APPENDIX 13-1

Methodology

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1. LANDSCAPE AND VISUAL IMPACT ASSESSMENT (LVIA) METHODOLOGY

1.1 Introduction

This appendix reports the comprehensive methodology for Landscape and Visual Impact Assessment (LVIA) conducted for the Proposed Project in Chapter 13 of this EIAR. Chapter 13 follows the naming conventions and definitions detailed in Section 1.1.1 References to Proposed Project of Chapter 1 of this EIAR. For terminology used in this appendix relating to the Proposed Project, see Section 13.1.2 of the main LVIA chapter.

1.2 Essential Aspects of the 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 Relevant LVIA Guidance

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), and
- 'Notes and Clarifications on Aspects of Guidelines for Landscape and Visual Assessment Third Edition (GLVIA3): Landscape Institute Technical Guidance Note 2024-01' (hereafter, LI TGN 24-01) (LI, 2024).

For guidelines pertaining to the siting and design of wind energy developments, this LVIA focuses on the best-practice guidance of:

- 'Wind Energy Development Guidelines for Planning Authorities' (Department of Environment, Heritage and Local Government [DoEHLG], 2006) (hereafter referred to as the **'the Guidelines (DoEHLG, 2006)'**);
- 'Draft Revised Wind Energy Development Guidelines' (Department of Housing, Planning and Local Government [DoHPLG], 2019) (hereafter referred to as the **'Draft 2019 Guidelines (DoHPLG, 2019)'**);

In addition, the following 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);
- 'Visual Representation of Development Proposals' (Landscape Institute Technical Guidance Note 06/19, 2019) (LI TGN 06/19);
- 'Siting and Designing Wind Farms in the Landscape, Version 3a' (Scottish Natural Heritage [SNH], 2017) (SNH Guidance v.3a);
- 'Visual Representation of Wind Farms, Version 2.2' (SNH, 2017) (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) (SNH Guidance v.2)
- '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 all relevant figures and maps. 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 the 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),
- 'Notes and Clarifications on Aspects of GLVIA3: Landscape Institute Technical Guidance Note 2024-01' (LI TGN 24-01) (LI, 2024),
- *Appendix 3* of the Guidelines (DoEHLG, 2006) and including reference to the Draft 2019 Guidelines (DoHPLG, 2019)

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

The impact assessments in Chapter 13 assess the effects of the Proposed Project on landscape and visual receptors within a 20km radius from the Proposed Turbines, an area called the **'LVIA Study Area'.** The rationale for the 20km LVIA Study Area is explained below.

GLVIA3 refers to the identification of the area of landscape that is to be covered while assessing landscape and visual effects:

> *"The study areas should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner."*

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 per the Guidelines (DoEHLG, 2006) (p.94), and Draft 2019 Guidelines (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

Furthermore, as prescribed by best practice guidance, the professional judgement of the assessment team, in addition to the desk studies and survey work undertaken, and experience from other relevant projects, the following topic areas have been scoped out of the assessment:

- Effects on landscape and visual receptors that have minimal or no theoretical visibility (as predicted by the ZTV) and/or very distant visibility, and are therefore unlikely to be subject to significant effects,
- Effects on designated landscape receptors beyond 20km 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 visual receptors beyond 20km from the Proposed Turbines, where it is judged that potential significant effects are unlikely to occur,
- Effects on landscape character and designated LCAs beyond 15km from the Proposed Turbines, where it is judged that potential significant effects on landscape character are unlikely to occur,
- Cumulative landscape and visual effects beyond 20km from the Proposed Turbines, where it is judged that potential significant cumulative effects are unlikely to occur,
- Cumulative effects in combination with single turbines with a tip height less than 50 metres which are located at distances greater than 5km from the Proposed Project, where it is deemed no significant cumulative effects are likely to occur in combination with the Proposed Project.

1.4.3.1 Assessment of Archaeological or National Monument Receptors

This LVIA Chapter does not include an assessment of archaeological or national monument receptors. As per industry best practice guidance, the purpose of an LVIA is to assess effects on the landscape resource and on people's views and visual amenity. As per the GLVIA3, visual receptors *"are all people"* (LI & IEMA, 2013, para 6.31). The susceptibility of receptors is judged with reference to visitors to heritage assets where views of the surroundings contribute to their experience (para 6.32) - that is, the receptor is the person experiencing the view, not the monument itself. Where a monument is not visited, there is no visual receptor for the LVIA to assess.

