# APPENDIX 12-1

***LVIA METHODOLOGY***

# 1. LVIA METHODOLOGY

## 1.1 Scope and Definition of Landscape and Visual Impact (LVIA) Study Area

For the purposes of this chapter, where the 'Proposed Development site' or 'the site' is referred to, this relates to the primary study area for the Proposed Development, as delineated in green and labelled as the 'EIAR Development Site Boundary' in Appendix 12-4 (A0 LVIA Baseline Map), Figure 12-2 and Figure 12-5.

Landscape and visual baseline mapping and viewpoint selection are based on wider study areas. The geographical parameters for this LVIA was determined by desktop study, survey work undertaken, the professional judgement of the assessment team, experience from other relevant projects and policy guidance or standards (*Appendix 3*, Wind Energy Development Guidelines – DoEHLG, 2006 and GLVIA, 2013). The LVIA study area was chosen as 20 kilometres for visual and landscape effects. This is the study area for which the baseline maps and viewpoint locations are produced and are referred to as the 'study area' or the 'LVIA study area'.

Furthermore, the following topic areas have been scoped out of the assessment:

- Effects on landscape and visual receptors that have minimal or no theoretical visibility (as predicted by the ZTV) and/or very distant visibility, and are therefore unlikely to be subject to significant effects;
- Effects on designated landscapes beyond a 20 km radius from the Proposed Development, from where it is judged that potential significant effects on key characteristics and/or special qualities, or views are judged unlikely to occur;
- Effects on landscape character beyond a 20 km radius from the Proposed Development, where it is judged that potential significant effects on landscape character are unlikely to occur;
- Effects on visual receptors beyond a 20 km radius from the Proposed Development, where it is judged that potential significant effects are unlikely to occur;
- Cumulative effects in relation to single turbines (except where otherwise stated);
- Cumulative landscape and visual effects beyond a 20 km radius from the Proposed Development, where it is judged that potential significant effects are unlikely to occur;
- Underground elements of the project such as grid connection cabling which are underground and therefore not visible. The construction works required for installation of underground components are very temporary in nature and there is no potential for them to induce significant landscape and visual effects, therefore, they not considered further in this assessment.

Furthermore, in most cases ZTV mapping will be produced within a radius of 20 km from the proposed turbines, however, the 2006 DoEHLG Wind Energy Development Guidelines for Planning Authorities require that *"in areas where landscapes of national or international renown are located within 25 km of a proposed wind energy development, the Zone of Theoretical Visibility should be extended as far (and in the direction of) that landscape'".* Therefore, the ZTV shown in Figure 12-5 (Section 12.4, Visibility of the Proposed Development) has been extended to 25 kilometres to include the Burren National Park which is a landscape of national and international renown.

## 1.2 Guidelines

Ireland signed and ratified the European Landscape Convention (ELC) in 2002, which introduces a pan-European concept which centres on the quality of landscape protection, management and planning. The Department of Arts, Heritage and the Gaeltacht has published a National Landscape Strategy for Ireland in 2015. The Strategy aims to ensure compliance with the ELC and contains six main objectives, which include developing a national Landscape Character Assessment and Developing Landscape Policies.

In 2000, the Department of the Environment and Local Government published 'Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities', which recommended that all Local Authorities adopt a standardised approach to landscape assessment for incorporation into Development Plans and consideration as part of the planning process. However, this DoEHLG 2000 guidance remains in draft form.

The landscape and visual impact assessment was primarily based on the *Guidelines for Landscape and Visual Impact Assessment* or GLVIA (The Landscape Institute/Institute of Environmental Management and Assessment, UK, 2013). A range of other guidelines also inform the preparation of this landscape and visual impact assessment, which include:

- Wind Energy Development Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government, 2006),
- Draft Revised Wind Energy Development Guidelines (Department of Planning, Housing and Local Government, 2019),
- Visual Assessment of Wind Farms: Best Practice (Scottish Natural Heritage, 2002).
- Visual Representation of Wind Farms: Version 2.2 (Scottish Natural Heritage, 2017).
- Siting and Designing Wind Farms in the Landscape, Version 3a (Scottish Natural Heritage, 2017).
- Assessing the Cumulative Impact of Onshore Wind Energy Developments. (Scottish Natural Heritage, 2012)
- Photography and photomontage in landscape and visual impact assessment (Landscape Institute Advice Note 01/11, 2011)
- Visual representation of development proposals (Landscape Institute Technical Guidance Note 02/17, 2017)
- Spatial Planning for Onshore Wind Turbines – natural heritage considerations (Scottish Natural Heritage, 2015)
- Cumulative Impact of Wind Turbines on Landscape and Visual Amenity (Carmarthenshire County Council, 2013)

