Planning and Environmental Consultants

Chapter 14 - Landscape and Visual

Carrow Wind Farm, Co. Tipperary

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14. LANDSCAPE AND VISUAL

14.1 Introduction

This chapter comprises a Landscape and Visual Impact Assessment (LVIA). The LVIA assesses the likely significant effects of the Proposed Project on the landscape and visual amenity. The LVIA reported in this chapter was informed by desktop studies and receptor mapping, site visits, verified photomontages, and an impact assessment methodology which follows best practice guidance for LVIA. The LVIA also includes assessment of cumulative landscape and visual effects. This chapter is supported by one volume and five appendices:

- **EIAR Volume 2: Photomontage Booklet:** A1-banner photomontage booklet presenting verified photomontage visualisations from representative viewpoints (15 no.);
- **Appendix 14-1, LVIA Methodology:** An appendix detailing the methodology and guidance used for the assessments reported in this chapter;
- **Appendix 14-2, LCA Assessment Tables:** An assessment of effects on designated Landscape Character Areas (LCAs);
- **Appendix 14-3, Photomontage Visual Impact Assessment Tables:** A visual impact assessment of the representative viewpoints (15 no.) included in the Photomontage Booklet;
- **Appendix 14-4, A0 LVIA Baseline Map:** A large-scale (A0) map showing all baseline landscape and visual receptors and LVIA tools (e.g. viewpoints and visibility mapping);
- **Appendix 14-5, Photowire Visualisation Booklet:** Draft early-stage photomontage visualisations from alternative viewpoint locations (5 no.) which are not assessed in the LVIA and are not included in Appendix 14-3 or the Photomontage Booklet.

14.1.1 Statement of Authority

MKO has developed extensive expertise and experience over the last 20 years in the LVIA of large-scale infrastructure developments for Environmental Impact Assessment Reports (EIAR). The MKO Landscape and Visual team have produced LVIA across a diverse range of project types including renewable energy and grid infrastructure; residential developments; transport infrastructure; extraction infrastructure; and a range of other projects requiring EIAR.

This LVIA was written by Jack Workman and Rachel Smith with oversight by Michael Watson. James Crean provided technical support for the production of the LVIA including fieldwork and GIS with oversight from Jack and Michael.

Jack Workman MSc., TMLI. is the Landscape & Visual Project Director at MKO and is chartered as a Technician Member of the British Landscape Institute. Jack is an environmental scientist and an LVIA specialist with an academic background in the field of Environmental Science and Geography. Jack's primary role at MKO is scoping and writing LVIA for EIARs with over 5 years of experience managing all aspects of LVIA for a broad range of commercial infrastructure developments. Jack holds a BSc. in Psychology, and an MSc. in Coastal and Marine Environments (Physical Processes, Policy & Practice). Jack is an active participant in the National Landscape Forum, presenting in 2023 and 2024 on the topic of LVIA, he also regularly delivers guest lectures for students on the topic of LVIA at top third level institutions in Ireland including University of Galway, Trinity College Dublin, University College Dublin and University College Cork. Jack holds a membership with the Chartered Institute of Water and Environmental Management and is also a member of the Landscape Research Group.

Rachel Smith, MSc., is a Project Environmental Scientist and LVIA Specialist who has been working with MKO since October 2023. Rachel is an Earth & Environmental Science consultant with more than 10 years of professional experience in producing and editing technical scientific reports, and collecting,

analysing and reporting environmental data for regulatory compliance in both the US and Ireland, including the utilisation of QGIS mapping, organisation of field work, management of environmental databases and training of environmental science staff. Rachel's primary role at MKO is producing and reviewing the LVIA chapter of EIA reports accompanying Planning Applications for multi-scale onshore renewable energy and non-wind developments, as well as conducting research in Irish landscape policy. Rachel holds an MSc. in Coastal and Marine Environments (Physical Processes, Policies & Practice) and a BSc. in Geology.

Michael Watson is the Environment Division Director in MKO who has over 25 years of experience in the environmental sector. Following the completion of his master's degree in environmental resource management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments and Landscape & Visual Impact Assessments on behalf of clients in the wind farm, waste management, commercial and industrial sectors nationally. Michael worked on the capture and development of photomontages as well as compiling the Landscape & Visual Impact Assessments for some of the first wind turbines being proposed in Ireland in the early 2000's and has been compiling and reviewing LVIA chapters for multiple wind farm projects each year since 2014. Michael is a key member of the MKO senior management team and as head of the Environment Division has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv).

James Crean is an Environmental Scientist and LVIA Specialist with MKO. His primary role at MKO is producing the LVIA chapter of EIAR reports. James holds an MSc. in Applied Coastal and Marine Management from University College Cork. Since joining MKO, James has worked on a wide variety of renewable energy infrastructure, commercial, recreational, and residential projects. James' key strengths include proficiency in GIS tools such as ArcGIS and QGIS, conducting landscape and visual impact assessments and capturing image data through drone surveys and photomontages. James is an affiliate member with the Landscape Institute, with qualifications to fly drones in the A1, A2 and A3 subcategories.

