APPENDIX 13-1

LVIA METHODOLOGY

Appendix 13-1: LVIA Methodology

Lackareagh Wind Farm, Co. Clare

Table of Contents

TABLE OF TABLES

TABLE OF FIGURES

1. LANDSCAPE AND VISUAL IMPACT ASSESSMENT (LVIA) METHODOLOGY

1.1 Introduction

Chapter 13 follows the naming conventions and definitions detailed in Section 1.1.1 'References to Proposed Project' of Chapter 1 'Introduction' of this EIAR. In Chapter 13, the following terminology is used throughout the chapter and all appendices in relation to Lackareagh Wind Farm, Co. Clare:

- **'Proposed Project'** refers to the entirety of the project for the purposes of this Environmental Impact Assessment (EIA) in accordance with the EIA Directive. The Proposed Project is described in detail in Chapter 4 of this EIAR;
- **'Proposed Wind Farm'** refers to turbines and associated foundations and hardstanding areas, including access roads, underground cabling, permanent meteorological mast, temporary construction compound, junction accommodation works, peat and spoil management, tree felling, site drainage, operational stage signage, battery energy storage system, 38kV on-site substation, informational lookout point, all ancillary works and apparatus. The Proposed Wind Farm is described in detail in Chapter 4;
- **'The site'** refers to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green, as shown in Figure 1-1 of Chapter 1 'Introduction' of this EIAR;
- **'Proposed Grid Connection Route'** refers to the underground 38kV cabling connecting to the existing Ardnacrusha 110kV substation, and all ancillary works and apparatus. The Proposed Grid Connection Route is described in detail in Chapter 4;
- In the present LVIA Chapter, the phrase **'proposed turbines'** refers to the 7 no. turbine components of the Proposed Project.

1.2 Essential Aspects of LVIA

The Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3) (Landscape Institute & Institute of Environmental Management and Assessment [LI & IEMA], 2013) state that:

> *'It is important to make sure that the project description provides all the information needed to identify its effect on particular aspects of the environment. For LVIA, it is important to understand, from the project description, the essential aspects of the scheme that will potentially give rise to its effect on the landscape and visual amenity'.*

For the Proposed Project assessed in Chapter 13 of this EIAR, it is deemed that the tall, vertical nature of the proposed turbines make them the most prominent elements from a landscape and visual perspective, having the most potential to give rise to significant landscape and visual effects. In this regard, the proposed turbines are deemed to be the 'essential aspect' of the development which will give rise to effects on the landscape and visual amenity and therefore are the primary focus of the LVIA.

Additional elements of the Proposed Project are deemed to be less visually prominent than the proposed turbines; however, these components may also potentially give rise to localised landscape and visual effects. Although not the primary focus of the LVIA, these additional elements are also given due consideration and assessment in the Chapter.

1.3 Guidelines

While the legislation and general guidance on Environmental Impact Assessment (EIA) is set out in Chapter 1 of this EIAR, only the guidance specifically pertaining to landscape and visual impact are outlined below. Meanwhile, a full list of all documents referenced in all sections of this appendix is provided in the bibliography of Chapter 13.

In 2002, Ireland signed and ratified the European Landscape Convention (ELC), which introduced a pan-European concept centring on the quality of landscape protection, management, and planning. In 2015, the Department of Arts, Heritage and the Gaeltacht accordingly published a National Landscape Strategy for Ireland, aiming to ensure compliance with the ELC and containing six main objectives, which included developing a 'National Landscape Character Assessment' as well as 'Landscape Policies'.

In 2000, the Department of the Environment, Heritage, and Local Government (DoEHLG, formerly Department of Environment and Local Government) published the 'Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities' (hereafter, DoEHLG 2000 Guidance), 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, at the time of writing this report, the DoEHLG 2000 Guidance remains in draft form.

Therefore, the LVIA in this report is primarily based on the following guidance, published in the UK:

- GLVIA3 (LI & IEMA, 2013).

In addition, ten general guidance documents also informed the framework preparation of this LVIA, as follows (arranged from most recent):

- 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (Environmental Protection Agency of Ireland [EPA], 2022);
- 'Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments' (Nature Scot, 2021; includes methodology published in 2012);
- 'Draft Revised Wind Energy Development Guidelines (Draft DoHPLG 2019 Guidelines)' (Department of Housing, Local Government and Heritage [DoHPLG], 2019);
- 'Visual Representation of Development Proposals' (Landscape Institute Technical Guidance Note 06/19, 2019) (hereafter, LI TGN 06/19);
- 'Siting and Designing Wind Farms in the Landscape, Version 3a' (Scottish Natural Heritage [SNH], 2017) (hereafter, SNH Guidance v.3a);
- 'Visual Representation of Wind Farms, Version 2.2' (SNH, 2017) (hereafter, SNH Guidance v.2.2);
- 'Spatial Planning for Onshore Wind Turbines: Natural Heritage Considerations' (SNH, 2015);
- 'Visual Representation of Wind Farms, Version 2' (SNH, 2014) (hereafter, SNH Guidance v.2)
- 'Wind Energy Development Guidelines (DoEHLG 2006 Guidelines) for Planning Authorities' (DoEHLG, 2006);
- 'Visual Assessment of Wind Farms: Best Practice' (SNH, 2002).

1.4 Scope and Definition of LVIA Study Area

In the main Chapter 13, the site of the Proposed Project is delineated by a green line labelled 'EIAR Site Boundary' in the following figures:

- Figure 13-1: Half Blade Zone of Theoretical Visibility (ZTV) Map;

- Figure 13-4: Landscape Policy Context Map;
- Figure 13-10: Designated Landscape Character Areas (LCAs) Map;
- Figure 13-12: Visual Baseline Map;
- Figure 13-16: Cumulative Context Map;
- Figure 13-20: Cumulative Wind Farm Map with Photomontage Viewpoints;
- *Appendix 13-4: LVIA Baseline Map.*

Landscape and visual baseline mapping and viewpoint selection are based on the two wider study areas referred to in this LVIA as the 'LVIA Study Area' with a 20km radius, and 'Landscape Character Area (LCA) Study Area' with a 15km radius; these are explained in subsections below. The geographical parameters of this LVIA were determined by desktop study, survey work undertaken and the professional judgement of the assessment team, as well as experience from other relevant projects and policy guidance or standards, including:

- GLVIA3 (LI & IEMA, 2013);
- *Appendix 3* of the 'Wind Energy Development Guidelines for Planning Authorities' (hereafter, WEDGs) (Department of the Environment, Heritage and Local Government [DoEHLG], 2006); and including reference to the:
- Draft Revised WEDGs (Department of Planning, Housing and Local Government [DoHPLG], 2019).

1.4.1 LVIA Study Area for Effects on Landscape and Visual Receptors: 20km Radius

An area of 20km surrounding the Proposed Project site was selected to conduct assessment of the landscape and visual baseline features and viewpoint selections.

The assessment of landscape visibility was conducted by calculating the Zone of Theoretical Visibility (ZTV) (see below, Section 1.5, 'Visibility Mapping: ZTV'). The distance at which a ZTV is set from a proposed wind farm development usually defines the parameters of the LVIA Study Area, therefore, the radius of 20km was selected for landscape and visual effects, as is suggested by guidance (WEDGs, DoEHLG, 2006, p.94; Draft Revised WEDGs, DoHPLG, 2019, p.152):

> *'For blade tips in excess of 100m, a Zone of Theoretical Visibility radius of 20km would be adequate'.*

1.4.2 LCA Study Area for Effects on Designated Landscape Character Areas (LCAs): 15km Radius

Through extensive experience conducting LVIA for previous wind energy development projects, the MKO assessment team has determined that no significant effects on landscape character are likely to arise beyond a distance of 15km from the proposed turbines. The turbines of a wind farm are unlikely to significantly impact the key characteristics of county-level designated LCAs beyond a distance of 15km, even for the most sensitive designated LCAs. Therefore, a study area of 15km, hereafter referred to as the '**LCA Study Area'**, is deemed appropriate for assessing the effects on landscape character in relation to designated LCAs.