## 1.3 Zone of Theoretical Visibility Mapping

The Zone of Theoretical Visibility (ZTV) represents the area over which a development can theoretically be seen and is based on a Digital Terrain Model (DTM), overlaid on a map base. A DTM refers to the way in which a computer represents a piece of topography in three dimensions as a digital model. ZTV maps provide the following information:

- Indicates broad areas where visibility of a wind energy development is most likely to occur;
- How much of the wind energy development is likely to be visible (using different coloured bands for different numbers of turbines);
- The extent and pattern of visibility.

Production of ZTV maps is usually one of the first steps of Visual Impact Assessment, helping to inform the selection of the Study Area in which impacts will be considered in more detail and the identification of sensitive vantage points. (Visual Representation of Wind Farms, Scottish Natural Heritage, 2017).

### 1.3.1 Limitations of ZTV Mapping

The Scottish Natural Heritage guidelines referred to above acknowledge the following limitations inherent to the use of theoretical visibility mapping:

- The ZTV presents a 'bare ground' scenario, i.e. visibility of the Proposed Development in a landscape without screening structures or vegetation. This includes trees, hedgerows, buildings and small-scale landform or ground surface features. The ZTV also does not take into account the effects of weather and atmospheric conditions, and therefore can be said to represent a 'worst-case' scenario, that is where the wind turbines could potentially be seen given no intervening obstructions and favourable weather conditions.
- The ZTV indicates areas from where a wind farm may be visible, but cannot show how it will look, nor indicate the nature or magnitude of visual impacts. The visibility of the turbines will decrease with the distance from which they are viewed, but this is not accounted for in the ZTV. Figure 1-1 below provides an illustration of the differences in view relative to the distance from a turbine.

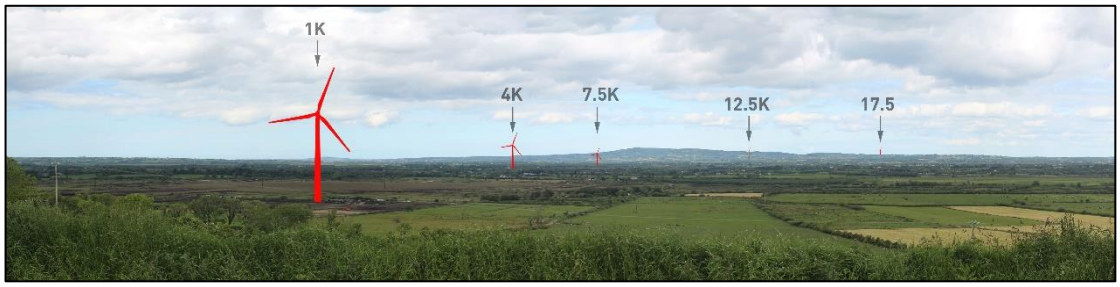


*Figure 1-1 The effect of distance on visibility of wind turbines (Illustrative Purposes Only)*

- A ZTV is only as accurate as the data on which it is based. It is not easy to test the accuracy of a ZTV in the field, although some verification will occur during the assessment of viewpoints.
- In order to handle large areas of terrain, the DTM data is based on information that does not allow detail to be distinguished below a certain level. There are also differences in the way that the software package 'interpolates' between heights in the calculations made.

### 1.3.2 ZTV Methodology

The ZTV maps presented in the EIAR show visibility of the Proposed Development using the half blade height of the wind turbines as points of reference. The maps also show the visibility of the Proposed Development in addition to visibility of other existing, permitted and proposed wind farms in the area. The area covered by the ZTV maps in Chapter 12 (Figure12-8, Figure 12-10 and Figure 12-12) have a radius of 20 kilometres from the outer-most proposed turbines.

As stated previously, the 2006 DoEHLG Wind Energy Development Guidelines for Planning Authorities require that *"in areas where landscapes of national or international renown are located within 25 km of a proposed wind energy development, the Zone of Theoretical Visibility should be extended as far (and in the direction of) that landscape".* Therefore, the ZTV shown in Figure 12-5 has been extended to 25 kilometres to include the Burren National Park.