The cultural heritage significance of a monument, and any effect of the proposed development on its setting, is a separate specialist matter. GLVIA3 recognises that historic features are *"important in their own right as well as features of the landscape"* (para 5.9), and expressly cautions that landscape and cultural heritage baselines should not be conflated, *"or there will be a danger of both double handling and inappropriate judgements by non-experts"* (para 5.11). The Landscape Institute has confirmed the same position, noting that *"assessing the effects on the historic environment is a separate specialist topic in EIA,"* and that the terms *"visual impact"* and *"setting"* carry different meanings for the landscape and heritage disciplines (LI, 2021, Technical Note 01/21).

Accordingly, the LVIA contained in Chapter 13 of this EIAR assesses monuments (such as Clomantagh Church and Cemetery) as features of the landscape and assesses the visual amenity of people who experience views of and from them. The assessment of effects on the cultural heritage significance and setting of these assets, including any monuments that are not publicly accessible or are not experienced by the public (i.e. visual receptors) are properly addressed within the Cultural Heritage chapter (Chapter 14) of the EIAR, prepared by the appropriate specialist.

1.5 Visibility Mapping: Zone of Theoretical Visibility (ZTV)

The ZTV represents the area over which a development can theoretically be seen as a result of surrounding landform characteristics in the landscape. The ZTV is modelled using the turbine locations and size specifications in combination with a Digital Terrain Model (DTM). 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, is overlaid onto a base map and 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 likely to be visible in those areas (using different coloured bands for different numbers of turbines),
- The geographic extent and pattern of theoretical visibility.

The production of the ZTV map is one of the first steps of LVIA, as it 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). Importantly, the ZTV shows areas in the LVIA Study Area where **no visibility** of the Proposed Turbines will occur, enabling landscape and visual receptors to be scoped out of the impact assessment.

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 ZTV. The Guidelines (DoEHLG, 2006) p.94 and Draft 2019 Guidelines (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 Guidelines (DoEHLG, 2006) (p.94) and Draft 2019 Guidelines (DoHPLG, 2019) (p.152) best practice guidance for selecting the size of an LVIA study area recommends that:

> *'...in areas where landscapes of national or international renown are located within 25km of a proposed wind energy development, the Zone of Theoretical Visibility should be extended as far (and in the direction of) that landscape'.*

For the LVIA Chapter, the baseline 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 1.4 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 Guidelines (DoEHLG, 2006), p.94 and Draft 2019 Guidelines (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: 1–3 turbines theoretically visible;
- Yellow: 4–7 turbines theoretically visible;
- Dark Blue: 8–10 turbines theoretically visible.

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:

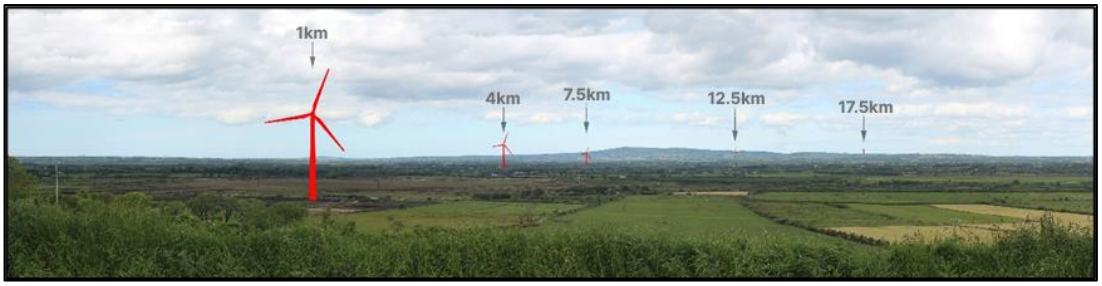


Figure 1-1: Effect of Distance on the Visibility of Wind Turbines (illustrative purposes only)

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 2020, 2022 and 2026, 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 Project 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.

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.