1.4.3 Topics Scoped Out of Assessment

On the basis of desk studies and survey work undertaken, the professional judgement of the assessment team, experience from other relevant projects and policy guidance or standards, 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 ZTV mapping) and are therefore unlikely to be subject to 'Significant' effects;
- Effects on designated landscape receptors beyond a 20km radius (LVIA Study Area) from the proposed turbines, 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 and designated LCAs beyond a 15km radius (LCA Study Area) from the proposed turbines, where it is judged that potential 'Significant' effects on landscape character are unlikely to occur;
- Effects on visual receptors beyond a 20km radius (LVIA Study Area) from the proposed turbines, where it is judged that potential 'Significant' effects are unlikely to occur;
- Cumulative landscape and visual effects beyond a 20km radius (LVIA Study Area) from the proposed turbines, where it is judged that potential 'Significant' cumulative effects are unlikely to occur.

1.5 Visibility Mapping: Zone of Theoretical Visibility (ZTV)

The ZTV represents the area over which a development can theoretically be seen and is based on a Digital Terrain Model (DTM), overlain on a map base. The DTM is a three-dimensional computerised visual representation of a piece of topography, in the form of a digital model. The associated ZTV map, constructed based on the details of the DTM, indicates the following:

- Broad areas where visibility of a wind energy development is most likely to occur;
- How many of the proposed turbines of the wind energy development are theoretically visible in those areas (using coloured bands for different numbers of turbines); and
- The extent and pattern of visibility.

The production of the ZTV map is one of the first steps of LVIA, as it (i) determines the boundaries of the LVIA Study Area in which impacts will be considered in more detail, and (ii) informs the identification of sensitive vantage points (SNH Guidance v.2.2, 2017).

1.5.1 ZTV Methodology

The ZTV maps presented in the EIAR show a calculated area of visibility of the proposed turbines using the 'half-blade' height of the wind turbines as points of reference; this area is referred to as the Half-Blade ZTV, or ZTV. The WEDGs (DoEHLG, 2006 p.94) and Draft Revised WEDGs (DoHPLG, 2019 p.152) note that:

> *'It is recommended that the Zone of Theoretical Visibility should assess the degree of visibility based on the numbers of turbines visible to half the blade length in addition to hub-height'.*

Furthermore, as well as per the guidance, a Half-Blade ZTV is considered more appropriate and useful than a 'full-blade' ZTV for analysing visibility of the proposed turbines and scoping receptors in and out for assessment, particularly when using a DTM representing a bare earth scenario. The decision to use a Half-Blade ZTV is based upon the guidance as well as the professional judgement and the extensive experience of the assessment team in ground truthing ZTVs against the reality of turbine visibility within landscapes where turbines already exist.

The area presented in the ZTV maps in Chapter 13 has a radius of 20km from the outer-most proposed turbines.

The Draft Revised WEDGs (DoPHLG, 2019, p.159) 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 25km from the proposed turbines, thus the extension of the ZTV beyond 20km from the outer-most proposed turbine is not warranted in the case of this LVIA. As explained above in Section 1.1 'Scope and Definition of LVIA Study Area', 20km was deemed a sufficient and appropriate study area for the Proposed Project and any assessment of landscape and visual effects, as is determined in the WEDGs (DoEHLG, 2006, p.94) and Draft Revised WEDGs (DoHPLG, 2019, p.152):

> *'For blade tips in excess of 100m, a Zone of Theoretical Visibility radius of 20km would be adequate.'*

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

On each ZTV map, separate colour bands are used to indicate the number of turbines potentially visible to half-blade height, i.e. only half of one blade may 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, as follows:

- Teal: 1–2 turbines theoretically visible;
- Yellow: 3–4 turbines theoretically visible;
- Grey: 5–7 turbines theoretically visible.

The following ZTV figures have been prepared for this EIAR report, accompanying Chapter 13:

- Figure 13-1: Half Blade Zone of Theoretical Visibility (ZTV) Map;
- Figure 13-5: ZTV & Landscape Policy Context Map;
- Figure 13-11: ZTV & Designated LCAs;
- Figure 13-13: ZTV & Visual Baseline Map;
- Figure 13-14: ZTV & Settlement Hierarchy;
- Figure 13-15: ZTV & Photomontage Viewpoints, Photowire Viewpoints and Visual Receptors;
- Figure 13-17: ZTV for Cumulative Context: Other Wind Farms.

1.5.2 Limitations of ZTV Mapping

The SNH Guidance v.2.2 (2017) acknowledges the following limitations inherent to the use of theoretical visibility mapping:

- The ZTV presents a 'bare ground' scenario, i.e. visibility of the proposed turbines in a landscape without screening structures or vegetation, such as trees, hedgerows, buildings and small-scale landform or ground surface features;
- The ZTV does not take into account the effects of weather or atmospheric conditions, and therefore can be said to represent a 'worst-case' scenario, that is, one in which the wind turbines could potentially be seen given the combination of no intervening obstructions and favourable weather conditions;

- A ZTV is only as accurate as the data on which it is based. Accordingly, is not viable to test the accuracy of a ZTV in the field, although some verification does occur during the assessment of viewpoints;
- In order to handle relatively large areas of terrain, the DTM data are based on information that does not allow detail to be distinguished below a certain level of resolution. There are also differences in the way that the software package 'interpolates' between heights in the calculations made; and finally,
- While the ZTV indicates areas from which a wind farm may be visible, it cannot show how the Proposed Project will actually look, nor can it indicate the nature or magnitude of visual impacts. For example, the visibility of turbines naturally decreases with the distance from which they are viewed, yet this is not accounted for in the ZTV. Figure 1-1 below provides an illustration of the differences in view relative to the distance of the viewer from the turbine:

Figure 1-1: Effect of Distance on the Visibility of Wind Turbines (illustrative purposes only).

1.5.3 On-Site Visibility Appraisal: Route Screening Analysis (RSA)

As the ZTV does not account for localised undulations in topography and other visual screening factors, the actual visibility is often far less than is indicated by ZTV mapping. Therefore, whilst the ZTV map is a useful tool to aid analysis of the likely visibility of the proposed turbines and scope out areas where impacts will not occur, the LVIA in Chapter 13 was also informed by visibility appraisals conducted from sensitive receptors throughout the LVIA Study Area.

During site visits conducted for this LVIA in 2022, 2023 and 2024, the likely visibility of the proposed turbines was appraised from receptors where the ZTV indicated theoretical visibility. This included an analysis of visibility towards the proposed turbines from the local road network immediately surrounding the site during an exercise called 'Route Screening Analysis' (RSA), a methodology developed by MKO.

The RSA methodology was developed in order to comprehensively demonstrate the varying characteristics of visual screening existent on roads, proximate to the Proposed Wind Farm and to record the actual visibility of the proposed turbines in comparison to the theoretical visibility. As its name suggests, RSA considers the actual visibility based on the currently existing roadside 'screen' of vegetation, topography or built structure.

For this LVIA, the RSA surveys were undertaken during January, March and April 2024 from all public roads within 5km of the proposed turbines. For certain roads continuing beyond 5km in the vicinity of Killaloe to the east of the proposed turbines, the RSA survey continued to record the screening until an appropriate termination point or junction. This included screening along the R463, R465 and R466 regional roads, which contain portions of designated Scenic Routes SR-26 and SR-27 (designated by the CCDP), considered relatively prominent and well trafficked transport routes in close proximity to the site.