14.1.2 Proposed Project Description

A full and detailed description of the Proposed Project can be found in the EIAR Chapter 4 Description. Section 4.1 of that chapter describes the Proposed Project and its component parts, including the works subject of a proposed application for planning permission to An Coimisiún Pleanála.

The Proposed Project elements will include:

- 14 no. proposed turbines (185m height, 163m rotor diameter, 103.5m hub height),
- Underground grid connection route (approx. 38.2km in length) with electrical cabling,
- Proposed on-site 110kV substation and Battery Energy Storage System (BESS),
- One meteorological met mast (103.5m height),
- Tree felling and hedgerow removal with biodiversity management measures,
- Other accommodation works and associated site development works.

This planning application seeks a ten-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm.

14.1.3 In-Text Reference to the Proposed Project

The following references are used throughout this chapter and its associated appendices as per the definitions set out in the EIAR Chapter 1 Introduction. The Proposed Project, Proposed Wind Farm and Proposed Grid Connection Route are described in detail in the EIAR Chapter 4 Description.

- "**Proposed Project**" encompasses the entirety of the project for the purposes of this EIA in accordance with the EIA Directive.
- "**Proposed Wind Farm**" refers to turbines and associated foundations and hardstanding areas, including entrances and access roads, underground cabling, permanent meteorological mast, temporary construction compounds, turbine delivery accommodation works, spoil repository areas, borrow pits, tree felling, site drainage, operational stage signage, battery energy storage system and all ancillary works and apparatus.
- "**Proposed Grid Connection Route**" refers to the 110kV on-site substation, all ancillary works and underground 110kV grid connection cabling connecting to the existing Killonan 110kV substation in Co. Limerick, and all ancillary works and apparatus.
- "**Site**" refers to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown on Figure 1-1 of the EIAR Chapter 1 and encompasses an area of approximately 1,507 hectares.
- "**Proposed Wind Farm site**" refers to the EIAR Site Boundary without the corridor that encompasses the underground grid connection cabling route.
- The term "**proposed turbines**" refers to the 14 no. proposed turbines (T01-T14) of the Proposed Wind Farm.

14.1.4 Essential Aspects of the Proposed Project and Primary Focus of the LVIA

This LVIA follows "The Guidelines for Landscape and Visual Impact Assessment Third Edition" (hereafter, GLVIA3) published by the Landscape Institute (LI) & Institute of Environmental Management and Assessment (IEMA) (2013) as well as "Notes and Clarifications on Aspects of GLVIA3: Landscape Institute Technical Guidance Note 2024-01" (hereafter, LI TGN 24-01) published by the LI (2024). The GLVIA3 states 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 effects on the landscape and visual amenity".*

The tall, vertical nature of the proposed turbines make them the most prominent elements of the Proposed Wind Farm from a landscape and visual perspective and have the most potential to give rise to significant landscape and visual effects. In this regard, the 14 no. proposed turbines are deemed to be the "essential aspect" of the Proposed Project which will give rise to effects on the landscape and visual amenity and are the primary focus of the LVIA reported in this chapter.

The relevant dimensions of the 14 no. proposed turbines T01-T14 are as follows:

- Tip height = 185 metres,
- Rotor diameter = 163 metres,
- Hub height = 103.5 metres.

Other components of the Proposed Wind Farm (including the proposed met mast, 103.5m height) are not deemed to be as visually prominent as the proposed turbines; however, they have the potential to

give rise to localised landscape and visual effects. Although not the primary focus of this LVIA, these elements are given full consideration throughout this chapter.

14.1.5 Mitigation by Design

The Wind Farm Site was strategically selected as a landscape highly suitable for the development of wind energy. Through the iterative project design process, various best practice tools for assessing the landscape and visual impact of a proposed wind farm development were utilised to bring forward the optimum design for the Proposed Project with respect to landscape and visual factors. These tools include landscape modelling, Zone of Theoretical Visibility (ZTV) mapping and the preparation of photomontage visualisations.

The iterative design process was informed by the siting and design guidance for wind farms in specific landscape types as set out in the "Wind Energy Development Guidelines for Planning Authorities" published by Department of the Environment, Heritage, and Local Government (DoEHLG), 2006, hereafter, "**DoEHLG 2006 Guidelines**," and regard to the "Draft Revised Wind Energy Development Guidelines" published by Department of Housing, Planning and Local Government (DoHPLG), 2019, hereafter the "**Draft 2019 Guidelines.**" Collectively, these documents are known as the "WEDGs."

The final design of the Proposed Project included the careful micro-siting of infrastructure with the aim of preventing the potential for significant landscape and visual effects. Details of the various turbine layout iterations included as part of this design process are included in the EIAR Chapter 3 Consideration of Reasonable Alternatives.