For this LVIA, the RSA survey was undertaken during August 2026 from all prominent local roads within 3km of the Proposed Turbines. The RSA was conducted to 5km for all regional roads, national roads, and motorways. Local roads which are designated as cycle routes and scenic routes were also surveyed to 5km. These local roads include the L-1806, L-1804, L-5000, L-1817, L-5828, L-5932 and the L-5829 which contain portions of 'North Kilkenny Cycle Route'. Where local roads continued beyond 3km and regional roads, national roads, and motorways continued beyond 5km from the Proposed Turbines, the RSA survey continued to record the visual screening until encountering an appropriate termination point or junction. It was not possible to carry out RSA on sections of the L1810, L1817, and the L5825 Local Roads (approximately 5.6km in total) that were closed down due to road works on the day the RSA was carried out.

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;
- **'Intermittent/Partial'** visual screening;
- **'Dense/Full'** visual screening.

These categories are defined as follows, and example photographs from the RSA are presented in Chapter 13. 'Little/No' visual screening indicates areas that are mainly open with very light vegetation and/or built structures and none or very little intervening topography; 'Intermittent/Partial' visual screening indicates areas of light deciduous roadside vegetation and short-gapped vegetation and/or built structures, or a degree of topographical screening allowing intermittent or partial views;

'Full/Dense' visual screening indicates vegetation and/or built structures dense enough to block the views and/or topography dense enough to effectively enclose the viewer.

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' (VP). 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 *EIAR Volume 2: 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 Turbines 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.

1.6.1 Viewpoint Selection

The viewpoints, or locations of photomontage imagery capture, were selected following the Guidelines and Draft 2019 Guidelines (DoHPLG, 2019), the GLVIA3 (LI & IEMA, 2013) and the SNH Guidance v.2.2 (2017). The selection of viewpoints is designed to provide a representative range of views of the Proposed Turbines.

Viewpoints were chosen after compiling the 'Visual Baseline' (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 searched in the LVIA Study Area:

- Designated Scenic Routes and Scenic Views;
- Tailte Eireann Viewing Areas;
- Settlements;
- Recreational routes:
    - Waymarked walking routes;
    - Cycle routes;
    - Scenic drives;
    - Tourist routes;
- Recreational, Cultural Heritage and Tourist Destinations;
- Transport routes;
- Residential receptors.

These visual receptors are listed in tables under the sections identified above in Chapter 13, along with theoretical visibility at those locations indicated by ZTV mapping. After all key visual receptors were identified, a Visual Receptor Preliminary Analysis was carried out to scope out selected visual receptors from further assessment due to the following reasons:

- Receptors which have none or very limited theoretical visibility according to ZTV mapping.
- Receptors comprising designated scenic routes or protected views, as well as Tailte Eireann Viewing Points, that are not directed towards the Proposed Turbines.
- Receptors visited on-site which have views towards the Proposed Turbines that are either entirely or substantially screened from view (by elements such as forestry and road-side hedgerows and trees, and buildings, as noted in Section 1.5.1 previously), or for which the distance from the Proposed Turbines, in combination with screening, would mitigate any potential for 'Significant' visual effects.

Views from all other key visual receptors were represented in the final selected 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 Turbines 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 Fieldwork: Data Collection Methods

Photographic and GPS data was collected from each viewpoint in the field. Under the LI TGN 06/19 Type 4 visualisation standards, photomontages are produced using quantifiable data with procedural transparency and a high level of accuracy. These visualisations involve using a defined camera and lens combination, with the camera location accurately established with a GNSS GPS to enable precise scaling and correct placement of the 3D model within the view.

As per best practice guidance, a tripod is set up and levelled at each viewpoint with the camera lens positioned 1.5 metres above the ground. In line with guidance, the tripod and camera height can be raised above this height by up to 20cm (a worst-case scenario) to ensure an unobstructed shot of the landscape if this is required due to interference in the foreground.

The camera and lens combination used for data collection, as specified in the guidance standards is a Full Frame Sensor (FFS) camera with a 50mm focal length prime lens. This approach ensures that the photomontages are survey and scale verifiable, reliable, and meet industry standards for visual accuracy.