As its name suggests, RSA considers the actual visibility of the proposed wind turbines from its immediate surrounding road network. In general, the RSA is undertaken in order to gain a clearer

understanding of visibility and visual screening, and to bridge the gap for the assessor between the computer-generated ZTV maps and the actual nature of visibility of the proposed turbines in proximity to the site.

As the route was driven in real-time, the extent of roadside screening between the road and the proposed turbines was recorded digitally on a tablet/GPS device; in addition, dashcam video footage was recorded to allow later confirmation of mapping, and to methodically record the views along the route. All routes were driven at a sufficiently slow speed so as to allow reasonable viewing towards the direction of the proposed turbines.

Using the tablet device, screening was logged as one of three categories:

- 'Little/No' visual screening, areas mainly open with very light vegetation;
- 'Intermittent/Partial' visual screening, areas of light deciduous roadside vegetation and short-gapped vegetation allowing intermittent or partial views;
- 'Dense/Full' visual screening, areas of vegetation dense enough to block views.

Example photographs of each visual screening category from the LVIA Study Area are presented in Chapter 13. Refer to Plates 13-1 through 13-3 in the main chapter.

In cases where the road travelled directly towards the view of the proposed turbines or travelled on The Gap Road/L7080/East Clare Way passing directly between the turbines, visual screening of the lowest classification was recorded (i.e. Little/No visual screening). In addition, care was taken to ensure that the recording of screening accounted for seasonal variation, particularly the condition of deciduous vegetation (lack of leaves and growth) in winter months. The screening data were then mapped and validated against the georeferenced dashcam footage.

1.6 Photomontage Visualisations

'Photomontages' are visualisations that superimpose an image of a proposed development upon a photograph or series of photographs from a specific location, termed the 'viewpoint'. The photomontage is intended as a graphical representation of how a proposed development will appear in the existing landscape and is used as an important tool in the LVIA process. A series of photomontages have been prepared as part of this LVIA and are presented in a separate volume, *EIAR Volume 2: Photomontage Booklet*, submitted as part of this EIAR.

The following two guidance documents are considered the industry benchmarks for producing photomontages specifically for wind energy developments and were the standards adhered to during the production of photomontages for the *Photomontage Booklet*:

- LI TGN 06/19 (2019);
- SNH Guidance v.2.2 (2017).

The verified photomontages produced for this EIAR are classified as 'Type 4 Visualisations' in the LI TGN 06/19 (2019), meaning that the visualisations maintain the following qualities. The proposed turbines modelled in the photomontages are proportionately scaled within a topographic model from the specific locations where the photographic imagery is captured, i.e. the 'viewpoints'. The turbines and topographic model are then carefully positioned and scaled within the landscape view presented in each photomontage (to 90° and 53.5° horizontal fields of view, as prescribed by the SNH Guidance v.2.2 (2017) and LI TGN 06/19 (2019). The modelling of turbines in the topographical model (known as the 'wireline') is generated by software using input co-ordinates of the turbine locations, viewpoint locations and the turbine specifications of the turbines presented.

The views presented in the *EIAR Volume 2: Photomontage Booklet* include a range of distances and geographic perspectives, and the images used for photomontages represent differing atmospheric

conditions. Although it is not reasonable to control the weather, all images were captured when weather was sufficient to enable clear and long-ranging visibility in the direction of the Proposed Project from selected viewpoints.

It is expected that the proposed turbines should appear differently in the landscape depending on factors such as time of day, weather conditions and the location of the observer. Accordingly, the photomontages produced for this LVIA aimed to realistically represent the Proposed Project while considering the turbines' contrast against the backdrop of the sky and landscape. The turbines presented in the photomontages have been coloured in such a way that ensures sufficient contrast for purposes of visual impact assessment, whilst at the same time balancing the intention to present the photomontages as 'life-like' visualisations.

As reported previously in Section 1.2 the essential aspect of the Proposed Project are the proposed turbines. The photomontage visualisations in the *Photomontage Booklet* focus on the proposed turbines only and do not include other infrastructure elements, as they are generally not seen at this scale.

1.6.1 Photomontage Viewpoint Selection

The 'photomontage viewpoints', or locations of photomontage imagery capture, were selected following the WEDGs (DoEHLG, 2006), GLVIA3 (LI & IEMA, 2013) and SNH Guidance v.2.2 (2017). The selection of viewpoints is designed to provide a representative range of views of the proposed turbines.

A total of 15 no. photomontage viewpoints (named as VP01–VP15) were chosen after compiling the 'Visual Baseline' section of the LVIA (Section 13.5 of Chapter 13). The main purpose of establishing the visual baseline was to identify the key visual receptors that should be considered for viewpoint selection. To this end, the following seven types of receptors were identified:

- Designated Scenic Routes and Views;
- Viewing Areas (e.g. marked on Ordnance Survey Ireland [OSi] maps);
- Settlements;
- Recreational Routes, including:
  - Waymarked Walking Trails;
  - Cycle Routes;
  - Scenic Drives;
  - Tourist Routes;
- Recreational, Cultural Heritage and Tourist Destinations;
- Transport Routes;
- Residential Receptors.

In Chapter 13, these visual receptors are listed in tables under the sections identified above, along with theoretical visibility at those locations indicated by ZTV mapping. After all key visual receptors were identified, a preliminary analysis of the receptors was conducted to scope out selected visual receptors from further assessment due to the following reasons:

- Receptors have no or very limited theoretical visibility according to ZTV mapping;
- Receptors comprise designated Views and Scenic Routes, as well as OSi viewing areas, that are not directed towards the Proposed Project;
- Receptors visited on-site have views towards the turbines that were either entirely or substantially screened, or for which the distance from the Proposed Project site in combination with visual screening would mitigate any potential for 'Significant' visual effects.

All other key visual receptors were selected as viewpoint locations. Viewpoints were chosen having regard to the SNH Guidance v.2.2 (2017) which advises that a range of views should be shown at a range of distances, aspects and varying elevations, and that images should illustrate instances where the Proposed Development will be completely visible as well as partially visible. Consideration was also

given to ensure that photomontages captured other wind farm developments in the LVIA Study Area in order to assess cumulative landscape and visual effects.

1.6.2 Photomontage Presentation

The photomontage visuals contained in the *EIAR Volume 2: Photomontage Booklet* are devised to be viewed at arm's length. The existing views, photomontages and wireline views are panoramas presented on banner sheets of paper of size 'A1'. More specifically, the horizontal field of view presented in the visualisations are spread across 84.1cm, the equivalent of the maximum horizontal field of an A1 sheet of paper. In line with best practice guidance for the production of photomontages for wind energy development (SNH Guidance v.2.2, 2017; LI TGN 06/19, 2019) the A1 banners present the Proposed Project enlarged to fit within a 53.5° horizontal field of view.