Landscape and visual "mitigating" factors which were key to the site selection and design of the Proposed Project are listed here; these factors are of key relevance to the LVIA:

- **Appropriate Wind Energy Zoning Ratings in Local Planning Policy**: The proposed turbines are seen within a low sensitivity, modified working landscape of marginal upland where potential wind energy development is acceptable ("Open for Consideration" TCDP 2022-2028).
- **Established Wind Energy Landscape**: The Proposed Wind Farm is located within the uplands of Slieve Felim Mountain range and Knockbane peak which is a generally robust landscape characterised by small spatial enclosures and undulating terrain which has effectively absorbed multiple wind energy developments to date (i.e. existing wind energy developments).
- **Siting in Landscape of High Compatibility to Wind Farms in Local Planning Policy**: The compatibility of LCA-17a to "Windfarm" land-use type is given as "High" (TCDP 2022-2028), which is the highest compatibility classification for wind energy development out of a five-tier compatibility scale—only two LCAs in the county have been given this capacity rating for the wind energy land-use type. This favourable compatibility rating indicates that the landscape is highly suitable for wind energy development.
- **Siting in Landscape with Capacity to Accommodate Development in Local Planning Policy**: LCA-17a is defined as having "*capacity to accommodate development without undue deterioration in the scenic quality*" and is classed as "*Medium Sensitivity*" such that "*Change or Development is generally acceptable*" because "*the landscape is somewhat degraded, so undergoing change or the precedent for such and similar development is set and the landscape is capable of absorbing considerable change without detriment*" (TCDP 2022-2028).
- **Keeping with Established Development Trends in Local Planning Policy**: The Proposed Wind Farm is located in Co. Tipperary which states the intention of continued wind energy development: "*Co. Tipperary is already one the country's leading producers of Renewables – this pattern is set to continue and is provided for in the Wind Energy Strategy*" (TCDP 2022-2028).

- **Compliance with Wind Energy Development Guidelines Set-Back Distance:** The Proposed Project exceeds the recommended 500m setback from residences (DoELHG 2006 Guidelines) and adheres to the prescribed 4-times-tip-height (740m) setback distance for residential visual amenity (Draft 2019 Guidelines) in the WEDGs.
- **No Significant Impact on Designated Scenic Routes and Views**: The Proposed Wind Farm has been strategically sited in a location where there is no significant impact on any designated protected views as set out in local planning policy.
- **No Significant Impact on Designated Landscape Receptors**: The Proposed Wind Farm has been strategically sited in a landscape setting (an LVIA Study Area to 20km from the proposed turbines) where there is no significant impact on designated or protected high sensitivity landscape receptors in local planning policy of county, regional or national renown.
- **Limited Visibility within Mountainous Terrain**. Due to the position of the proposed turbines within small spatial enclosures on the southern slope of Knockbane peak in the wider Slieve Felim Mountain Range, there is largely no visibility of the proposed turbines to the north and northwest. As shown in the ZTV Map, there is no theoretical visibility of the proposed turbines in approximately one-third of the of the LVIA Study Area.
- **Sparsely Settled & Highly Modified Landscape**: The infrastructure of the Proposed Wind Farm has been strategically sited within a sparsely settled landscape characterised by agricultural land and commercial forestry. It is therefore a modified working landscape deemed to be of low landscape sensitivity, and a site capable of effectively absorbing the Proposed Wind Farm.
- **Large Setback from Population Centres and Receptors:** Site selection and siting of proposed turbines ensures limited visibility and large setback distances from large population centres and designated landscape and visual receptors of high sensitivity.
- **Appropriate Siting and Design for Landscape Character Type in WEDGs**. The proposed turbines are sited on or near elevated peaks within a small spatial extent and with slightly irregular spacing in a clustered layout of relatively even height profile, thereby aligning with best practice siting and design for wind energy developments in Transitional Marginal Landscape Types (DoEHLG 2006 Guidelines, Draft 2019 Guidelines).
- **Underground Grid Connection:** The intended connection to the national electricity grid is underground, thereby eliminating potential landscape and visual effects during the operational phase.

14.2 Methodology and Assessment Criteria

14.2.1 LVIA Wind Energy Context

Given Ireland's renewable energy targets which have been set by the State for onshore renewable wind energy development, wind turbines will form a new component in the working landscape for the foreseeable future. The focus for visual impact assessment of wind energy developments is therefore distance, arrangement, location and potential disruption to key scenic sensitivities rather than a commonly misconceived focus on whether turbines are visible or not from a particular vantage point. The outcome of the visual impact assessment, with regards to the EPA (2022) definition of significance, is calibrated in the overall context of LVIA of wind energy developments in Ireland and what is acceptable in the context of emerging baseline trends and the acceptability of wind turbines within views as a result of national policy.

Over time, wind turbines have, and will become, a more familiar and accepted component of the Irish landscape, particularly in working rural contexts. Accordingly, their presence may not carry the same level of perceived visual intrusion as less common or incongruous forms of development. In this context, the calibration of visual impact significance reflects both the policy-driven imperative for renewable energy development and the evolving visual baseline in parts of the Irish landscape. While the visibility of turbines remains an important consideration, it does not in itself equate to significant visual impact.