SNH Guidance v.2.2 (2017) prescribes presentation of photomontages of wind energy developments within wide angle panoramic views. Panoramic imagery is captured by turning the camera on the tripod and capturing imagery in a 360º field of view with sufficient overlap for photo stitching. To

eliminate parallax distortion errors and ensure image alignment during panorama creation, a Nodal Ninja panoramic tripod head was used. This equipment is specifically designed to minimize parallax distortion (the distortion of panoramic image when multiple individual images are stitched), ensuring that the images are seamlessly stitched together, thus preserving the integrity of the visual representation.

In adherence with best practice verification standards, a GNSS GPS device is used to capture the exact position of the camera lens with a vertical and horizontal accuracy of +/- 3cm.

1.6.3 Wireline Visualisations

The photomontages in the *Volume 2: Photomontage Booklet* are accompanied by 'wireline' views. These show the Proposed Turbines (and other existing, permitted and proposed turbines) scaled within a topographic model without background photography. They show the location, scale and layout of all turbines from each viewpoint in a bare-earth scenario where no above ground visual screening occurs other than that caused by landform. The wireline views in the *Volume 2: Photomontage Booklet* show turbines which are coloured to correspond with their planning status: 'existing' (grey), 'permitted' (red) or 'proposed' (blue), with the turbines of the Proposed Project in green. In addition, the name and extent of different wind farms are labelled in the wireline views to enable understanding of the cumulative scenario experienced from each viewpoint.

1.6.4 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:** 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'. 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 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 Turbines and all other existing, permitted, and proposed wind farms within the view. A matching wireline 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 53.5°:** 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 Wireline with Cumulative at 53.5°:** A wireline image of the Proposed Turbines and the turbines of the identified existing, permitted or proposed wind farms in a 53.5-degree horizontal field of view. The Proposed Turbines and any other existing, permitted, and proposed wind farms are individually labelled for ease of identification.

Cumulative Photomontage Scenarios – VP01, VP02, VP10, and VP19

For viewpoints VP01, VP02, VP10, and VP19, additional views are presented in the *Volume 2: Photomontage Booklet* to visually distinguish between the existing receiving landscape and a potential future cumulative scenario. The first shows the proposed Killoshulan turbines in combination with existing, permitted and other proposed wind energy developments. The second shows the proposed Killoshulan turbines in combination with other existing wind energy developments only.

This approach has been adopted at selected viewpoints where there is a greater concentration of surrounding wind energy developments. The purpose of presenting these additional scenarios is for visual purposes only, to clearly demonstrate how the proposed Killoshulan turbines would be seen within the existing landscape context, both with and without other permitted and proposed wind energy developments, where such developments remain subject to the outcome of the planning process and do not form part of the existing receiving landscape yet.

The views presented in the *Volume 2: Photomontage Booklet* for these viewpoints are as follows:

- **(3) Proposed Killoshulan Photomontage at 90°** – A 90-degree photomontage image with the proposed wind farm and all other existing wind farms within the view. A matching wireline image shows the turbines of all proposed Killoshulan turbines and existing wind farms individually coloured and labelled for ease of identification;
- **(4) Proposed Killoshulan Photomontage at 53.5°** –A photomontage image of the proposed Killoshulan turbines and any existing turbines in a 53.5-degree horizontal field of view;
- **(5) Proposed Killoshulan Wireline at 53.5°** - A wireline image of the proposed Killoshulan turbines and any existing turbines in a 53.5-degree horizontal field of view. The Proposed Development turbines and any other existing wind farms are individually labelled for ease of identification;
- **(6) 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. A matching wireline image shows the turbines of all proposed, permitted and existing wind farms individually coloured and labelled for ease of identification;
- **(7) 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;
- **(8) Proposed Wireline with Cumulative at 53.5°** - A wireline 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.

Presentation of 2 Field of Views – VP18

For viewpoint 18, the Proposed Turbines are shown within two slightly differing fields of view. The imagery presented for these viewpoints were captured from the same location but show an 'A' view in one direction and a 'B' view in the other direction. Photomontages were presented as such in order to ensure most of the Proposed Turbines are visible within a 53.5° photomontage. The differing 90°and 53.5° view extents for views A and B are marked on the key image sheet to show the differing directional (A and B) views. The descriptions of the differing fields of view have been kept within the

same table. Assessment of visual effects from each viewpoint accounts for the full horizontal extent of both photomontages in corresponding A and B views. A 180° key image is provided on the overview sheet, with the extent and direction of each view clearly identified. Each view is subsequently presented as a 90° contextual photomontage and a 53.5° detailed photomontage, together with the corresponding matching wirelines. Assessment of visual effects in Appendix 13-3 'Photomontage Assessment Tables' from each viewpoint accounts for the full horizontal extent of both views A and B.