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

1. **Overview Sheet and Key Image at 120°:** 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 or permitted turbines is called the 'Key Image at 120°'. Existing turbines visible in the landscape may appear within this image, and the horizontal extent of the 90-degree and 53.5-degree images to be presented in subsequent images is also framed;
2. **Existing View at 90°:** A 90-degree visual baseline image without any proposed or permitted turbines and this is immediately followed by a 'Matching Wireline' image of the same view which includes any existing turbines visible in the landscape. If turbines are already existing in the landscape, these will be visible on the photograph and are rendered into the wireline view;
3. **Proposed Photomontage with Cumulative at 90°:** A 90-degree photomontage image with the Proposed Wind Farm and all other existing, permitted and proposed wind farms within the view. This is immediately followed by a Matching Wireline image showing the turbines of all proposed, permitted and existing wind farms individually coloured and labelled for ease of identification;
4. **Proposed Photomontage with Cumulative at 53.5°:** A photomontage image of the proposed turbines and any existing, permitted and proposed turbines in a 53.5-degree horizontal field of view. This is immediately followed by a Matching Wireline image showing the turbines of all proposed, permitted and existing wind farms individually coloured and labelled for ease of identification.
5. **Viewpoint VP13 with Four Fields of View A/B/C/D:** VP13 was taken from a location in very close proximity to the proposed turbines and has been divided into multiple views: 13A, 13B, 13C and 13D; this was done in order to capture all views of the proposed turbines and relevant cumulative turbines from this location. In the *Photomontage Booklet*, the Overview Sheet for each of the four views A through D displays the 'Key Image at 360°' with the specific view highlighted in boxes with white-dashed-line edges. Across the top of each Overview Sheet, the four directions of each view A through D are indicated in separate maps for reference.
6. **Viewpoint VP14 with Two Fields of View A/B:** VP14 was taken from a location in close proximity to the proposed turbines and has been divided into two views: 14A and 14B. In the *Photomontage Booklet*, the Overview Sheet for each of the two views A and B displays the 'Key Image at 180°' with the specific view highlighted in boxes with white-dashed-line edges.

1.6.3 Presentation of Wireline Views

The SNH Guidance v.2.2 (2017) suggests that all turbine blades should be presented in the same orientation when presented within a wireline view with one blade completely vertical. The rationale for this method proposes that the singular vertical blade will show the greatest turbine tip height for all turbines.

Using the above method, the orientation of the turbine blades does not match what is presented in the corresponding photomontage. Conversely, guidance in the WEDGS (DoEHLG, 2006, p. 97) and Draft Revised WEDGs (DoHPLG, 2019) state the following in relation to wirelines (referring to 'wireframes' – equivalent to wirelines):

> *'Related to the above, the photomontage should be accompanied by a wire frame computer generated perspective view of the landscape, or shaded-relief model, illustrating all theoretically visible turbines. These wire frame diagrams may also be used to indicate turbines that are not visible in whole or in part due to screening, simply to prove that point.* ***Wire frames and photomontages should be at the same scale and presented in unison so that direct comparison/correlation can be made'.***

This LVIA is cognisant of guidance from all three sources: the WEDGS (DoEHLG, 2006), Draft Revised WEDGs (DoHPLG, 2019) and SNH v.2.2 (2017). Of these, it is considered that that the guidance in the WEDGs and Draft Revised WEDGs is the preferred option. Thus, wireline views showing the turbines in irregular orientation with each other, but in unison with the corresponding photomontage is deemed an optimal method of presentation for the following reasons:

- The view enables direct correlation and comparison with the photomontages;
- If all turbines were to be oriented the same way, this would be an unnatural and unrealistic representation, hence there is no scenario in reality where this would occur;
- Although the single vertical blade shows the greatest tip height, it does not necessarily show the greatest visual exposure of turbines in the landscape, as there could potentially be two blades (instead of one) seen above a feature of the landform when using a non-regular orientation;
- Non-regular orientations are preferable and optimal for demonstrating turbine range with comparative wireline views when they are required; refer below to Section 1.6.6 'Turbine Range Assessment: Comparative Wirelines'.

For these reasons outlined above, the turbines in the wireline views within the *Photomontage Booklet* are presented in unison with the orientation of the turbines in the photomontages, in line with the WEDGs and Draft Revised WEDGs guidance.

1.6.4 Limitations of Photomontage Visualisation

Photographs, and therefore photomontages, are subject to a range of limitations, as stated in the SNH Guidance v.2 (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 judgement. The guidance also notes that interpretation of visualisations must be taken into account as well as additional information including variable lighting, the movement of turbine blades, seasonal differences and the movement of the viewer through the landscape. However, accepting these limitations, the SNH Guidance v.2 (2014) and v.2.2 (2017) state that photomontages are useful tools in the visual impact assessment of wind turbines.

Furthermore, with regard to the representation of cumulative visual effects, the photomontages were constructed to also show existing, permitted and proposed turbines. The representation of existing turbines relies on the existing turbines as seen within the photographic imagery captured on-site, while permitted and proposed turbines are images of turbines that have been modelled and rendered into the image. As such, there can be a discrepancy in the lighting and sharpness between these two different representations.

Photomontages (classified as 'Type 4 Visualisations' of Development Proposals according to the LI TGN 06/19, 2019) are two-dimensional representations of three-dimensional views and thus cannot convey the actual perspective or depth of view when seeing the objects with the naked eye. One of the ways in which this limitation affects the assessment of cumulative visual effects is where turbines have been proposed to be cited in front of or behind existing or permitted turbines. In the field, this physical separation may be obvious, while in the photomontage, the turbines may appear as one collective wind farm.

1.6.5 Photowires: Early-Stage Draft Photomontages (Alternative Viewpoints)

Photomontage imagery was captured from a total of 33 no. viewpoints in the LVIA Study Area to represent the receptors scoped in for further assessment following the visual baseline exercise in the main Chapter 13. In some instances, viewpoints were chosen to represent multiple visual receptors nearby yet not necessarily exactly at that viewpoint. All photomontage images from all viewpoints were progressed to the early 'draft' stage called 'photowires'. From these, 15 no. viewpoints (VP01—VP15) were selected for inclusion in the *EIAR Volume 2: Photomontage Booklet*, which includes the comprehensive assessment of cumulative effects with other wind energy developments. Those 15 viewpoints selected for the *Photomontage Booklet* represent the most sensitive receptors where open visibility of the proposed turbines occur and provide a good geographical spread of views surrounding the site.

The remaining 18 no. viewpoints were maintained in early 'draft' stage as photowires, classified as 'Type 3 Visualisations' in the LI TGN 06/19, 2019, and are presented in *Appendix 13-5: Photowire Visualisation Booklet*, named PW-A through PW-R. The 18 no. photowires, comprising panoramic images with overlain wirelines, are used to aid discussions in Chapter 13, but do not form part of the assessment of visual effects included in *Appendix 13-3: Photomontage Visual Impact Assessment Tables*.

Photowires were not progressed from the 'draft' stage as they indicated either that the proposed turbines were almost entirely screened from view by intervening landscape features, or because it was determined that another nearby viewpoint was a better representation of views from receptors in a particular area or represented a greater number of sensitive receptors. However, all photowires are presented within *Appendix 13-5* and comprehensively discussed in Chapter 13 in order to illustrate certain points made in Section 13.7 'Likely Significant Landscape and Visual Effects' of that chapter. The locations of photowire viewpoints PW-A through PW-R in *Appendix 13-5* are marked in Figure 13-15 of the main report. As per the LI TGN 06/19 (2019) guidance, all photowires are presented in *Appendix 13-5* on A3 paper within a 27-degree field of view including a 150% enlargement factor as the Proposed Wind Farm is presented.

It should be emphasised that photowires are useful visual aids to inform the impact assessment; however, they do not include modelling of other existing, permitted, or proposed wind energy developments and are therefore not used for the assessment of cumulative effects.

1.6.6 Turbine Range Assessment: Comparative Wirelines

In this LVIA, two additional photomontage visualisations are included in the *EIAR Volume 2: Photomontage Booklet* for:

- VP14 'Kilbane' (View 14B); and
- VP15 'Aillemore – Lower'.

These additional photomontage visualisations were produced for the purpose of assessing the potential effects arising as a result of the proposed turbine envelope range detailed in Chapter 1 'Introduction' of this EIAR and briefly outlined in the LVIA Chapter 13 (Section 1.3.2 'Range of Turbine Dimensions Assessed in this Chapter').

