which may be beneficial, neutral, or adverse. Opinions as to the visual effects of wind energy developments vary widely, however it is not the assumption of this assessment that all change, including substantial levels of change is an adverse experience. Rather this assessment has considered factors such as the visual composition of the landscape in the view together with the design and composition, which may or may not be reasonably, accommodated within the scale and character of the landscape as perceived from the receptor location.
Probability of Effect	The probability of a landscape and visual effect occurring as a result of this Development should be regarded as certain, subject to the stated project

Term/abbreviation	Definition
	design and the continuance of the existing, baseline landscape resource, including known changes such as other permitted wind farm development. The probability of cumulative effects however is variable. Whereas those effects related to operational wind energy development and those under construction are considered as certain, effects related to development with planning consent are only considered as likely. Wind energy development sites for which there is a submitted planning application are considered as uncertain and other wind energy development for which no planning application has been made are considered as uncertain / unknown, as the level of uncertainty would be greater.
Proximity activated lighting	Lighting which is turned on by the detection of moving objects, such as aircraft detected by radar.
Rarity	The presence of rare elements or features in the landscape or the presence of a rare Landscape Character Type. (GLVIA3 ¹ , Box 5.1)
RD	Rotor Diameter
Receptor	Physical landscape resource, special interest, or viewer group that will experience an effect.
Recreation Value*	Evidence that the landscape is valued for recreational activity where experience of the landscape is important. (GLVIA3 ¹ , Box 5.1)
Representativeness*	Whether the landscape contains a particular character and/or features or elements which are considered particularly important examples.
Residual effects	Likely environmental effects, remaining after mitigation.
Scale Indicators	Landscape elements and features of a known or recognisable scale such as houses, trees, and vehicles that may be compared to other objects, where the scale of height is less familiar, to indicate their true scale.
Scenic quality	Depends upon perception and reflects the particular combination and pattern of elements in the landscape, its aesthetic qualities, its more intangible sense of place or 'genius loci' and other more intangible qualities. (GLVIA3 ¹ , Box 5.1)
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.
Sense of Place (genius loci)	The essential character and spirit of an area: 'genius loci' literally means 'spirit of the place'.
Sensitivity*	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value associated to that receptor.
Significance	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.

Term/abbreviation	Definition
Significant Effects	It is a requirement of the EIA Regulations to determine the likely significant effects of the development on the environment which should relate to the level of an effect and the type of effect. The significance of an effect gives an indication as to the degree of importance (based on the magnitude of the effect and the sensitivity of the receptor) that should be attached to the impact described. Whether or not an effect should be considered significant is not absolute and requires the application of professional judgement. Significant – ‘noteworthy, of considerable amount or effect or importance, not insignificant or negligible’. Those levels and types of landscape and visual effect likely to have a major or important / noteworthy or special effect of which a decision maker should take particular note.
Sky glow	The brightness of the night sky in a built-up area as a result of light pollution, apparent as a diffuse artificial light in the sky above major towns and cities.
SNH	Scottish Natural Heritage (now NatureScot).
Susceptibility*	The ability of a defined landscape or visual receptor to accommodate the specific Proposed Development without undue negative consequences.
Sustainability*	The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.
Temporary or permanent effects	Effects may be considered as temporary or permanent. In the case of wind energy development, the application is for a 30-year period after which the assessment assumes that decommissioning will occur and that the site will be restored. For these reasons the development is referred to as long term and reversible.
Time depth	Historical layering – the idea of landscape as a ‘palimpsest’, a much written-over asset of landscape.
Townscape	The character and composition of the built environment including the buildings and the relationships between them, the different types of urban open space, including green spaces, and the relationship between buildings and open spaces.
Type or Nature of effect	Whether an effect is direct or indirect, temporary or permanent, beneficial (positive), neutral or adverse (negative) solus or cumulative.
Viewpoints	Selected for illustration of the visual effects fall broadly into three groups: • Representative Viewpoints: selected to represent the experience of different types of visual receptor, where larger numbers of viewpoints cannot all be included individually and where the significant effects are unlikely to differ – for example certain points may be chosen to represent the view of users of particular public footpaths and bridleways. • Specific Viewpoints: chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific

Term/abbreviation	Definition
	local visitor attractions, such as landscapes with statutory landscape designations or viewpoints with particular cultural landscape associations. • Illustrative Viewpoints: chosen specifically to demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations (GLVIA3¹, Para 6.19).
Visual amenity	The overall views and surroundings, which provide a visual setting or backdrop to the activities of people living, working, participating in recreational activities, visiting or travelling through an area.
Visual dominance	A visual effect often referred to in respect of residential properties that in relation to development would be subject to blocking of views, or reduction of light / shadowing, and high levels of visual intrusion.
Visual effect*	Effects on specific views and on the general visual amenity experienced by people.
Visual Receptors*	Individuals and/or defined groups of people who have the potential to be affected by a proposal.
Visual sensitivity	The sensitivity of visual receptors such as residents, relative to their location and context, to visual change proposed by development.
Visualisation	Computer visualisation, photomontage, or other technique to illustrate the appearance of the development from a known location.
Wireline / Wireframe	A computer-generated line drawing of the DTM and the Proposed Development from a known location.
Zone of Theoretical Visibility (ZTV)*	A map, usually digitally produced, showing areas of land within which, a development is theoretical visible.