Key factors of focus in the overall impact assessment on visual receptors in relation to photomontages are:

- The scale of the turbines as a result of setback distance;
- The number of turbines visible;
- Full or partial visibility of turbines e.g. are they partially screened by features
- Horizontal extent how do the turbines comprise the field of view experienced by receptors, with regard given to their composition within both 53.5-degree or 90-degree field of view shown in the *Photomontage Booklet*.
- Overall visual coherency with regards to form and arrangement and how the turbines correspond to the landscape from a particular vantage point as per best practice siting and design guidance

14.2.2 Scope and Definition of LVIA Study Area

In this LVIA, the Proposed Wind Farm is the key focus of the assessments as the proposed turbines are the primary essential aspect of the Proposed Project under assessment of the LVIA (see previous Section 14.1.4).

The assessment of effects on landscape and visual amenity uses wider study areas beyond the Proposed Wind Farm site. For this assessment, two study areas with different radii are defined with respect to the location of the proposed turbines:

- 20km LVIA Study Area for the assessment of effects on landscape and visual receptors, hereafter referred to as the "**LVIA Study Area**,"
- 15km LCA Study Area for the assessment of effects on designated "Landscape Character Areas" (LCAs), hereafter referred to as the "**LCA Study Area**."

On the basis of desk studies and survey work undertaken, as well as 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 the ZTV) and/or very distant visibility and are therefore unlikely to be subject to significant effects.
- Effects on designated landscapes beyond a 20km radius 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 designated LCAs beyond a 15km radius 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 from the proposed turbines, where it is judged that potential significant effects are unlikely to occur.
- Cumulative landscape character effects beyond a 15km radius and cumulative landscape & visual effects beyond a 20km radius from the proposed turbines, where it is judged that potential significant effects are unlikely to occur.
- Cumulative effects in combination with single turbines with a tip height less than 50m which are located at distances greater than 5km from the Proposed Wind Farm, where it is deemed no significant cumulative effects are likely to occur in combination with the Proposed Wind Farm.

14.2.3 Guidance

The legislation and general guidance on Environmental Impact Assessment is set out in Chapter 1 of this EIAR. The LVIA reported in this chapter was guided and informed by guidance documentation

specifically pertaining to LVIA. Details of the guidance used to conduct this LVIA are outlined in *Appendix 14-1: LVIA Methodology* (Section 1.3 Guidance).

14.2.4 Baseline Landscape and Visual Information

Landscape Baseline. In order to carry out this assessment, an initial desk study of the following landscape baseline information was undertaken to inform the LVIA:

- Landscape Policy Context:
  - Policies, objectives and designations contained in the relevant county development plans pertaining to landscape and wind energy.
- Landscape Character Areas & Preliminary Analysis:
  - Landscape Character Areas (LCAs) in the LCA Study Area and preliminary analysis of LCAs scoped in for assessment.
- Landscape Character of the Proposed Wind Farm site:
  - Landscape character descriptions of the Proposed Wind Farm site based on site surveys undertaken in in March and September 2024 and January 2025.
- Landscape Sensitivity of the Proposed Wind Farm site:
  - Assigning an overall "Sensitivity" rating to the Proposed Wind Farm site and its surrounding area according to its "Value" and "Susceptibility to Change" based on the appraisal of multiple indicators.
- Guidance for Siting and Design from Wind Energy Development Guidelines:
  - Landscape characterisation of the Proposed Wind Farm site as indicated in wind energy guidance of the DoEHLG 2006 Guidelines and Draft 2019 Guidelines.
- Wider Landscape Setting:
  - Landscape character and key sensitivities of the wider landscape setting of the LVIA Study Area, including historic and archaeological landscape characterisation.
- Landscape Receptors Preliminary Analysis
  - Indicates the selection and rationale for landscape receptors scoped in for assessment in the LVIA, and receptors scoped out.

Visual Baseline. An initial desk study of the following visual baseline information was undertaken to inform the LVIA:

- Visibility of the proposed turbines in the 20km LVIA Study Area:
  - ZTV mapping,
  - Visibility appraisal within 3-5km of the proposed turbines through Route Screening Analysis (RSA), a method developed by MKO to quantify on-the-ground visual screening relative to the proposed turbines.
- Identification of visual receptors in the LVIA Study Area:
  - Designated scenic routes and protected views,
  - Protected scenic amenity designations,
  - Popular recreational, cultural heritage, and tourist destinations,
  - OSi viewing areas,
  - Settlements,
  - Prominent transport routes,
  - Residential receptors in close proximity.
- Preliminary analysis of visibility from visual and residential receptors according to ZTV mapping and on-site visibility appraisals.
- Identification of 15 no. viewpoints (VP01-VP15; see *Photomontage Booklet*) representing visual receptors throughout the LVIA Study Area, selected for photomontage visualisation and assessment in the LVIA.

14.2.5 Assessment of Potential Impacts

The LVIA process used in this chapter is presented in *Appendix 14-1: LVIA Methodology* and includes clearly documented methods based on guidelines of the GLVIA3 (LI & IEMA, 2013) as follows.

The LVIA considers landscape and visual "Sensitivity" balanced with the "Magnitude of Change" to determine the likely significance of effects. Mitigating factors are then considered to arrive at "Residual" landscape and visual effects. Residual landscape and visual effects are graded upon an "impact assessment classification of significance" scale, as defined by the EPA (2022) ranging as follows: "Imperceptible", "Not Significant", "Slight", "Moderate", "Significant", "Very Significant" or "Profound"; see definitions of these ratings quoted in *Appendix 14-1*.