For each viewpoint VP14 and VP15, the proposed turbines are modelled using two additional turbine envelope configurations (Maximum Scenario 1 and Minimum Scenario 2) comprising different-sized components than the configuration modelled for all other visualisations (Median Scenario 3) presented in the *Photomontage Booklet*, as well as in all photowires of *Appendix 13-5: Photowire Visualisation Booklet*. The two selected VPs are located in close proximity to the proposed turbines where the turbine range is most likely to be perceptible: VP14 (1.1km) and VP15 (1.4km).

Considering the relatively small difference in scale of the range for the proposed turbines (0.5m for turbine tip height), along with the relatively large scale of the proposed turbines when viewed in the actual landscape, the differences in the range are not easily perceptible when comparing one photomontage with another. Therefore, in order to provide a suitable visual aid for the reader and assessor to better visualise the difference between the turbine scenario models presented as part of the range, comparative wireline views are also provided for the above VPs, as described here.

Following each photomontage for VP14 and VP15, a comparative wireline image is presented for 53.5° showing the wireline of the alternative turbine envelope ('Intermediate Hub Height and Maximum Rotor Diameter', or, 'Minimum Hub Height and Intermediate Rotor Diameter' overlain on the standard model wireline used for all 15 viewpoints 'Maximum Tip Height, Maximum Hub Height, Minimum Rotor Diameter'). This was done to facilitate a clear visual comparison between the turbine ranges.

The three turbine envelope specifications as defined in Chapter 1 and assessed in Chapter 13 and their respective wireline colours are as follows:

- **Green Wireline: used for all VPs in the *Photomontage Booklet***, Median Scenario 3 'Maximum Tip Height, Maximum Hub Height, Minimum Rotor Diameter':
  - Maximum Tip Height: 180m;
  - Maximum Hub Height: 105m;
  - Minimum Rotor Diameter: 150m.
- **Red Wireline: only for VP14 and VP15 in the *Photomontage Booklet***, Maximum Scenario 1 'Maximum Tip Height, Intermediate Hub Height, Maximum Rotor Diameter Maximum':
  - Maximum Tip Height: 180m;
  - Intermediate Hub Height: 102.5m;
  - Maximum Rotor Diameter: 155m.
- **Brown/Yellow Wireline: only for VP14 and VP15 in the *Photomontage Booklet***, Minimum Scenario 2 'Minimum Tip Height, Minimum Hub Height, Intermediate Rotor Diameter':

- Minimum Tip Height: 179.5m;
- Minimum Hub Height: 105m;
- Intermediate Rotor Diameter: 149m.

1.7 Assessing Landscape Effects

In line with the GLVIA3 (LI & IEMA, 2013), the potential impacts on landscape receptors and visual receptors are assessed separately. This section details the methods used to determine the likely significant landscape effects of the Proposed Development on landscape receptors.

The methodology for assessing landscape effects uses qualitative methods in order to arrive at an overall impact assessment, based on the DoEHLG 2000 Guidance as well as the GLVIA3 (LI & IEMA, 2013) and WEDGs (DoEHLG, 2006) and Draft Revised WEDGs (DoHPLG, 2019).

Here, 'landscape effects' are described as changes which affect the landscape as a resource. This includes how the Proposed Development will affect the physical elements that make up the landscape, as well as its aesthetic and perceptual aspects and its landscape character. Landscape effects also relate to changes in the structure of the landscape. Under the GLVIA3 (LI & IEMA, 2013), the assessment of likely 'Significant' effects on landscape receptors includes a judgement on both the 'Sensitivity' of the receptor as well as the 'Magnitude of Change'.

1.7.1 Identifying Landscape Receptors

Section 13.4 'Landscape Baseline' of Chapter 13 reports relevant policy pertinent to this LVIA along with a description of the receiving landscape of the Proposed Wind Farm site and its wider setting. As well as establishing the key sensitivities and key characteristics of the baseline landscape, this part of the LVIA focusses on identifying the key sensitive landscape receptors assessed later in Chapter 13. The following landscape receptors were identified in the landscape baseline:

- **Landscape Designations** based on:
  - Clare County Development Plan (CCDP) 2023–2029;
  - CCDP Volume 6: Clare Wind Energy Strategy (CWES);
  - Limerick Development Plan (LDP) 2022–2028;
  - Tipperary County Development Plan (TCDP) 2022–2028;
- **Landscape Character of the Proposed Wind Farm Site** and its immediate environment based on:
  - Site surveys undertaken throughout 2022, 2023 and 2024;
  - 'Landscape Character Types' identified in *Section 6.9 'Landscape Character Types as a Basis for Guidelines'* of the WEDGs (DoEHLG, 2006) and Draft Revised WEDGs (DoHPLG, 2019);
- **Landscape Character of the LCA Study Area** based on:
  - Landscape Character Assessment of County Clare LCACC (ERM Ireland Ltd., 2004);
  - LDP Chapter 6: 'Environment, Heritage, Landscape and Green Infrastructure';
  - TCDP Volume 3: 'Tipperary Landscape Character Assessment and Schedule of Views and Routes';
  - Site surveys undertaken throughout 2022, 2023 and 2024.

After all landscape receptors were identified, a preliminary analysis of landscape receptors was carried out to eliminate the landscape receptors where no or very limited theoretical visibility was indicated by ZTV mapping. All other landscape receptors were selected for further assessment of landscape effects.

The assessment of landscape effects considers the landscape 'Sensitivity' balanced with the 'Magnitude of Change' of the effect to determine the 'Significance' of the effect. Mitigating factors are then taken

into consideration to arrive at a 'Residual' landscape effect. Residual landscape effects are graded upon an 'impact assessment classification of significance' scale, as defined by the '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' of the Environmental Protection Agency of Ireland (EPA) (2022), included below in Table 1-4 of Section 1.7.5 'Landscape Effects Assessment Matrix' of this appendix.

1.7.2 Landscape Sensitivity: Value & Susceptibility to Change

Landscape 'Sensitivity' is described in the GLVIA3 (LI & IEMA, 2013) as a combination of the landscape's 'Susceptibility to Change' as well as the 'Value' attached to the landscape.

Landscape susceptibility to change is 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 turbines without undue consequences for the maintenance of the baseline (existing) landscape and/or the aims of landscape planning policies and strategies. Table 1-1 below presents differing assessment criteria for susceptibility to change.

Table 1-1: Assessment Criteria for Landscape Susceptibility to Change

Susceptibility of Landscape Receptor to Change	Description and Example Criteria
'High'	Landscape receptors where the overall character of the landscape receptor or the nature of the individual landscape receptor causes it to have a high susceptibility to change considering its inherent characteristics and where the landscape receptor has a low ability to accommodate the proposed change without undue consequences for the maintenance of its landscape character, and/or its quality or condition, and/or its particular aesthetic and perceptual aspects, and where such change is not in compliance with planning policies/strategies.
'Medium'	Landscape receptors where the overall character of the landscape receptor or the nature of the individual landscape receptor causes it to have a medium susceptibility to change considering its inherent characteristics and where the landscape receptor has a moderate ability to accommodate the proposed change without undue consequences for the maintenance of its landscape character, and/or its quality or condition, and/or its particular aesthetic and perceptual aspects, with consideration given to planning policies/strategies.
'Low'	Landscape receptors where the overall character of the landscape receptor or the nature of the individual landscape receptor causes it to have a low susceptibility to change considering its inherent characteristics and where the landscape receptor has a Strong ability to accommodate the proposed change without undue consequences for the maintenance of its landscape character, and/or its quality or condition, and/or its particular aesthetic and perceptual aspects, and where such change may be in compliance with planning policies/strategies.

Landscape 'Value' is a combination of values which are assessed in the 'Landscape Baseline' (Section 13.4 of Chapter 13), combining any formal landscape designations, and, where there are no designations, judgements based on individual elements of the landscape receptor, for example

particular landscape features, notable aesthetic, perceptual or experiential qualities, and combination of these contributors.