1.6.4.2 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 this method, the orientation of the turbine blades does not match what is presented in the corresponding photomontage. Conversely, guidance in the Guidelines (DoEHLG, 2006) and Draft 2019 Guidelines (DoHPLG, 2019) states 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 Guidelines (DoEHLG, 2006), Draft 2019 Guidelines (DoHPLG, 2019) and SNH v.2.2 (2017). Of these, it is considered that the guidance in the Guidelines (DoEHLG, 2006) and Draft 2019 Guidelines (DoHPLG, 2019) 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,

For these reasons outlined above, the turbines in the wireline views within the *Volume 2: Photomontage Booklet* are presented in unison with the orientation of the turbines in the photomontages, in line with the Guidelines (DoEHLG, 2006) and Draft 2019 Guidelines (DoHPLG, 2019).

1.6.5 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.

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

All imagery captured from viewpoints for the LVIA were progressed to a draft stage called - 'Photowires'. Photowires are early-stage draft photomontage visualisations (classified as 'Type 3 Visualisations' in the LI TGN 06/19, 2019) presenting a combination of photographic imagery and a 'wireline'. A wireline is the model of the Proposed Turbines accurately scaled and positioned within a digital elevation model (topography) as seen from a viewpoint. Photowires are produced by positioning and overlaying the wireline on top of the stitched photographic imagery captured from a viewpoint location.

Of the total of VPs captured for this LVIA, 20 no. viewpoints were selected for inclusion in the Photomontage Booklet, named VP01-VP20. Imagery captured from 4 other no. viewpoints are presented as Photowires. The Photowires are used as tools both to select the best viewpoints for assessment in the Photomontage Booklet, and also as part of discussion in the LVIA chapter to demonstrate the locations where very limited visibility might occur. A Photowires may not have been selected for the Photomontage Booklet as another nearby viewpoint was felt to be a better representation of views from receptors in a particular area or felt to represent a greater number of sensitive receptors.

The Photowire imagery presented in Chapter 13 are draft, therefore:

- No rendering is applied to the imagery to make the turbines photorealistic – hence the bright orange colour;
- Photowires do not include cumulative modelling, i.e. modelling and rendering of other permitted and proposed wind farms;
- The wireline element of the Photowire only accounts for visual screening by topography in the elevation model;

- The wireline overlaid on the photograph is shown in front of above-ground elements of the landscape, e.g. vegetation and the built environment. Therefore, the Photowire shows where the turbines are located relative to the viewpoint but are seen in front of above-ground features which, in reality, would visually screen them on the ground.

The 4 no. Photowires presented are useful visual aids for the discussion of visual effects included in Section 13.8 of Chapter 13: Likely Significant Landscape and Visual Effects. The location of Photowire viewpoints are marked as orange icons in Figure 13-20, labelled as 'PWVP' (e.g., PWVP-A).

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 Project 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 the Guidelines (DoEHLG, 2006) and Draft 2019 Guidelines (DoHPLG, 2019).

Here, 'landscape effects' are described as changes which affect the landscape as a resource. This includes how the Proposed Project 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

The 'Landscape Baseline' of (Section 13.4 of Chapter 13) reports relevant policy pertinent to this LVIA along with a description of the receiving landscape of the Proposed Project 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:
  - Kilkenny City and County Development Plan (KCCDP) 2021–2027,
  - Tipperary County Development Plan (TCDP) 2022–2028;
  - Laois County Development Plan (LCDP) 2021-2027
- **Landscape Character of the Site** and its immediate environment based on:
  - Site surveys undertaken throughout 2020, 2022 and 2026;
  - An appraisal of landscape value and the susceptibility of the landscape to change, and a determination of landscape sensitivity.
- **Landscape Character of the LVIA Study Area** based on:
  - Relevant County Development Plans;
  - Site Surveys undertaken throughout 2021 - 2026.