Photomontages are used as an illustrative tool to assess potential impacts, whereby the potential landscape and visual effects arising as a result of the proposed turbines are assessed from viewpoint locations representative of prominent landscape and visual receptors located within the LVIA Study Area. Throughout this chapter, "theoretical visibility" is referred to, based on ZTV mapping (see next Section 14.3 Visibility of the proposed turbines), and is assessed to compare "theoretical" versus "actual" visibility. The detailed methods used to produce ZTV maps and photomontages are included in *Appendix 14-1* (Section 1.5 Visibility Mapping: ZTV).

14.3 Visibility of the Proposed Turbines

14.3.1 Zone of Theoretical Visibility (ZTV) Mapping

Zone of Theoretical Visibility (ZTV) mapping is an important step in the LVIA process, in that it illustrates which areas within the LVIA Study Area have theoretical visibility of the proposed turbines and shows definitively which areas have no theoretical visibility.

The ZTV mapping methodology outlined in *Appendix 14-1: LVIA Methodology* was used to examine the theoretical visibility of the 14 no. proposed turbines of the Proposed Wind Farm from all landscape and visual receptors within the LVIA Study Area, using the half-blade height of the wind turbines as points of reference. As noted in *Appendix 14-1*, the potential for actual visibility on the ground is significantly less than the theoretical visibility predicted by the ZTV mapping due to on-site visual screening by intervening factors such as vegetation, built structure and localised undulations in topography, or visual screening owing to the disproportionate screening effect or atmospheric weather which obscure visibility.

Generation of the ZTV utilises large scale topographical data (interpolation across 10 m OSi contour data) and does not account for topographical variation of smaller scale (e.g., less than 10m). Therefore, in reality, modest and localised undulations in topography are likely to further inhibit visibility of the Proposed Wind Farm that may not be represented in the ZTV map. Other features of the landscape such as vegetation and man-made elements are also likely to obscure the proposed turbines from view from many areas where the ZTV indicates there is full visibility. In this regard, the ZTV is a useful tool to indicate definitive areas with no visibility of the proposed turbines, and thus, receptors located in these areas can be scoped out from further assessment.

14.3.2 ZTV Map and Physical Landscape Features

Separate colour bands are used on the ZTV map to indicate the number of turbines of which the half-blade will potentially be visible, shown on Figure 14-1 below. The legend one the map shows the number of visible turbines for each corresponding colour, which are as follows:

- Orange: 1-4 turbines theoretically visible,

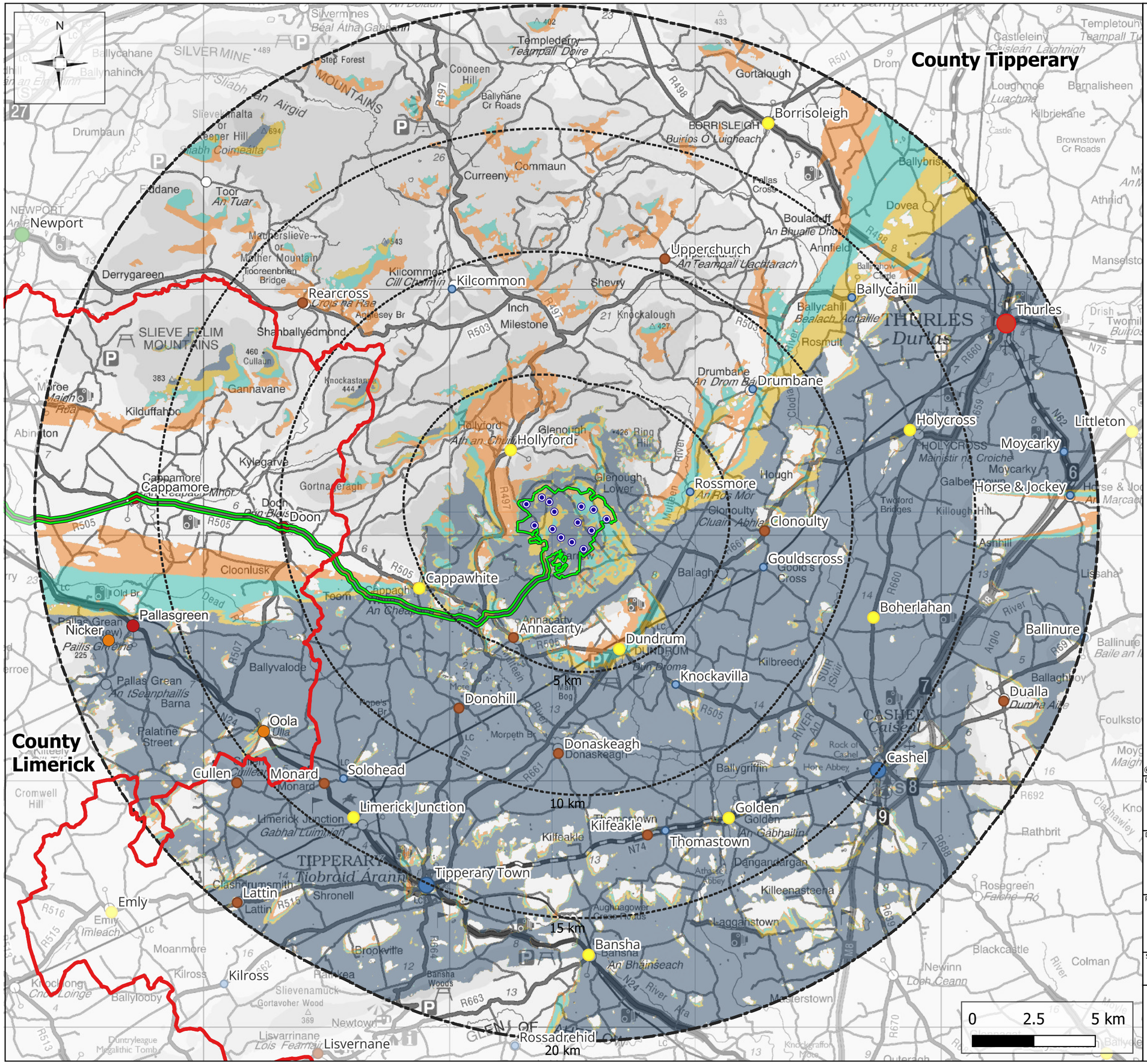
- Teal: 5-8 turbines theoretically visible,
- Yellow: 9-11 turbines theoretically visible,
- Grey: 12-14 turbines theoretically visible.