Notably, the GLVIA3 (LI & IEMA, 2013, p.89) states that:

> *'...there should not be over-reliance on designations as the sole indicator of value'.*

Accordingly, the assessments of landscape value undertaken in the LVIA included consideration of various elements that contribute to landscape value of specific receptors, using best practice standards and professional judgement. Where this occurred, landscape value was judged based on clearly stated criteria. Table 1-2 below presents differing assessment criteria for landscape value.

Table 1-2: Assessment Criteria for Landscape Value

Value Attached to Landscape Elements	Description and Example Criteria
'High'	Landscape receptors forming part of designations (e.g. areas of amenity, scenic routes/views) in the development plan, or at a national or international level, or landscape receptors not designated but where the receptor is judged to be of equivalent value using clearly stated criteria including wildness, naturalness, very strong cultural heritage or natural heritage associations and/or very high recreational value.
'Medium'	Landscape receptors where value is not formally designated but are of value as good examples of high quality, intact landscapes or landscape features and are deemed to be of relatively high scenic quality. Landscapes or landscape receptors that contain some rare elements, include areas or features which are wild or have a sense of naturalness, have strong cultural associations or which have recreational value.
'Low'	Landscapes that are not formally designated and considered as modified. Areas which do not have particularly scenic qualities, do not include rare elements or landscape features and do not have strongly evident cultural or heritage associations.

The 'Landscape Baseline' (Section 13.4 of Chapter 13) describes and determines the landscape value of the Proposed Wind Farm site and its wider landscape setting in order to establish the capacity of the immediate landscape in which the proposed turbines will be built, as is prescribed by best practice guidance (GLVIA3, 2013, p.80):

> *'...as part of the baseline description the value of the potentially affected landscape should be established'.*

Comprehension of landscape value and its susceptibility to change enables determination of the sensitivity of the landscape at a micro-level, as well as the Proposed Wind Farm site itself and the wider landscape setting.

In combining the assessment of the landscape value of a landscape receptor with the susceptibility to change of that receptor, it is noted here that a judgement of 'High' landscape value does not necessarily imply that this receptor has a 'High' susceptibility to change, and it is emphasised that this relationship can be complex. The combination of these to judgements, which determines the overall landscape 'Sensitivity', is undertaken using professional judgement with the rationale for judgements clearly

explained in the description of the assessment of effects or in the baseline study. On this basis, landscape receptors have been assigned one of the four following 'Sensitivity' ratings:

- 'Very High';
- 'High';
- 'Medium';
- 'Low'.

No table is provided for the description of these different classifications of landscape sensitivity as the relationship between susceptibility to change and landscape value is inherently complex and not suitable to concise definitions. It is noted that sensitivity classifications are generally guided by local and national planning policy, particularly for designated Landscape Character Areas (LCAs) and county policy in relation to these, as well as county wind energy policy, where available. However, it is noted that in cases where local variations in landscape receptors merit a smaller-scale-focused assessment that may differ from the policy, this was undertaken using professional judgement and is clearly explained in Chapter 13.

1.7.3 Sensitivity of Landscape Character Areas (LCAs)

The 'Sensitivity' of designated LCAs is comprehensively assessed in *Appendix 13-2: LCA Assessment Tables*. Ireland does not currently have a standardised nationwide Landscape Character Assessment. As such, the LCAs scoped in for assessment in Chapter 13 are located in different counties and each county uses a different method, scale, hierarchy and naming convention to represent the sensitivity of its individual LCAs.

For the purposes of this LVIA, and to provide consistency across the assessment of LCAs (*Appendix 13-2*), a rating of 'Sensitivity' was assigned to each LCA within the following classification scale:

- 'Very High';
- 'High';
- 'Medium';
- 'Low'.

The sensitivity classification assigned to each LCA takes into account key characteristic and sensitivity descriptions (and where applicable, the sensitivity ratings) in the respective county development plans, as well as any relevant wind energy capacity designations and policy. A rationale for the sensitivity classification of each LCA is provided in the assessment tables included in *Appendix 13-2*. LCAs at the 'Very High' end of the scale would include very sensitive landscapes of national importance, whilst LCAs at the 'Low' end of the scale might be locally important landscapes but are those which do not comprise receptors or characteristics of unique or national value.

1.7.4 Magnitude of Landscape Change

The 'Magnitude of Change', both within a given LCA or for a specific landscape receptor, is defined by a combination of the visual presence—that is, the size and scale—of the change, the extent of the area to be affected and the duration and reversibility of the effect.

It should be emphasised that all LVIA guidance documents generally agree that windfarm developments themselves are considered 'reversible'. As part of the impact assessment process, the magnitude of change for each LCA and landscape receptor was assessed using the definitions outlined below in Table 1-3.

Table 1-3: Assessment Criteria for Magnitude of Landscape Change

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. The effects are likely long term and may be irreversible.
'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. The effects could be long- to medium-term and/or partially reversible.
'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. The effects could potentially be medium- to short-term and/or reversible.
'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. The effects could be short-term and/or reversible.

1.7.5 Landscape Effects Assessment Matrix

The overall 'Significance' of landscape effects is determined by combining the landscape receptor 'Sensitivity' and the 'Magnitude of Change' classifications, according to the Landscape Effects Assessment Matrix shown below in Table 1-4.

In the below matrix, landscape receptor sensitivity is shown in the first, left-hand column and magnitude of landscape change is shown in the first row at the top. This matrix is used as an indicative tool to assist in determining the significance of landscape effects. In different circumstances, differing levels of mitigating factors may ultimately result in a different determination of the final rating of significance. The 'Significance' of a landscape effect is based on a balance between the 'Sensitivity' of the receptor and the 'Magnitude of Change' of the effect.

Table 1-4: Landscape Effects 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

	Substantial	Moderate	Slight	Negligible
Low	Moderate/Minor	Minor	Minor/Negligible	Negligible

The final 'Significance' rating of the landscape effect is then arrived at using a combination of the matrix and the EPA (2022) classification definitions, shown below in Table 1-5.

The determination of significance uses a seven-point scale, ranging from 'Major' to 'Negligible'. This seven-point scale is then translated to the EPA (2022) impact assessment classifications of 'Significance', as outlined in the table.

Table 1-5: Impact Assessment Significance Classification from EPA (2022) 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.

1.8 Assessing Visual Effects

'Visual effects' relate to the changes in views and visual amenity of the surroundings of individuals or groups of people, brought about by the development of the proposed wind farm. 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 the views shown in the photomontages and the potential visibility indicated by ZTV mapping, as well as the actual visibility on the ground.

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

- **Visual obstruction:** Occurs when there is an impact on a view which blocks the view;
- **Visual intrusion:** 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 'visual obstruction'. Therefore, the 'Significance' of the effect on visual receptors is a combination of the 'Sensitivity' of the receptor as well as the 'Magnitude of Change' of the effect.

Mitigating factors are then taken into consideration to arrive at a 'Residual' visual effect. Residual visual effects are graded upon the same 'impact assessment classification of significance' scale used for landscape effects, as defined by the EPA (2022), which is included below in Table 1-8 of Section 1.8.3 'Visual Effects Assessment Matrix'.

1.8.1 Visual Receptor Sensitivity

The 'Sensitivity' of a visual receptor depends on the occupation or activity of the people involved, as well the extent to which the attention is focused on views and visual amenity, according to the GLVIA3 (LI & IEMA, 2013). Visual receptor sensitivity is assessed as being 'Very High', 'High', 'Medium', or 'Low', based on the definition of descriptions and examples set out below in Table 1-6.