ZTV maps assume a worst-case or 'bare ground' scenario, i.e. no land-cover. They represent visibility of the proposed wind farm in the absence of all natural and manmade features from the landscape, including vegetation, houses and other buildings. In reality, such features will restrict or limit visibility of the wind turbines, due to the screening effects of vegetation, for example forestry and road-side hedgerows and trees, and buildings, particularly within towns and villages.

Separate colour bands are used on each ZTV map to indicate the number of turbines which will potentially be visible to half blade i.e. only half a blade might be visible over the topography as opposed to seeing a full turbine. The legend on each map shows the number of visible turbines for each corresponding colour, which are as follows:

- Orange: 1 - 2 turbines visible
- Light Green: 3 - 4 turbines visible
- Yellow: 5 - 6 turbines visible
- Blue/Grey: 7 – 8 turbines visible

### 1.3.3 Route Screening Methodology - Roads

In order to comprehensively demonstrate the varying characteristics of the roads and to record the actual visibility in comparison to the theoretical visibility, a methodology was developed. This is termed Route Screening Analysis and it was undertaken from all roads within a 2.5 km radius of the proposed turbines. Prominent roads within 5 km of the proposed turbines (e.g. regional roads or scenic routes) that showed theoretical visibility indicated by the ZTV map were also surveyed.

Route Screening Analysis as its name suggests considers the actual visibility of the proposed wind turbines from surrounding roads. Areas in close proximity to the Proposed Development generally comprises upland forested areas, agricultural land, a network of trees and hedgerows, and settlements. In order to get a clearer understanding of visibility and screening, and to bridge the gap for the assessor between the computer-generated ZTV maps and the actual nature of visibility in the study area, Route Screening Analysis was undertaken.

Within 2.5 km radius of the proposed turbines, every public road was driven, with notes taken on screening, views, and the direction of the views to the Proposed Development. The Route Screening Analysis survey was undertaken in July and August 2020.

In preparation for the route screening assessment, the ZTV maps were overlaid with aerial imagery and printed at a large scale. Each route was driven once in each direction as a minimum. The route was driven slowly along the route and mapping and notes of each section of roadway on a high-resolution aerial image was carried out. Screening between the wind farm site and the relevant side of the road was marked. In cases where the road travels directly in the direction of the proposed wind farm, screening on both sides of the road was included and the most representative of the two roadsides were mapped.

In addition, photographs were taken at intervals of approximately 500 metres along the routes to allow later confirmation of mapping, and to methodically record the views along the route. A photograph of the view along the road was taken in each direction, as well as the view to either side of the road. Following the site visit, a map was created of each route. The screening along the route was mapped as one of three categories:

The categories were as follows:

- Little/No Screening – mainly open and with some very light vegetation
- Intermittent/Partial Screening – light deciduous roadside vegetation and vegetation with short gaps which would allow intermittent or partial views
- Dense Screening – vegetation, topography and built structure which is dense enough to block views (e.g. coniferous forestry)

# 1.4 Photomontage Viewpoints

## 1.4.1 Viewpoint Identification

The viewpoints or photo locations were selected following guidance contained in the DoEHLG *'Wind Energy Development Guidelines for Planning Authorities'* (2006), the *'Guidelines for Landscape and Visual Impact Assessment'* (2013) and in the *'Visual Representation of Wind Farms'* (Scottish Natural Heritage, 2017). The selection of photo locations is designed to give a representative range of views of the Proposed Development.

Viewpoints, the photo locations from which the photomontages are produced, were chosen after compiling the Visual Baseline. The main purpose of establishing the visual baseline is to identify the key visual receptors that should be considered for viewpoint selection. To this end the following have been identified in order of priority:

- Designated Scenic Routes and Scenic Views
- Settlements
- Recreational and Tourist Destinations
- Recreational Routes
    - Waymarked Walking Routes
    - Cycle Routes
    - Scenic Drives
    - Tourist Routes
- Viewing Points (e.g. marked on OSi Maps)
- Transport Routes

These visual receptors are listed in tables under the sections identified above along with theoretical visibility at those locations indicated by the ZTV maps.

After all key visual receptors are identified, a Visual Receptor Preliminary Assessment is carried out to eliminate the visual receptors for the following reasons:

- No or very limited theoretical visibility indicated on the ZTV map for the visual receptor
- Designated views and scenic routes as well as OSi Viewing Points that are not directed towards the Proposed Development
- Visual receptors visited on site, where views towards the turbines were either entirely screened or substantially screened and distance from the Proposed Development site would mitigate any visual effects

Establishing visibility on the ground was assisted by the TrueViewVisuals software, which is an iPad-based Augmented Reality tool to help visualisation of a project live on the ground before it is built.