After all landscape receptors were identified, the landscape receptors were reviewed, and certain receptors were scoped out where no or very limited theoretical visibility was indicated by ZTV mapping, or those having a combination of distance, sensitivity and limited visibility such that significant effects are unlikely to occur. All remaining landscape receptors were included 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. Susceptibility to change in this case accounts for the specific development type of wind energy, which presents change on a different scale and magnitude than other development types. 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 Project 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 Project 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)

In Ireland, there is currently no standardised classification criteria for the landscape sensitivity of LCAs and there is no National or Regional Landscape Character Assessment. Importantly there is no classification criteria for the landscape sensitivity of LCAs with respect to wind energy specifically. Sensitivity designations within local county development plans are extremely inconsistent from county to county with respect to naming conventions, hierarchies, specific criteria used, and designations are often incompatible across county boundaries. Many sensitivity classifications are very outdated and very few include a specific sensitivity to wind energy development. Local LCA sensitivity designations are often highly incompatible with the National direction for deployment of onshore wind energy in the current climate action plan. Sensitivity designations in local planning policy are reported in the Landscape and Visual Chapter of this EIAR and are given due consideration in the LVIA. However, the sensitivity classification used in the assessment of impacts on designated LCAs in this EIAR is specifically focussed on sensitivity to wind energy development. Factors such as the specific landscape characteristics, values, qualities and susceptibility to change and importantly how sensitive the specific LCA is within a regional and national context.

The 'Sensitivity' of designated LCAs is comprehensively assessed in *Appendix 13-2: LCA Assessment*. Ireland does not currently have a standardised nationwide Landscape Character Assessment. For the purposes of this LVIA, 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 considers key characteristic and sensitivity descriptions (and where applicable, the sensitivity ratings) in the respective county development plan, 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

Receptor Sensitivity	Magnitude of Change			
	'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

Receptor Sensitivity	Magnitude of Change			
	'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 Project. 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.
'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 proximity to the viewer. The proposed turbines may cause substantial change to scenic sensitivities of the view. *Photomontage Example: Turbines may be of a large scale and very prominent within views, comprising large vertical and/or horizontal extent of views, turbines might typically comprise all, or greater than the 90-degree field of view shown in the EIAR Volume 2: Photomontage Booklet.*
'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 Project is partially visible over a moderate or medium extent, and where receptors are setback from the proposal. The proposed turbines may cause moderate change to key scenic sensitivities of the view. *Photomontage Example: Turbines are seen of a moderate and/or large scale comprising a large vertical and/or horizontal extent of views, typically comprising all the 53.5-degree field of view shown in the EIAR Volume 2: Photomontage Booklet.*
'Slight'	The proposal would be partially visible or visible at sufficient distance to be perceptible and result in a slight level of change in the view and its composition. The character of the view may be altered but will not affect key scenic sensitivities. *Photomontage Example: Turbines are seen but clearly set back from the viewpoint and are of small scale, or they are partially visible, they typically comprise a relatively small portion of the 53.5-degree field of view shown in the EIAR Volume 2: Photomontage Booklet.*
'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 preserved in most respects, approximating to little or very distant change. The Proposed Project may cause negligible change to key scenic sensitivities of the view. *Photomontage Example: Turbines are seen as small features at great distance from the viewpoint or partially visible, typically comprising a very small portion of the 53.5-degree field of view shown in the EIAR Volume 2: Photomontage Booklet.*

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

Receptor Sensitivity	Magnitude of Change			
	'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: Visual Effects Significance Graph (adapted from EPA, 2022)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 below in Table 1-9.

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 Effects

After determining the 'Significance' of landscape and visual effects using the above assessment matrices (and significance graph in the case of visual effects; see Figure 1-2 below), 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 matrices shown above 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.