Table 1-6: Assessment Criteria for Visual Receptor Sensitivity

Sensitivity of Visual Receptor(s)	Description
'Very High'	Included in this category are viewers primarily focused on views from this particular location, such as visitors to popular destinations identified for their outstanding views, and residents in close proximity who have primary views of a scenic quality in the direction of the proposed turbines.
'High'	Includes viewers at designated views or landscapes, such as residents in close proximity to the viewpoint who have primary views in the direction of the proposed turbines that may not necessarily be of a particularly scenic quality, viewers at well-known heritage or popular tourist or recreational areas and viewers along scenic or tourist routes.
'Medium'	Includes viewers who may have some susceptibility to a change in view, such as residents in medium proximity but who do not have views focused in the direction of the proposed turbines or whose views are not of a particularly scenic quality, 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.
'Low'	Includes viewers engaged in activities where the focus is not on the landscape or view. This includes those travelling along a busy route, viewers at work or engaged in sport not related to views or the experience of the landscape.

As described earlier in Section 1.6 'Photomontage Visualisations', the photomontage viewpoints are selected as specific locations representative of the key visual receptors. The viewpoint assessment tables in *Appendix 13-3: Photomontage Visual Impact Assessment Tables* 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 13-3* considers both the susceptibility of the visual receptors represented as well as the value attached to the available views at that particular location.

1.8.2 Magnitude of Visual Change

The 'Magnitude of Change' in terms of the visual change resulting at each viewpoint is determined by assessing 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 below in Table 1-7.

Table 1-7: Assessment Criteria for Magnitude of Visual Change

Magnitude of Change	Description
'Substantial'	Substantial change, where the proposal would result in large-scale, prominent or very prominent change, leading to substantial obstruction of an existing view or complete change in character and composition of the baseline through removal of key elements or the addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the proposed turbines are fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long-term or of a long duration.
'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 proposed turbines are partially visible over a moderate or medium extent, and which are not in close proximity to the proposed development. Change may be readily noticeable but not substantially different in scale and/or character from the surroundings and wider setting.
'Slight'	The proposal 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. This change could be short-term or of a short duration.
'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.

1.8.3 Visual Effects Assessment Matrix

The final 'Significance' rating of visual effects is determined by combining the visual receptor 'Sensitivity' and the 'Magnitude of Change' classifications, according to the Visual Effects Assessment Matrix shown below in Table 1-8.

In the matrix, visual receptor sensitivity is shown in the first, left-hand column and magnitude of the visual change is shown in the first row at the top of the table. This matrix is used as an indicative tool to assist in determining the significance of visual effects. In different circumstances, differing levels of mitigating factors may ultimately result in a different determination of the final rating of significance. The 'Significance' of a visual effect is based on a balance between the 'Sensitivity' of the receptor and the 'Magnitude of Change' of the effect.

Table 1-8: Visual Effects 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 significance of the visual effect is arrived at using a combination of the above matrix and what is known as the 'Visual Effect Significance Graph' from the EPA (2022) (shown in Figure 1-2, see next section).

The determination of significance uses a seven-point scale, ranging from 'Major' to 'Negligible'. This seven-point scale is then translated to the EPA (2022) impact assessment classifications of 'Significance', as outlined in the table.

Table 1-9: Impact Assessment Significance Classification from EPA (2022) 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.

1.9 Determination of Residual Landscape and Visual Effects

After determining the 'Significance' of landscape and visual effects using the above assessment matrices (and significance graph in the case of visual effects), mitigating factors are then taken into consideration

to arrive at the final 'Residual' effect rating, translated to the EPA classification scheme. In some cases, mitigating factors merit a reduction in classification.

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'.

Particularly for determining residual visual effects, the formulaic process created by the use of the above matrices (Table 1-4 and Table 1-8) does provide an indicative initial assessment, which can be seen clearly in the assessment of photomontages in *Appendix 13-3: Photomontage Visual Impact Assessment Tables*.

However, over-reliance on the formulaic process, which is heavily influenced by the definitions of 'Sensitivity' and 'Magnitude of Change' contained in the matrices can lead to a failure of properly accounting for the full range of circumstances and factors at play in the determination of the final significance rating of a visual effect (see sub-section 3.35 in '*Step 3: Judging the Overall Significance of the Effects*' of the GLVIA3, LI & IEMA, 2013, p.41).

In actuality, a wide range of factors, mitigating or otherwise, can factor into the final determination, and it is not possible to capture the complexity involved in balancing all considerations within the necessarily limited definitions contained in the matrices. This then naturally results in circumstances whereby the process of the determination of significance using the formulaic method involved with the matrix shown above in Table 1-8 can result in misrepresentations of the overall significance of visual effects. It is only by applying professional judgement and composing narrative descriptions of the effect, that such complexity can be integrated into the final determination of significance.

Therefore, the formulaic methods based upon the matrices presented above are combined with professional judgement in the determination of significance. This is shown by the 'Visual Effects Significance Graph' below in Figure 1-2 (adapted from the EPA, 2022) which illustrates how the professional judgement of the competent expert is used to properly determine the significance of an effect taking all considerations into account.

Accordingly, in this LVIA, focus is placed upon the narrative description of effects (see sub-section 3.36 of the GLVIA3, LI & IEMA, 2013, p.41) 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 sub-sections 3.28 and 3.29 in '*Step 2: Combining the Judgments*', GLVIA3, 2013, p.40). The comprehensive assessment of photomontages included in *Appendix 13-3* aims to provide a transparent and robust determination of residual visual effects utilising the graph in Figure 1-2 in combination with a clear and logical narrative.