Following this, Figure 14-2 shows the topographical features and elevation gradients existent within the receiving landscape of the LVIA Study Area, the geography of these topographical landforms defines the distribution of theoretical visibility illustrated in the ZTV map illustrates that full theoretical visibility of the 14 no. turbines occupies a relatively large proportion of the study area.

The Proposed Project is located in an upland area of west Co. Tipperary on the south-facing slopes of Knockbane peak (433m AOD). Knockbane peak is located at the farthest southeastern point of the Silvermines Mountains within the broader Slieve Felim Mountain Range, a large mountainous region which straddles the county borders of Co. Tipperary and Co. Limerick. The highest peak in the LVIA Study Area is Keeper Hill (694m AOD).

Another key feature of the LVIA Study Area is the low-lying river valley formed by the River Suir traversing the study area NE-SW (greater than 10km from the Proposed Wind Farm site) and the Multeen River running N-SE from the centre of the study area within 1km to the west of the Proposed Wind Farm site, joining the River Suir to the south. These two rivers form a large river valley to the east and south of the Proposed Wind Farm site (hereafter referred to as the River Suir valley) encompassing a significant low-lying landscape from which the proposed turbines are theoretically visible.

Another two rivers (Dead River and Mulkear River) form a smaller river valley to the west of the LVIA Study Area and also represent a low-lying landscape with potential visibility of the proposed turbines. As seen on Figure 14-2, the topography slopes down towards these river valleys, creating relatively flat topography in the east, south and west of the LVIA Study Area.



Map Legend

- County Boundaries
- LVIA Study Area
- EIAR Site Boundary
- Proposed Turbine Locations

Co. Tipperary Settlement Hierarchy

- Key Towns
- District Towns
- Local Towns
- Service Centres
- Local Service Centres
- Settlement Nodes

Co. Limerick Settlement Hierarchy

- Large Village
- Small Village

Zone of Theoretical Visibility

- 1-4 Turbines Theoretically Visible
- 5-8 Turbines Theoretically Visible
- 9-11 Turbines Theoretically Visible
- 12-14 Turbines Theoretically Visible

Drawing No.