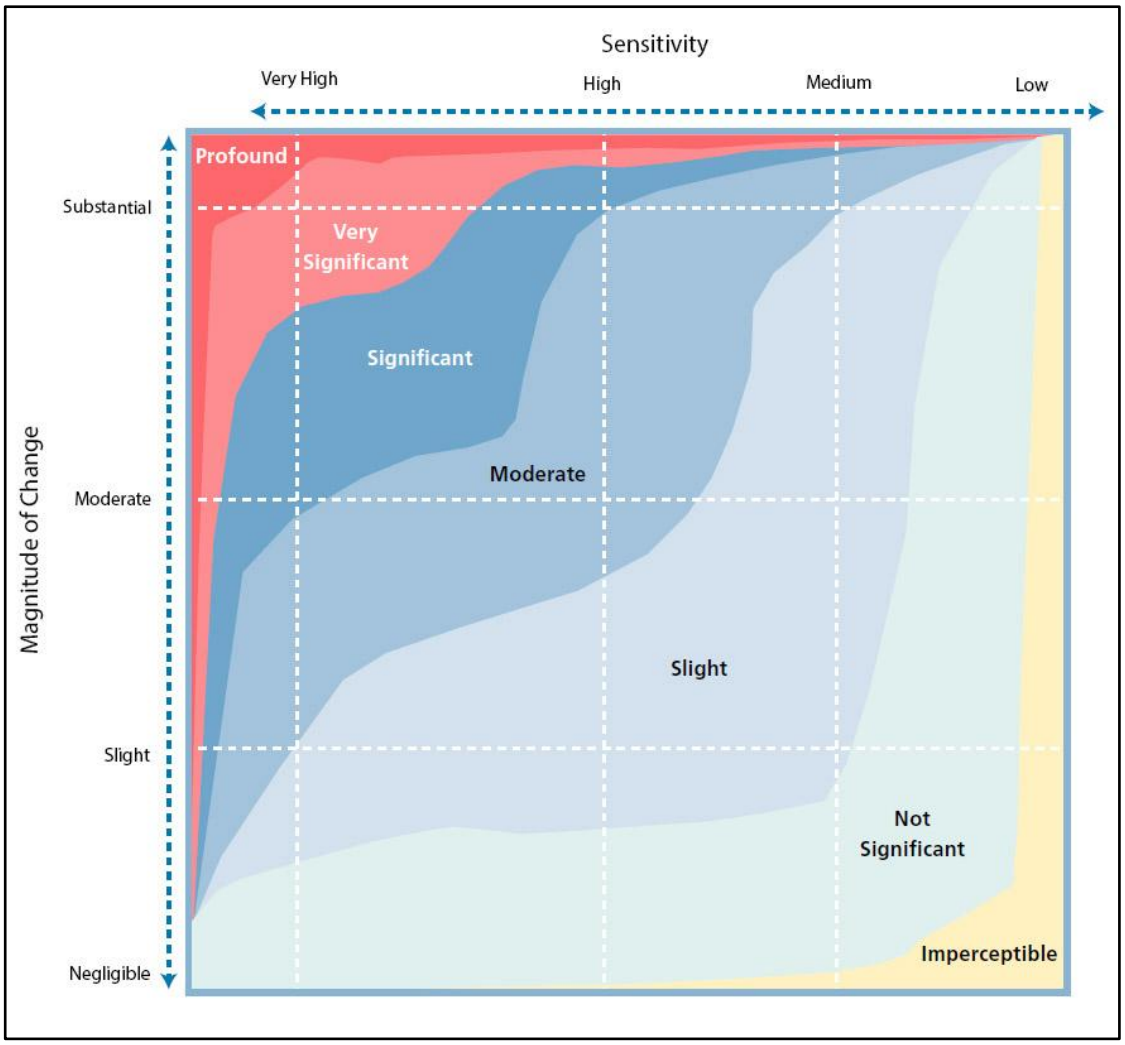


Figure 1-2: Visual Effects Significance Graph (adapted from EPA, 2022)

1.10 Assessing Cumulative Effects

1.10.1 Rationale of Cumulative Assessment

The Proposed Project is assessed in combination with the 'likely future receiving environments' according to the EPA (2022), which includes all existing and permitted wind farm developments in the LVIA Study Area, as well as those proposed or under construction at the time of conducting this LVIA. The assessment of cumulative landscape and visual effects considers all wind farm developments identified in the LVIA Study Area. It is highlighted that although the LVIA Study Area includes many cumulative wind farms, many of which are existing and permitted, the likelihood of proposed or pre-application wind farms cumulatively impacting specific landscape receptors is uncertain and is dependent on a range of factors, most notably the outcome of the planning process.

