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 the Landscape and Visual chapter, where the 'Proposed Development' or 'the site' is referred to, this relates to the immediate environment in which the Proposed Development is located, as shown delineated in green on the LVIA Baseline map (Appendix 12-4), and several Maps (Figures 12-8, 12-9, 12-10 & 12-11) in Section 12.4 – Landscape Baseline, as the 'EIAR Site Boundary'.

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 distance at which a ZTV is set from a proposed wind farm development usually defines the parameters of the LVIA study area. The LVIA study area was chosen as 20 kilometres for visual and landscape effects as is suggested by guidance; '*For blade tips in excess of 100m, a Zone of Theoretical Visibility radius of 20km would be adequate'* (Wind Energy Development Guidelines, *Page 94*, DoEHLG, 2006; *Page 152*, DoHPLG, 2019). The LVIA study area has been chosen as 20 kilometres from the proposed turbines for visual and landscape effects, and 15 kilometres for effects on landscape character. This is the study area for which the baseline maps and viewpoint locations are produced and is referred to as the 'LVIA study area'. Furthermore, as prescribed by best practice guidance and, professional experience of the assessment team, the following topic areas have been scoped out of the assessment:

- Effects on landscape and visual receptors that have very 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 landscape receptors 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 15 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 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;

1.2 Guidelines

While the legislation and general guidance on Environmental Impact Assessment is set out in Chapter 1 of this EIAR only guidance specifically pertaining to the Landscape and Visual Impact are outlined below.

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, Third Edition* or GLVIA3 (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) and the 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; & Nature Scot, 2021).
- 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 theoretical 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 (Figure 12-1, and Figure 12-13) have a radius of 20 kilometres from the outer-most proposed turbines.

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'.* A mapping investigation determined that no landscapes of National or International renown are located between 20 to 25 km from the Proposed Development and the extension of the ZTV beyond 20 km from the outer-most proposed turbine is not warranted. Therefore, 20 km was deemed a sufficient and appropriate boundary for the location and scale of the Proposed Development and any assessment of landscape and visual effects.

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: 1-5 turbines visible.
- Green: 6-10 turbine visible
- Yellow: 11-15 turbines visible
- Dark Blue: 16-20 turbines visible

1.3.3 Route Screening Methodology - Roads

In order to comprehensively demonstrate the varying characteristics of screening existent on roads, proximate to the Proposed Development 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 public roads within a 5 km radius of the proposed turbines.

Route Screening Analysis as its name suggests considers the actual visibility of the proposed wind turbines from surrounding roads. The landscape surrounding the Proposed Development comprises rolling 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.

Every public road was driven within 5 km radius of the proposed turbines. The extent of roadside screening was recorded digitally on a tablet/GPS device as the route is driven. In addition, dashcam video footage was recorded along the routes to allow later confirmation of mapping, and to methodically record the views along the route. All routes were driven slowly. Using the tablet device, screening was logged as one of three categories:

- 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 are dense enough to block views (e.g. coniferous forestry).

Screening between the wind farm site and the relevant side of the road was recorded. In cases where the road travels directly in the direction of the proposed wind farm or between the two turbine clusters, screening of the lowest classification was recorded (least amount of screening). The Route Screening Analysis surveys were conducted in February and May 2021. Great care was taken to ensure recording of screening accounted for seasonal variation, particularly the condition of deciduous vegetation (lack of leaves and growth) in winter months. The screening data was then mapped and validated against the georeferenced dashcam footage.

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 Views
- Settlements
- Recreational and Tourist Destinations
- Viewing Points (e.g. marked on OSi Maps)
- Recreational Routes
    - Waymarked Walking Routes
    - Cycle Routes
    - Scenic Drives
    - Tourist Routes
- 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, permitted and proposed 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 viewpoint images contained in the accompanying Photomontage Booklet are devised to be viewed at arm's length. The viewpoints presented in the 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 (Key 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 at 90º** - 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. The existing Meteorological Mast visible at the southern turbine cluster is also rendered into the baseline wireframe.
3. **Proposed Photomontage with Cumulative at 90º** – 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 with Cumulative at 53.5º** – 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 with Cumulative at 53.5º** - 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 Development turbines and any other existing, permitted and proposed wind farms are individually labelled for ease of identification.

Field of View in Two Directions

The Volume 2 photomontage booklet shows the Proposed Development within two fields of view from 2 No. viewpoints - Viewpoint 04 (Dysart) and Viewpoint 18 (Skyvalley). The imagery presented for viewpoints 04 and 18 were captured from the same location but show an 'A' view in one direction and a 'B' view in another direction. Photomontages were presented like this in order to ensure most of the proposed turbines are visible within a 53.5º photomontage. To provide context, the key image in the 'Overview Sheet' for these two photomontage viewpoints show a 180º field of view (instead of a 120 º) with the differing 90 º and 53.5º view extents marked for both the differing directional (A and B) views. Assessment of visual effects from each viewpoint accounts for the views in both directions.