Figure 14-1

Drawing Title

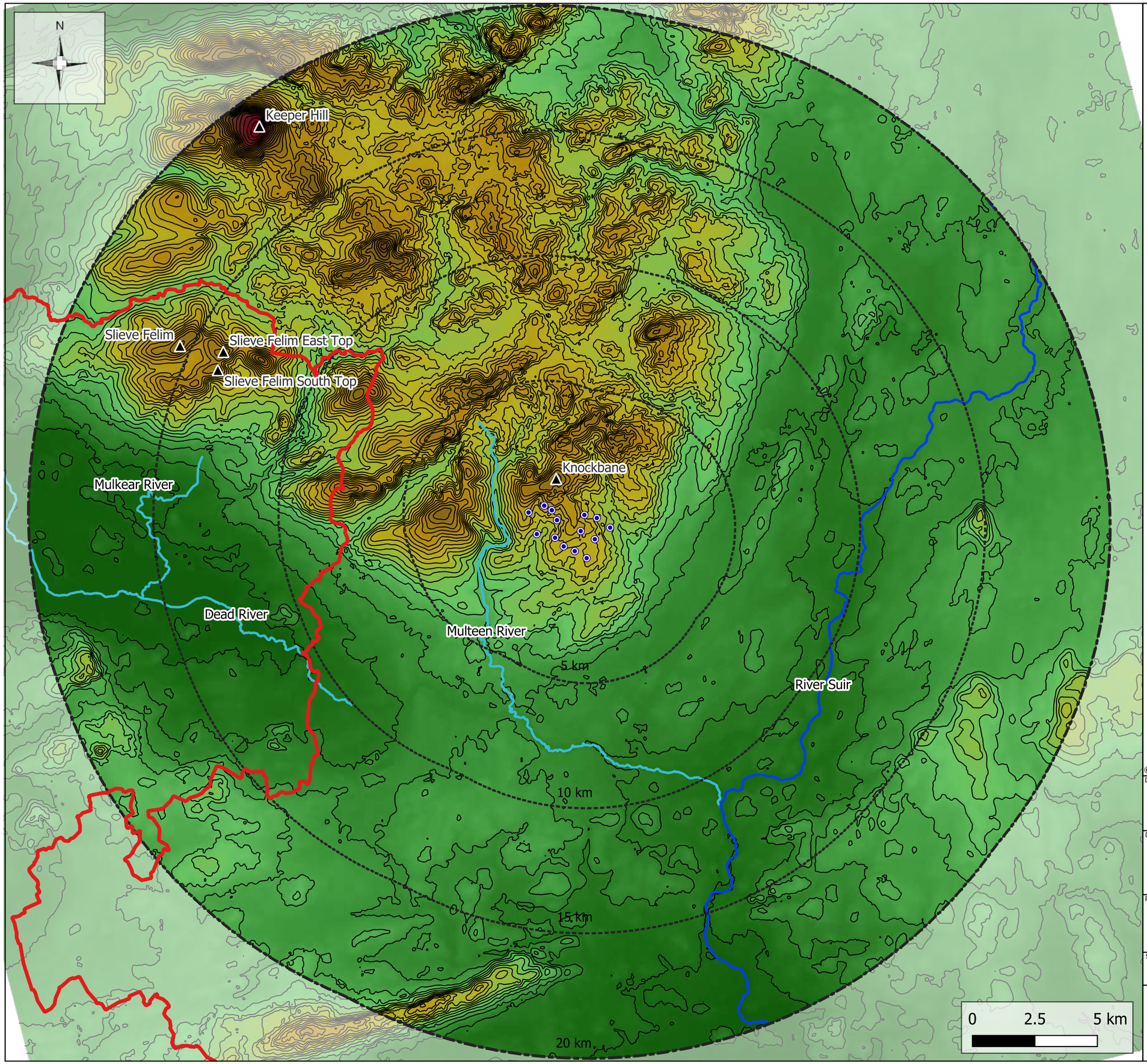
Zone of Theoretical Visibility

Project Title

Carrow Wind Farm

Scale	Project No.	Date	Drawn By	Checked By
1:150,000	231102	04.02.2026	JC	RS

MKO



Map Legend

- County Boundaries
- LVIA Study Area
- Proposed Turbine Locations
- Topographical Features

Waterbodies

- River Suir
- Other Rivers in the LVIA Study Area

Elevation (Above Ordnance Datum)

- 50 metres
- 150 metres
- 250 metres
- 350 metres
- 450 metres
- 550 metres
- 650 metres
- 20m Contours

Drawing No.

Figure 14-2

Drawing Title

Physical Landscape Features

Project Title

Carrow Wind Farm

Scale	Project No.	Date	Drawn By	Checked By
1:147,500	231102	04.02.2026	JC	RS

14.3.3 Discussion of Theoretical Visibility

Due to the position of the proposed turbines on the southern slope of Knockbane peak in the wider Slieve Felim mountain range, there is largely no visibility of the proposed turbines to the north and northwest, which comprises a vast proportion of the LVIA Study Area, as shown by the non-coloured area in the ZTV Map (Figure 14-1).

Within 5km of the proposed turbines, there is a large area of full theoretical visibility to the south and southwest, corresponding with the foothills of Knockbane peak and the landscape beginning to descend. Immediately north of the proposed turbines, Knockbane peak along with other peaks of the Slieve Felim Mountains, provide visual containment of the proposed turbines, reducing visual exposure to the north and northwest. Notably, one small area located to the southeast of the proposed turbines near the village of Dundrum has no visibility, due to visual screening from local topography.

Beyond 5km of the proposed turbines, the landscape to the east, south and west gently slopes downward toward the River Suir valley and the surrounding plateaus, creating conditions for mostly full theoretical visibility in these directions. The open, relatively low-lying terrain of the River Suir valley, particularly within a 5-10 km radius from the site, allows for uninterrupted visibility at these distances. Beyond the central area of the River Suir valley, theoretical visibility becomes increasingly fragmented as the distance from the proposed turbines increases. Within the 10-20 km range, visibility patterns become more varied due to the local undulating terrain. Between 15-20km, the settlement towns of Thurles in the northeast, Cashel in the southeast, and Co. Tipperary in the southwest are located within areas of patchy full theoretical visibility.