All other key visual receptors were selected as viewpoint locations. In addition, viewpoints were selected in close proximity to the proposed turbines, where turbines are likely to be most visible and hence visual effects may be greatest.

Viewpoints were chosen having regard to the SNH Guidance (2017) which advises that a range of views should be shown at a range of distances and aspects, as well as at varying elevations and showing both where the development will be completely visible as well as partially visible. Consideration was also given to ensure that photomontages captured other wind farms in order to assess cumulative visual effects.

## 1.4.2 Photomontages

Photomontages are visualisations that superimpose an image of a proposed development upon a photograph or series of photographs. They are intended as graphical representations of how a proposed development will appear in the existing landscape and are used as a tool in the LVIA process. A series of photomontages have been prepared as part of this assessment and are presented in a separate Volume 2 Photomontage Booklet to be submitted along with this EIAR.

### 1.4.2.1 Photomontage Limitations

Photographs, and therefore photomontages, are subject to a range of limitations, as stated in *'Visual Assessment of Wind Farms'* (Scottish Natural Heritage, 2014):

- Visualisations provide a tool for assessment that can be compared with an actual view in the field; they should never be considered as a substitute to visiting a viewpoint in the field.
- Neither photographs nor visualisations can replicate a view as seen in reality by the human eye.
- Visualisations are only as accurate as the data used to construct them.
- Visualisations can only represent the view from a single location at a particular time and in particular weather conditions.
- Static visualisations cannot convey the effect of turbine blade movement.

Although the scale, siting and geometry of photomontages are based on technical data, the other qualities of the image are open to judgments. The guidance also notes that interpretation of visualisations also needs to take into account additional information including variable lighting, movement of turbine blades, seasonal differences and the movement of the viewer through the landscape. However, accepting these limitations, the SNH guidelines state that photomontages are useful tools in the Visual Impact Assessment of wind turbines.

Furthermore, with regard to the representation of cumulative visual effects, existing and permitted turbines are also shown in the photomontages. The representation of existing turbines relies on photographs taken on site, while permitted and proposed turbines are images of turbines superimposed into the image. As such there can be a discrepancy in the lighting and sharpness between these two different representations.

Photomontages are 2D representations of 3D views and thus cannot convey the perspective and depth of view of seeing the actual objects with the naked eye. One of the areas that this limitation affects cumulative visual effects is where proposed turbines are proposed to be located in front or behind existing or permitted turbines. In the field this physical separation may be obvious, while on the photomontage the turbines may appear as one wind farm.

### 1.4.2.2 Photomontage Presentations

The viewpoints presented in the accompanying Photomontage Booklet show several views from each viewpoint location. These include:

1. **Overview Sheet –** Viewpoint details include location description, grid reference distance from nearest turbine and technical data in relation to photography. Three maps at various scales show the viewpoint location. A 120-degree existing view image without any proposed and permitted turbine. Existing turbines visible in the landscape may appear within the image and the horizontal extent of the 90-degree and 53.5-degree image to be presented in subsequent images is also framed.
2. **Baseline** - 90-degree visual baseline image without any proposed or permitted turbines and a matching wireframe image of the same view which includes any existing turbines

visible in the landscape. If turbines are already existing in the landscape, these are visible on the photograph and are rendered in the wireframe. If turbines have been constructed in the intervening period between when the photography imagery was taken and the date of production of the photomontage, those turbines have been digitally rendered into the image as they now form part of the current view.

3. **Cumulative Photomontage (90 degrees)** – Showing a 90-degree photomontage image with the proposed wind farm and all other existing, permitted and proposed wind farms within the view. A matching wireframe image shows the turbines of all proposed, permitted and existing wind farms individually coloured and labelled for ease of identification.
4. **Proposed Photomontage (53.5 degrees) with Cumulative** – Showing a photomontage image of the proposed turbines and any existing, permitted and proposed turbines in a 53.5-degree horizontal field of view.
5. **Proposed Wireframe (53.5 degrees)** - Showing a wireframe image of the proposed turbines and any existing and permitted turbines in a 53.5-degree horizontal field of view. The proposed Slieveacurry turbines and any other existing, permitted and proposed wind farms are individually labelled for ease of identification.

The viewpoint images contained in the booklet are devised to be viewed at arm's length.