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:
  - Roscommon County Development Plan 2022-2028
  - Galway County Development Plan 2015-2021
  - Longford County Development Plan 2021-2027
  - Westmeath County Development Plan 2021-2027
  - Offaly County Development Plan 2021-2027

- **Landscape Character of the Study Area based on**:
  - Landscape Character Assessment of County Roscommon
  - Landscape and Landscape Character Assessment of County Galway
  - Chapter 13 of the Westmeath County Development Plan 2021-2027

- **Landscape Character of the Proposed Development Site** and its immediate environment based on:
    - Site Surveys undertaken throughout 2020 and 2021;
    - Landscape Character Types identified in *Landscape Character Types as a basis for Guidelines*: Wind Energy Development Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government, 2006) and also the Draft Revised Wind Energy Development Guidelines (2019)

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.

To establish the landscape sensitivity to wind farm development for this LVIA, the landscape values of the Landscape Character Areas (LCA) assigned in the *Landscape Character Assessment* of County Roscommon (Roscommon County Development Plan 2022-2028) was a primary source. Each Co. Roscommon LCA is designated one of four value classifications, Moderate value as the lowest value classification and Exceptional Value as the highest classification. The Co. Roscommon LCA value ratings have informed the sensitivity ratings given to each LCA in the assessments of landscape character conducted in this LVIA. However, a new naming convention has been assigned to these designations to align with the following assessment methodology. The translation of these designated LCA values are reported below. This was required to enable a full spectrum of sensitivity (including low) compared to the top heavy (exclusion of low value designations) classifications in The Landscape Character Assessment of County Roscommon (2008).

- Co. Roscommon Exceptional Value = **Very High** Sensitivity
- Co. Roscommon Very High Value = **High** Sensitivity
- Co. Roscommon High Value = **Medium** Sensitivity
- Co. Roscommon Moderate Value = **Low** Sensitivity

The resulting sensitivity classifications were as follows:

- Very High
- High
- Medium
- Low

Two LCAs from County Galway and one LCA from County Westmeath were also included in the assessment of LCAs. Sensitivity classifications were taken from the Landscape and Landscape Character Assessment of County Galway and Chapter 13 of the Westmeath County Development Plan and aligned accordingly with the classifications above.

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.
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
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 1-3 below.

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

Matrix Classification Significance	EPA Significance Classification	EPA (2022) 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 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 Very High, 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. Residents in close proximity who have primary views of a scenic quality in the direction of the development.
High	Includes viewers at designated views or landscapes. Viewers such as residents in close proximity to the viewpoint who have primary views that will be in the direction of the development that may not necessarily be of a particularly scenic quality; 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 views which are considered moderately scenic. Viewers such as residents in medium proximity but who do not have views focused in the direction of the proposed development or whose views are not of a particularly scenic quality;
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.

Photomontage viewpoints are specific locations which are representative of key visual receptors. The viewpoint assessment tables in Appendix 12-3 consider all receptors represented in the determination of the visual receptor sensitivity rating for each viewpoint. This determination takes a balanced approach considering the types, sensitivities, and quantities of visual receptors represented. The sensitivity rating given to each photomontage viewpoint in Appendix 12-3 considers both the susceptibility of the visual receptors represented as well as the value attached to the available views at that particular location.

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 (2022) 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 Determination of Residual Landscape and Visual Effects

The matrices and tables above are excellent tools to aid professional judgement in the determination of the significance of an effect. They are useful in that they provide a transparent, objective, structure to the process of balancing sensitivity and magnitude of change. In the context of the determination of visual effects, the formulaic process created by the use of the matrix above provides an indicative initial assessment, which can be seen clearly in the photomontage assessment tables in Appendix 12-3.

However, over-reliance on the formulaic process, which is heavily influenced by the definitions of sensitivity and magnitude of change contained in the tables above, can lead to a failure to properly account for the full range of circumstances and factors at play in the determination of the significance of a visual effect (see section 3.35, GLVIA3, 2013). A wide range of factors, mitigating or otherwise, can factor into such a determination, and it is not possible to capture the complexity involved in balancing all considerations within the necessarily limited definitions contained in these tables. This then naturally results in circumstances whereby the process of the determination of significance using the formulaic method involved with the matrix shown in Table 1-6 can result in misrepresentations of the significance of visual effects. It is only with professional judgement, and narrative descriptions of effect, that such complexity can be integrated into the determination of significance. Therefore, the formulaic methods based upon the matrix presented above is combined with professional judgement in the determination

of significance. This is illustrated in Figure 1-2 below where the professional judgment of the competent expert is used to properly determine the significance of an effect taking all considerations into account.