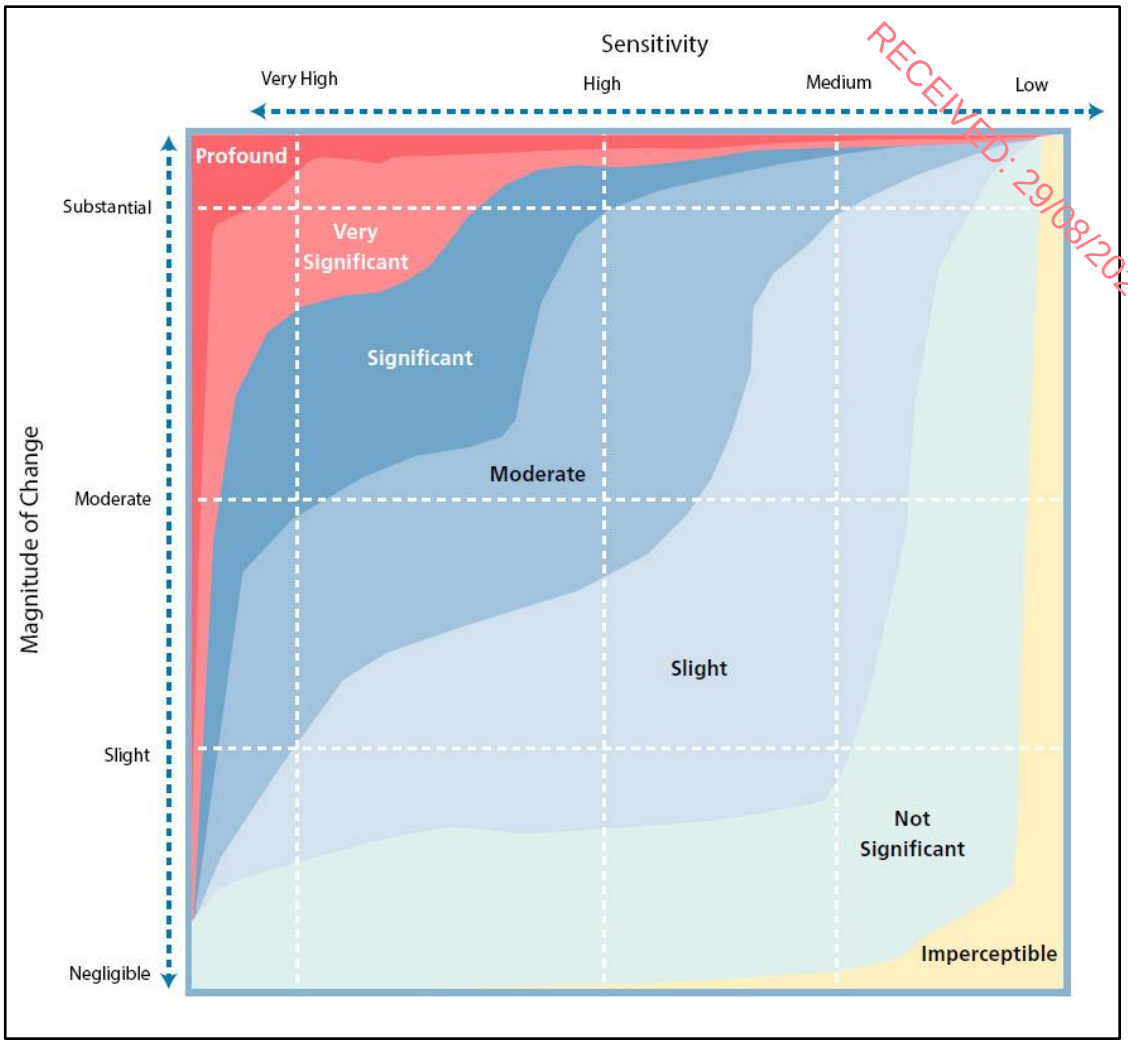

Figure 1-2: Visual Effects Significance Graph (adapted from EPA, 2022)

1.10 Assessing Cumulative Effects

1.10.1 Cumulative Landscape Effects

The Nature Scot online publication '*Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments*' (2021) identifies two principal areas of cumulative landscape effects, on the physical fabric of the landscape and on the landscape character, which state:

- ***'Physical Fabric:*** *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*';
- ***'Landscape Character:*** *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 Wind Farm site and the LCAs in which the site is located. Therefore, the landscape receptors are to be assessed for cumulative landscape effects on the physical fabric of the landscape arising from the proposed turbines and all other components of the Proposed Project.

Cumulative effects on the landscape character were assessed in the identified LCAs with theoretical visibility of the proposed turbines, with particular emphasis on the LCA in which the proposed turbines will be located.

Cumulative landscape effects are included in *Appendix 13-2: LCA Assessment Tables* and summarised in Section 13.7 'Likely Significant Landscape and Visual Effects' of Chapter 13.

1.10.2 Cumulative Visual Effects

Nature Scot (2021) defines cumulative effects as '*additional changes caused by a proposed development in conjunction with other similar developments*'. Whilst this assessment considers other types of developments beside wind farms, the focus is always on assessing the greatest potential for 'Significant' cumulative visual effects. In this regard, the greatest cumulative effects with the Proposed Project are most likely to occur in conjunction with other wind energy developments, therefore the focus of cumulative visual effects assessment in Chapter 13 is on the interactions with other wind turbines. The definition in the WEDGs (DoEHLG, 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 (LI & IEMA, 2013) and Nature Scot (2021) guidance also note that cumulative visual effects can be experienced **in combination**, where two or more developments are visible from one viewpoint, either **simultaneously** or **in succession**, and these are considered in the assessment of visual effects from photomontage viewpoints in *Appendix 13-3: Photomontage Visual Impact Assessment Tables*.

Another type of cumulative visual effect includes where two or more developments are seen **sequentially**, where a viewer moves to another viewpoint or along a transport or recreational route and sees the same or different developments. The photomontage viewpoints illustrate the combined visibility and analysis of the photomontages, route screening, site visits and field work undertaken, thereby allowing sequential visibility to be assessed.

The guidance on cumulative effects given in the WEDGs (DoEHLG, 2006) relating to the Proposed Wind Farm 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 Guidance v.3a (2017) states that:

> *'...introducing turbines that are not similar in form, design, colour and scale may increase visual complexity and clutter'.*

Therefore, the cumulative assessment concentrates 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; and
- 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, permitted or proposed.

The assessment of cumulative effects is included in Appendix 13-3 and summarised in Section 13.7 'Likely Significant Landscape and Visual Effects' of Chapter 13 of this EIAR.

1.10.3 Reporting of Cumulative Effects in the LVIA: Chapter 13 and Impact Assessment Appendices

Discussion and assessment of cumulative landscape and visual effects are reported in the following locations of Chapter 13 in this EIAR:

- Section 13.6 'Cumulative Context: Other Wind Farms' of Chapter 13:
  - Provides an overview of the other developments likely to contribute to cumulative effects in combination with the Proposed Project in the LVIA Study Area and the various cumulative scenarios likely to occur in existing and future receiving environments;
  - Provides an overview of the assessment methodology and cumulative ZTV mapping;
- Section 13.7.3.3 'Cumulative Effects: Other Wind Farms' of Chapter 13:
  - Subsection 'Cumulative Landscape Effects' provides discussion of the interactions of the Proposed Project with other existing, permitted, and/or proposed wind energy developments within the landscape, including an overview of the relevant cumulative assessments on LCAs reported in *Appendix 13-2*;
  - Subsection 'Cumulative Visual Effects' provides discussion of the visual interactions of the Proposed Project with other existing, permitted, and/or proposed wind energy developments, including an overview of the relevant cumulative assessments as shown in the photomontages reported in *Appendix 13-3*.
- *Appendix 13-2: LCA Assessment Tables:*
  - Assesses the likely significant effects of the Proposed Project on designated LCAs, with a specific assessment table for each LCA scoped in for assessment;
  - One row in each assessment table (row heading: 'Cumulative Effects') is dedicated to reporting the likely cumulative landscape effects arising in each LCA in combination with the Proposed Project and is factored into the overall rating of significance of impacts on each LCA;
- *Appendix 13-3: Photomontage Visual Impact Assessment Tables:*

- Assesses the likely 'Significant' visual effects of the Proposed Project from 15 no. selected photomontage viewpoints, providing a specific assessment table for each viewpoint;
- Two rows in each assessment table (row headings: 'Cumulative Context' and 'Cumulative Effects') are dedicated to the discussion and assessment of likely cumulative visual effects as seen in the photomontage from each viewpoint;
- The potential for cumulative visual effects is factored into the 'Magnitude of Change' determination reported for each viewpoint, indicating the potential to alter the outcome of the visual impact assessment and determination of likely 'Significant' effects for each viewpoint (see previous methodology criteria above in Section 1.8 'Assessing Visual Effects').

The discussion of effects reported both in Chapter 13 and within the assessment appendices (*Appendix 13-2* and *Appendix 13-3*) uses appropriate and logical narrative to describe cumulative interactions between the Proposed Project and all other wind energy developments irrespective of their categorisation of 'Existing', 'Permitted' or 'Proposed'.

The discussion of cumulative interactions on specific landscape and visual receptors is relative to the effects on that receptor and is proportionate to the likelihood of 'Significant' landscape and visual effects occurring. Further, the discussion, as well as the impact assessments, consider the probability of such cumulative effects arising in mind of the above category of the other developments with which the Proposed Project interacts.

Finally, the assessment of cumulative landscape and visual effects is maintained proportionally, meaning that the focus is always on the extent to which the Proposed Project may contribute towards cumulative effects on the specific receptors under assessment; these contributions are clearly explained narratively in the cumulative impact assessments included in Chapter 13 (refer to Sections 13.6 and 13.7.3.3 listed above), as well as the impact assessment appendices (*Appendix 13-2* and *Appendix 13-3*).

APPENDIX 13-1

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