### 1.4.2.3 Photomontages - Range of Turbine Dimensions Assessed

The dimensions presented below are the range of hub height, blade length and overall tip height assessed within differing chapters of this EIAR and constitute a 'reasonably limited range':

- Turbine Tip Height - Maximum height 175 metres, Minimum height 173 metres
- Hub Height - Maximum height 108.5 metres, Minimum height 100 metres
- Blade Length - Maximum length 75 metres, Minimum length 66.5 metres.

The minimum turbine tip height within the limited range is 173 metres and the maximum turbine tip height is 175 metres. From a visual perspective, the two metre difference in tip height within this range will have a negligible effect, therefore the illustration of 175m tip height is also representative of 173m tip height. A blade length of 66.5m and a hub height of 108.5m was considered throughout this assessment as a representative illustration of the Proposed Development on the basis of professional judgement and on consideration of the range of turbines which could be installed. This combination of blade length and hub height (175m Tip) has been identified as a worst-case scenario for likely visual effects and is most representative for assessment, on the basis that the greatest extent of the entire turbine structure (blades and tower) would potentially be visible from the viewpoints assessed in the EIAR. This turbine configuration (blade length of 66.5m and a hub height of 108.5m) of the reasonably limited range is termed as the 'Highest Hub and Shortest Blade' and is presented for all 17 No. photomontage viewpoints.

- **Highest Hub and Shortest Blade** – All 17 No. Photomontage Viewpoints.
  - Maximum Tip Height – 175 metres
  - Maximum Hub Height – 108.5 metres
  - Blade Length – 66.5 metres

Irrespective of which combination of hub height and blade length within the range outlined in this application is installed on site, the significance of residual landscape and visual effects will not be altered. However, for the avoidance of doubt, an alternative turbine configuration of the longest blade and lowest hub is presented for four selected viewpoints included in the photomontage booklet, this configuration is termed 'Lowest Hub and Longest Blade'. The viewpoints selected are representative of short-range views (viewpoints 03 and 17, <1.5 km from the Proposed Development), a medium-range view (viewpoint 09, 5.5km from the Proposed Development) and a long-range view (viewpoint 05, 9.1km from the Proposed Development). The following summarises the 'Lowest Hub and Longest Blade' that is presented:

- **Lowest Hub and Longest Blade** – 4 No. Photomontage Viewpoints (Viewpoint 03 Cloonanaha; Viewpoint 05 Carrowlagan; Viewpoint 09 Leagard North; Viewpoint 17 Boolynamiscaun)
  - Maximum Tip Height – 175 metres
  - Minimum Hub Height – 100 metres
  - Blade Length – 75 metres

# 1.5 Landscape and Visual Impact Assessment Methodology

## 1.5.1 Identification of Landscape Receptors

The landscape receptors were selected following guidance contained the *'Guidelines for Landscape and Visual Impact Assessment'* (2013) and in the *'Visual Representation of Wind Farms'* (Scottish Natural Heritage, 2017).

The following landscape receptors are identified in the landscape baseline:

- **Landscape Designations** based on:
  - Clare County Development Plan 2017 to 2023 (CCDP).
  - County Clare Wind Energy Strategy (Volume 5 of the Clare County Development Plan 2017-2023)
- **Landscape Character of the Proposed Development Site** and its immediate environment based on:
  - Landscape Type identified using DoEHLG Guidelines 2006 and cognisant of the DoHPLG Draft Revised Wind Energy Development Guidelines (2019).
  - Site Visits.
- **Landscape Character of the Study Area** based on:
  - Landscape Character Assessment of County Clare, 2004 (LCACC), (Chapter 13.2.1 of the CCDP).

After all landscape receptors are identified, a Landscape Receptor Preliminary Assessment is carried out to eliminate the landscape receptors, where no or very limited theoretical visibility has been indicated on the ZTV map.

All other landscape receptors were selected for further assessment of landscape effects.

## 1.5.2 Assessing Landscape Effects

The methodology uses qualitative methods in order to arrive at an assessment, which is based on the Landscape and Landscape Assessment (2000) Guidelines as well as the GLVIA (2013), and the DoEHLG (2006) Guidelines were also taken into account.

Landscape effects can be described as changes which affect the landscape as a resource. This includes how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects and its landscape character. Landscape effects also relate to changes in the structure of the landscape. Under the GLVIA (2013), the assessment of likely significant effects on landscape receptors includes a judgement on both the sensitivity of the receptor as well as magnitude of the change.

### 1.5.2.1 Assessing Landscape Sensitivity

Landscape Sensitivity, which is described in the GLVIA (2013) as a combination of the landscape's susceptibility to change as well as the value attached to the landscape.