A focus is placed upon the narrative description of effects (see section 3.36, GLVIA3, 2013) given the naturally subjective nature of the significance determination process, particularly in relation to visual effects, ensuring that the rationale for the overall judgement is clear (see sections 3.28-3.29, GLVIA3, 2013). The comprehensive assessment of photomontages included in Appendix 12-3 aims to provide a transparent and robust determination of residual visual effects utilising the graph in Figure 1-2 below in combination with a clear and logical narrative.

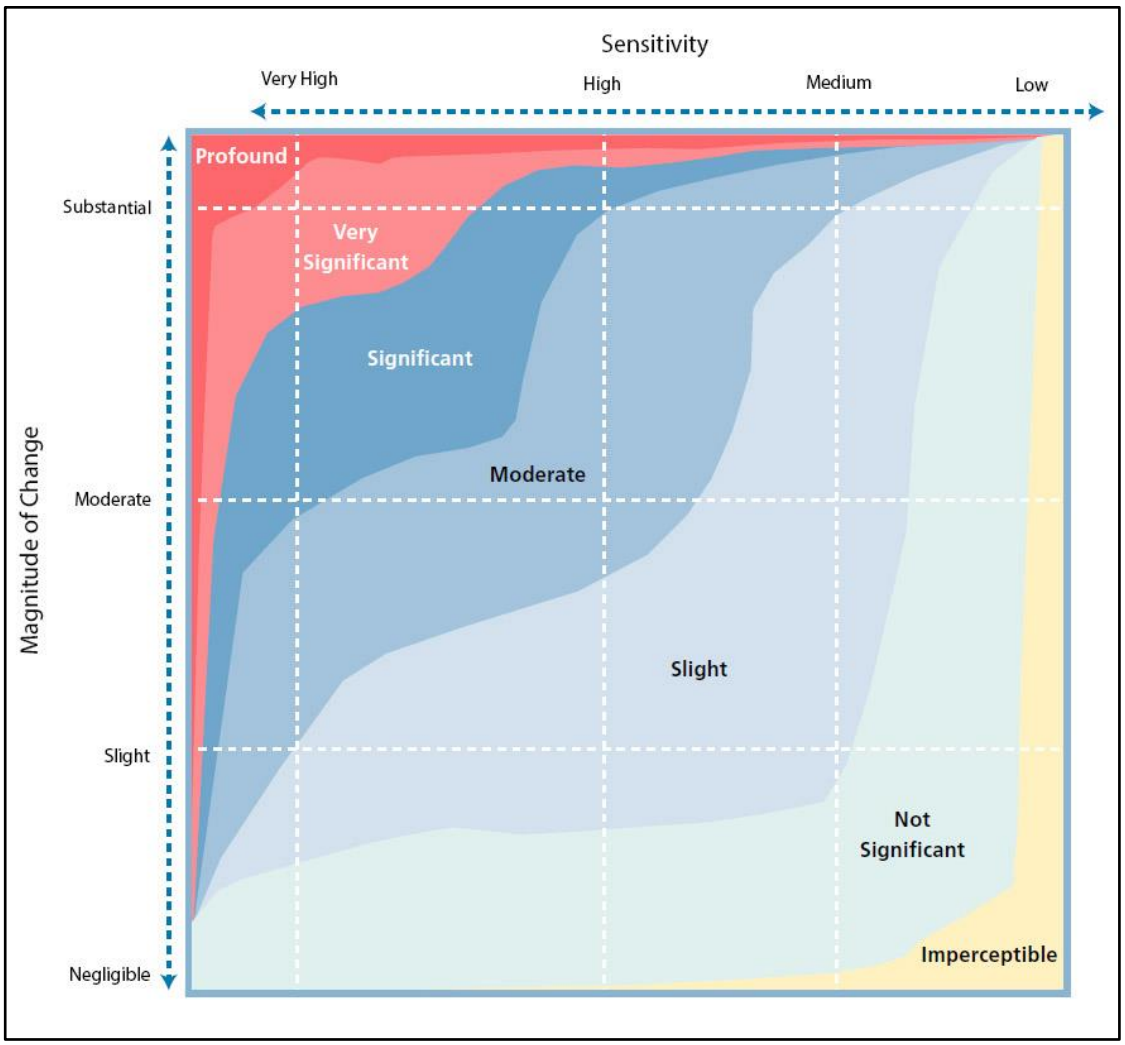

Figure 1-2 Visual Effect Significance Graph (adapted from EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022)

1.5.5 Assessing Cumulative Landscape and Visual Effects

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

1.5.5.2 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 GLVIA3 (2013) and Nature Scot (2021) guidance also note cumulative visual effects can be experienced in combination, where two or more developments are visible from one viewpoint, either simultaneously or in succession, as well as sequentially, where a viewer moves to another viewpoint or along a transport or recreational route and sees the same or different developments. 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 is included in the viewpoint assessment tables in Appendix 12-3 and summarised in the Landscape Chapter of the EIAR, Chapter 12.