Whilst the categories of **Existing**, **Permitted** and **Proposed** provide clarity in the presentation of visuals considering the scope of potential development in this landscape, the discussion of cumulative interactions on specific landscape and visual receptors is relative to the effects on that receptor and proportionate to the likelihood of significant landscape and visual effects occurring.

In terms of cumulative landscape and visual effects, only wind energy projects have been considered, as only these would be described as very tall vertical elements in the landscape and therefore have the most potential to give rise to significant cumulative effects. Other wind energy developments within

20km of the Proposed Turbines were identified by searching past planning applications lodged through the online planning portals of relevant planning authorities (i.e. Kilkenny County Council, Laois County Council, Tipperary County Council, and An Coimisiún Pleanála).

The information identified in the initial planning search was then used to verify, by means of a desk-based study and ground-truthing, whether the permitted wind energy developments had been constructed. The effects reported in Chapter 13 and assessment appendices (*Appendix 13-2: LCA Assessment Tables* and *Appendix 13-3: Photomontage Visual Impact Assessment Tables*) uses appropriate and logical narrative to discuss cumulative interactions between the Proposed Project and all other wind energy developments irrespective of which category they occur.

Assessment of cumulative landscape and visual effects need to be proportional. The focus is always on the extent to which the Proposed Project will contribute towards the cumulative effects on the particular receptors under assessment, these contributions are clearly explained in narrative in the cumulative impact assessments included in the chapter, as well as the impact assessment appendices (*Appendix 13-2* and *Appendix 13-3*).

1.10.2 Cumulative Visualisation in Photomontage Booklet

In general, photomontages are an informative tool for assessing potential cumulative landscape and visual impacts. All other existing, permitted, and proposed wind farms are included in the visualisations in the *Photomontage Booklet* as follows:

- **Existing View**, and **Existing Wireline View**: Turbines of existing wind energy developments currently operational in the baseline landscape at the time of conducting this LVIA.
- **Proposed with Cumulative View** and **Proposed with Cumulative Wireline View**: As well as the Proposed Turbines, turbines of all other existing, permitted and under construction are presented in the photomontages and wireline views. Also, well-developed wind farm proposals* with project details in the public domain are included in these views.

**Cumulative effects between the Proposed Turbines and other proposed wind farms (not permitted) are more uncertain and is reliant on an outcome of the planning and consenting system.*

1.10.3 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 Project 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 Chapter 13, Section 13.7 Likely Significant Landscape and Visual Effects.

1.10.4 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 Guidelines (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 Guidelines (DoEHLG, 2006) and Draft 2019 Guidelines (DoHPLG, 2019) relating to the Proposed Project 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 Chapter 13, Section 13.7 Likely Significant Landscape and Visual Effects.

1.10.5 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: 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 13.7.3.1.4 Cumulative Landscape Effects of Chapter 13:**
  - 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*,
- **Section 13.7.3.2.6 Cumulative Visual Effects of Chapter 13:**
  - 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 Context') is dedicated to outlining the number and type ('Existing', and/or 'Permitted', and/or 'Proposed') of cumulative wind energy developments located within the corresponding LCA.
  - One row in each assessment table (row heading: 'Cumulative Effects') is dedicated to reporting and discussing the cumulative landscape effects arising in each LCA.

- Potential for cumulative landscape effects are factored into the 'Magnitude of Change' determination for each LCA

- ***Appendix 13-3: Photomontage Visual Impact Assessment Tables:***
  - Assesses the likely 'Significant' visual effects of the Proposed Project from 20 no. selected photomontage viewpoints, providing a specific assessment table for each viewpoint,
  - A row in each assessment table (row heading: 'Cumulative') is dedicated to the discussion and assessment of likely cumulative visual effects as seen in the photomontage from each viewpoint,
  - Potential for cumulative visual effects are factored into the 'Magnitude of Change' determination for each viewpoint which has the potential to alter the outcome of the visual impact assessment and the determination of likely significant effects for each viewpoint (see methodology criteria in Section 1.6.2 and 1.6.3).

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 13.7.3.1.4, and Section 13.7.3.2.6 listed above), as well as the impact assessment appendices (*Appendix 13-2* and *Appendix 13-3*).