Susceptibility to change can be described as the ability of the landscape receptor (either the overall character, quality of the landscape or a particular landscape feature) to accommodate the Proposed Development without undue consequences for the maintenance of the baseline (existing) landscape and/or the aims of landscape planning policies and strategies. Landscape value is a combination of values which are assessed in the landscape baseline, combining any formal landscape designations.

Susceptibility to change can be described as the ability of the landscape receptor (either the overall character, quality of the landscape or a particular landscape feature) to accommodate the Proposed Development without undue consequences for the maintenance of the baseline (existing) landscape and/or the aims of landscape planning policies and strategies. Landscape value is a combination of values which are assessed in the landscape baseline, combining any formal landscape designations.

For the purposes of this LVIA and the assessment of landscape sensitivity, the following landscape sensitivity ratings were assigned to the landscape character areas within the study area; sensitivity ratings were assessed/chosen/identified based upon the sensitivity rating scale implemented by the *Clare Wind Energy Strategy*.

- High
- Medium to High
- Medium
- Medium to Low

### 1.5.2.2 Assessing Magnitude of Change in the Landscape

The magnitude of change in each landscape character area is a combination of the visual presence - size and scale - of the change, the extent of the area to be affected, and the duration and reversibility of the effect. The magnitude of change for each landscape character area was assessed using the definitions outlined in Table 1-1 below.

*Table 1-1 Magnitude of Landscape Change Assessment Criteria*

| Magnitude of Change | Description |
|---|---|
| Substantial | Where a landscape will experience the loss of key landscape features or the introduction of uncharacteristic additions over a large area. The changes to the landscape are prominent and large in scale. The level of change has an effect on the overall landscape character. |
| Moderate | A more limited loss of or change to landscape features over a medium extent which will result in some change to landscape features and aesthetics. Could include the addition of some new uncharacteristic features or elements that would lead to the potential for change in landscape character in a localised area or part of a landscape character area. Would include moderate effects on the overall landscape character that do not affect key characteristics. |

| Magnitude of Change | Description |
|---|---|
| Slight | The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. |
| Negligible | A change affecting smaller areas of landscape character including the loss of some landscape elements or the addition of features or elements which are either of low value or hardly noticeable. |

### 1.5.2.3 Landscape Effects Assessment Matrix

The significance of landscape effect was arrived at by combining the magnitude and sensitivity classifications, using the assessment matrix in Table 1-2 below, where landscape sensitivity is shown in the left-hand first column and magnitude of change is shown in the first row at the top of the table.

*Table 1-2 Landscape effects significance assessment matrix*

| | Substantial | Moderate | Slight | Negligible |
|---|---|---|---|---|
| High | Major | Major/Moderate | Moderate | Moderate/Minor |
| Medium to High | Major/Moderate | Moderate | Moderate/Minor | Minor |
| Medium | Moderate | Moderate/Minor | Minor | Minor/Negligible |
| Medium to Low | Moderate/Minor | Minor | Minor/Negligible | Negligible |

The determination of significance uses a seven-point scale, ranging from Major to Negligible. This seven-point scale is translated to the EPA impact assessment classifications of significance, as outlined in Table 1-3 below.

*Table 1-3 EPA Impact Assessment Significance Classification for Landscape Effects*

| Matrix Classification Significance | EPA Significance Classification | EPA (2017) Definition of Significance |
|---|---|---|
| Major | Profound | An effect which obliterates sensitive characteristics |
| Major/Moderate | Very significant | An effect, which by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment |
| Moderate | Significant | An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| Moderate/Minor | Moderate | An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |

| Matrix Classification Significance | EPA Significance Classification | EPA (2017) Definition of Significance |
|---|---|---|
| **Minor** | Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| **Minor/Negligible** | Not Significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| **Negligible** | Imperceptible | An effect capable of measurement but without significant consequences |

### 1.5.3 Assessing Visual Effects

Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people. These may result from changes in content and character of views as a result in changes to the landscape. The assessment of visual effects is based on views shown in photomontages and the potential visibility indicated by the ZTV maps as well as actual visibility on the ground.

It should be noted that in assessing visual effects, there are different types of visual effects:

- **Visual obstruction:** This occurs when there is an impact on a view which blocks the view.
- **Visual intrusion:** This occurs when there is an impact on a view but which does not block the view.

Due to the nature of the development and the appearance of wind turbines, visual intrusion occurs more frequently than obstruction.