14.3.4 Onsite Visibility Appraisal

This LVIA conducted on-site visibility appraisal to investigate areas of theoretical visibility and determine the actual potential for visibility in the direction of the proposed turbines versus what is indicated by the ZTV Map. In practice, vast areas of the 20km LVIA Study Area which have an indication of full theoretical visibility (11-14 turbines visible) are anticipated to have little to no actual visibility of the proposed turbines, due to natural above-ground screening factors existent within the landscape.

Field surveys conducted in March and September 2024 and January 2025 determined that screening from localised undulations in topography (less than 10m in height), as well as the presence of existing roadside vegetation and built structures significantly reduce the likelihood of viewing the proposed turbines from vast areas of the low-lying River Suir valley within the LVIA Study Area, particularly from areas to the east, south and southwest beyond 5km from the proposed turbines. The on-site visibility appraisal, along with ZTV mapping, photomontage capture, and site walkover, is an important tool informing the impact assessments and analysis of visibility in this chapter and included the Route Screening Analysis (RSA) exercise, detailed in Section 14.3.5.

14.3.5 Route Screening Analysis (RSA): Visibility in Close Proximity

14.3.5.1 Route Screening Categories

Onsite visibility appraisal indicates that areas within 3km of the proposed turbines are most likely to have potential for significant visual effects arising as a result of the proposed turbines. Therefore, for this LVIA, Route Screening Analysis (RSA) was carried out within a 3km radius of the proposed turbines, in January 2025. Local roads within 3km were assessed, while major roads, such as regional or national roads, were assessed to 5km from the proposed turbines. RSA was conducted to record the varying

degrees of visual screening along the local road network and demonstrate the actual potential for visibility of the proposed turbines compared to ZTV mapping. The full methodology is outlined in *Appendix 14-1: LVIA Methodology* (Section 1.5.3 Onsite Visibility Appraisal: RSA). The RSA visual screening categories are:

- "**Little/No**" visual screening: areas of the road that are mainly open with open views in the direction of the proposed turbines (see example below in Plate 14-1),
- "**Intermittent/Partial**" visual screening: areas of the road where there are intermittent or partial views in the direction of the proposed turbines (see Plate 14-2),
- "**Dense/Full**" visual screening: areas of the road with dense visual screening, sufficient to block views in the direction of the proposed turbines (see Plate 14-3).

For this LVIA, the distribution of visual screening on 85.4km of public road was recorded during the RSA survey. The results of the route screening survey are mapped below in the Route Screening Analysis Map (Figure 14-3); the map shows the extent to which each screening classification is present on the public roads within 3km of the proposed turbines. Where roads continued beyond 3km from the proposed turbines, the RSA survey continued to record the screening until an appropriate termination point or junction. Screening along the prominent transport routes of the R497 and R505 Regional Roads was recorded to a distance of 5km. The imagery of visual screening examples shown below in PLATES were captured within the LVIA Study Area, within 3km of the Proposed Wind Farm site.

Plate 14-1 Example of "Little/No" visual screening from within 3km of the Proposed Wind Farm site

Plate 14-2 Example of "Intermittent/Partial" visual screening from within 3km of the Proposed Wind Farm site

Plate 14-3 Example of "Dense/Full" visual screening from within 3km of the Proposed Wind Farm site

14.3.5.2 RSA Results and Discussion

The RSA results report the extent and density of visual screening present along the local road network in the immediate vicinity of the Proposed Wind Farm site. This allows the actual likely visibility of the proposed turbines to be considered and assessed in an objective and quantitative manner, thereby reducing the level of subjectivity involved in determining the actual potential for the proposed turbines to be viewed from within the local landscape immediately around the Proposed Wind Farm site.

Table 14-1 shows the RSA results of the survey, indicating that more than 70% of the surveyed roads have some form of visual screening in the direction of the proposed turbines, either Intermittent/Partial or Dense/Full.

Table 14-1 Route Screening Analysis Results

Screening Class	Length of Road Mapped in Figure 14-3	Percentage Distribution of Screening Class on Surveyed Roads
"Little/None"	25.0km	29.3%
"Intermittent/Partial"	37.1km	43.4%
"Dense/Full"	23.3km	27.3%

The remaining roads showing Little/No visual screening were investigated as areas with the greatest potential for open visibility in the direction of the proposed turbines. Photomontage imagery was captured from these areas, which had both Little/No visual screening and potential visibility according to the ZTV Map (see previous Figure 14-1). The RSA results were also utilised to investigate the potential visual effects on local residential receptors within 2-3km of the proposed turbines; refer to Section 14.7.3.2.10 Effects on Local Residential Receptors.

The Route Screening Analysis Map (Figure 14-3) indicates that areas of Little/No screening occur both within the Proposed Wind Farm site itself where uninhabited roads pass between the proposed turbines, as well as on isolated portions of road networks in all directions surrounding the proposed turbines.

Map Legend

- Proposed Turbine Locations

Route Screening Analysis

- Class 1 - No / Very Little Screening
- Class 2 - Partial / Intermittent Screening
- Class 3 - Dense / Full Screening

Drawing No.

Figure 14-3

Drawing Title

Route Screening Analysis

Project Title

Carrow Wind Farm

Scale	Project No.	Date	Drawn By	Checked By
1:42,000	231102	04.02.2026	JC	RS