The likely significant effects of the Proposed Development in terms of visual and landscape effects are informed by the ZTV and photomontages. Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people. These may result from changes in content and character of views because of changes to the landscape. The significance of the effect on visual receptors is a combination of the sensitivity of the receptor as well as the magnitude of the change.

#### 1.5.3.1 Visual Receptor Sensitivity

Visual Receptor Sensitivity depends on the occupation or activity of the people, as well the extent to which the attention is focused on views and visual amenity, according to the GLVIA Guidelines (2013). Visual receptor sensitivity is assessed as either being High, Medium or Low, based on the definition of descriptions and examples set out in Table 1-4 below.

*Table 1-4 Visual Receptor Sensitivity Assessment Criteria*

| Sensitivity of Visual Receptor(s) | Description |
|---|---|
| Very High | Included in this category are viewers that are primarily focused on views from this particular location, such as visitors to popular destinations identified for their outstanding views or residents in close proximity or medium proximity whose primary views will be in the direction of the development. |

| Sensitivity of Visual Receptor(s) | Description |
|---|---|
| High | Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes |
| Medium | Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. |
| Low | Includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape. |

### 1.5.3.2 Magnitude of Visual Change

The magnitude of the visual change resulting at each viewpoint is a combination of scale of the change, the extent of the area to be affected and the duration and reversibility of the effect, determined by reviewing the photomontage and wireframe images for each viewpoint. The magnitude of change is determined in accordance with the definitions and descriptions included in Table 1-5 below.

*Table 1-5 Magnitude of Visual Change Assessment Criteria*

| Magnitude of Change | Description |
|---|---|
| Substantial | Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the Proposed Development is fully or almost fully visible over a wide extent, at close proximity to the viewer. |
| Moderate | The change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting. |
| Slight | The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. |
| Negligible | Any change would only be barely distinguishable from the status quo “do-nothing scenario” in the surroundings. The composition and character of the view would be substantially unaltered, approximating to little or no change. |

### 1.5.3.3 Visual Effects Assessment Matrix

Table 1-6 below shows the significance of visual effects, arrived at by combining the visual receptor sensitivity and the magnitude of change classifications. Visual receptor sensitivity is shown in the left-hand first column and magnitude of visual change is shown in the first row at the top of the table.

*Table 1-6 Visual effects significance assessment matrix*

| | Substantial | Moderate | Slight | Negligible |
|---|---|---|---|---|
| Very High | Major | Major/Moderate | Moderate | Moderate/Minor |
| High | Major/Moderate | Moderate | Moderate/Minor | Minor |
| Medium | Moderate | Moderate/Minor | Minor | Minor/Negligible |
| Low | Moderate/Minor | Minor | Minor/Negligible | Negligible |

The determination of significance uses a seven-point scale, ranging from Major to Negligible. This seven-point scale is translated to the EPA impact assessment classifications of significance, as outlined in Table 1-7 below.

*Table 1-7 EPA Impact Assessment Significance Classification for Visual Effects*

| Matrix Classification Significance | EPA Significance Classification | EPA (2017) Definition of Significance |
|---|---|---|
| Major | Profound | An effect which obliterates sensitive characteristics. |
| Major/Moderate | Very significant | An effect, which by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment. |
| Moderate | Significant | An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| Moderate/Minor | Moderate | An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| Minor | Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| Minor/Negligible | Not Significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| Negligible | Imperceptible | An effect capable of measurement but without significant consequences |

#### 1.5.3.4 Residual Visual Effect

After determining the significance of the visual effect using the above visual effects assessment matrix, mitigating factors are taken into consideration to arrive at the final residual effect. In some cases, mitigating factors merit a reduction in classification.

## 1.5.4 Assessing Cumulative Landscape and Visual Effects

### 1.5.4.1 Cumulative Landscape Effects

The SNH 2017 publication *Assessing the Cumulative Impact of Onshore Wind Energy Developments* identifies two principal areas of cumulative landscape effects, on the physical fabric of the landscape and on the landscape character, which state:

- *Cumulative effects on the **physical fabric** of the landscape arise when two or more developments affect landscape components such as woodland, dykes, rural roads or hedgerows. Although this may not significantly affect the landscape character, the cumulative effect on these components may be significant – for example, where the last remnants of former shelterbelts are completely removed by two or more developments.*
- *Cumulative effects on **landscape character** arise when two or more developments introduce new features into the landscape. In this way, they can change the landscape character to such an extent that they create a different landscape character type, in a similar way to large scale afforestation. That change need not be adverse; some derelict or degraded landscapes may be enhanced as a result of such a change in landscape character.*

Potential changes to the physical fabric outlined above are predominantly restricted to the Proposed Development site and the LCAs in which the site is located. Therefore, these landscape receptors will be assessed for cumulative landscape effects on the physical fabric of the landscape arising from the Proposed Development.

Cumulative effects on the landscape character will be assessed in the Landscape Character Areas (LCAs) that have theoretical visibility of the Proposed Development with particular emphasis on the LCA in which the proposed turbines will be located.

Table 1-8 below taken from *Cumulative Impact of Wind Turbines on Landscape and Visual Amenity* (Carmarthenshire County Council, 2013) will be used to assign a current status of the LCAs and whether the addition of the proposed turbines will change the status of any of the LCAs.

*Table 1-8 Landscape types with regard to wind turbine development descriptions (Source Guidance on cumulative impact of wind turbines on landscape and visual amenity)*

| | Landscape Status | Description |
|---|---|---|
| 1 | Landscape character area with no wind turbines | No turbines within an area and not visible except at a distance where they are very small or inconspicuous. |
| 2 | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s | Turbines are visible but are not at a scale, number, spacing or extent that makes them a defining/key characteristic. Turbines might be seen occasionally at close quarters but more often within background views. |
| 3 | Landscape character area with wind turbines | Turbines are located and visible and are at a scale and/or a spacing that makes them one of the defining/key characteristics. Turbines might be seen in the foreground, |

| | Landscape Status | Description |
|---|---|---|
| | | mid-ground or background. However, there would be other key characteristics which would be strong and there would be sufficient separation between turbines for views without turbines and other characteristics remaining dominant in these parts of the area. |
| 4 | Wind turbine landscape | Turbines are frequent and may include extensive wind farms and are the dominant, defining characteristic but there is separation between groups of turbines. However, within these areas wind turbines are likely to be visible. |
| 5 | Windfarm | Landscape fully developed as a wind farm with no clear separation between groups of turbines. |

Cumulative landscape effects are included in LCA Assessment Tables in Appendix 12-2 and summarised in the LVIA Chapter of the EIAR.

### 1.5.4.2 Cumulative Visual Effects

For this assessment, the SNH (2012) definition of cumulative effects as additional changes caused by a proposed development in conjunction with other similar developments, is used, however, this assessment also considers other types of developments. The definition in the DoEHLG Guidelines (2006) defines cumulative impacts in terms of wind farms, as the perceived effect on the landscape of two or more wind energy developments visible from any one place.

The GLVIA (2013) and SNH (2012) guidance also note cumulative visual effects can be experienced in combination, where two or more developments are visible from one viewpoint, as well as sequentially, where a viewer moves to another viewpoint and sees the same or different developments. The photomontage viewpoints illustrate combined visibility and analysis of the photomontages and route screening allows sequential visibility to be assessed.

The guidance on cumulative effects given in the DoEHLG 2006 '*Wind Energy Development Guidelines'* relating to the Proposed Development site is as follows:

- *Similarity in the siting and design approach is preferred where a number of wind energy developments are located in the same landscape character area, particularly within the same viewshed. However, an alternative approach where a particular aesthetic effect is sought may be acceptable.*
- *Different wind energy developments can appear as a single collective unit if located near each other.*
- *It is preferable to avoid locating turbines where they can be seen one behind another, when viewed from highly sensitive key viewpoints (for example, viewing points along walking or scenic routes, or from designated views or prospects), as this results in visual stacking and, thus, confusion. This may not be critical, however, where the wind energy development to the rear is in the distant background.*
- *Wind energy developments within relatively close proximity to one another, while in different landscape character contexts, may be so close as to be within the same visual unit and, therefore, should involve the same siting and design approach.*

The SNH 2017 publication *Siting and Designing Wind Farms in the Landscape* states that *'introducing turbines that are not similar in form, design, colour and scale may increase visual complexity and clutter'.*

Therefore, the cumulative assessment will concentrate on the following issues:

- Whether the proposed turbines increase the spatial extent of turbines in the view
- Whether the different wind energy developments can appear as a single collective unit or there is separation
- Whether 'visual stacking' occurs
- Whether the contrast of different size and design between different wind developments creates visual clutter.

As cumulative visual effects depend on the aspect from which the turbines will be seen various viewpoints were selected to give a thorough overview of the how the proposed turbines will appear in conjunction to turbines already present. The assessment of cumulative effects was included in the viewpoint assessment tables in Appendix 12-3 and summarised in the LVIA Chapter of the EIAR.