



White Hill Wind Farm

Environmental Impact Assessment Report

Chapter 13: Material Assets

White Hill Wind Limited

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Contents

13.0 Introduction	1
13.0.1 Description of the Project	1
13.1 Transport & Access	1
13.1.1 Introduction.....	1
13.1.2 Methodology	2
13.1.3 Description of Existing Environment.....	5
13.1.4 Description of Likely Effects.....	11
13.1.5 Mitigation & Monitoring Measures	18
13.1.6 Residual Effects	20
13.1.7 Summary	20
13.2 Aviation	22
13.2.1 Introduction.....	22
13.2.2 Methodology	22
13.2.3 Consultation.....	22
13.2.4 Description of Existing Environment.....	22
13.2.5 Description of Likely Effects.....	23
13.2.6 Cumulative Effects	24
13.2.7 Mitigation & Monitoring Measures	24
13.2.8 Residual Effects	25
13.2.9 Summary	25
13.3 Telecommunications	26
13.3.1 Introduction.....	26
13.3.2 Methodology	26
13.3.3 Description of Existing Environment.....	27
13.3.4 Description of Likely Effects.....	27
13.3.5 Cumulative Effects	29
13.3.6 Mitigation & Monitoring Measures	29
13.3.7 Residual Effects	30
13.3.8 Summary	30
13.4 Resources & Utility Infrastructure	31
13.4.1 Introduction.....	31
13.4.2 Description of Existing Environment.....	31
13.4.3 Description of Likely Effects.....	32
13.4.4 Mitigation & Monitoring Measures	33
13.4.5 Residual Effects	33
13.4.6 Summary	33



13.0 Introduction

Material assets are “resources that are valued and that are intrinsic to specific places” which can be of human or natural origin¹. While the meaning is less clear than other factors, Material Assets are taken to mean “built services and infrastructure”². The majority of assets of natural origin are assessed elsewhere within this EIAR such as biodiversity, water quality, air quality and landscape. This chapter addresses, therefore, Material Assets which are of human origin, including transport, access, aviation, telecommunications, and resources & utility infrastructure. Another Material Asset of human origin, archaeology and cultural heritage, is addressed in **Chapter 10**.

13.0.1 Description of the Project

In summary, the project comprises the following main components as described in **Chapter 3**:-

- 7 no. wind turbines with an overall tip height of 185m, and all associated ancillary infrastructure;
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including the provision of site drainage infrastructure;
- Upgrades to the turbine component haul route; and,
- Construction of an electricity substation and installation of c. 15km of underground grid connection cable between the White Hill Wind Farm and the existing Kilkenny 110kV electricity substation.

The wind farm site traverses the administrative boundary between counties Carlow and Kilkenny; with 4 no. turbines located in Co. Carlow and 3 no. turbines within Co. Kilkenny. The electricity substation is located within Co. Carlow while the majority, c. 14km, of the underground electricity line is located in Co. Kilkenny. Off-site and secondary developments; including the forestry replant lands and candidate quarries which may supply construction materials; also form part of the project.

The turbine component haul route and associated upgrade works as described in **Chapter 3**. It is envisaged that the turbines will be transported from the Port of Waterford, through the counties of Kilkenny, Waterford, Carlow and Kildare to the project site.

A full description of the project is presented in **Chapter 3**.

13.1 Transport & Access

13.1.1 Introduction

13.1.1.1 Background and Objectives

Galetech Energy Services ('GES') has undertaken an assessment of the likely significant effects on transport and access arising from the construction, operation and decommissioning of the project.

This chapter provides an assessment of the local road network for construction, operational and decommissioning traffic, including the turbine component haul route, and reviews the site access arrangements for construction, operational and decommissioning phases. The relevant sections of this chapter should also be read in

¹ Draft Advice Notes for preparing Environmental Impact Statements (EPA, 2015)

² Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)

conjunction with the Route Access Survey enclosed at **Annex 3.5**.

13.1.1.2 Statement of Authority

The assessment of likely significant effects on transport & access, and preparation of this EIAR chapter, has been undertaken by various members of the GES Environment & Planning Team. GES has substantial experience in this discipline having prepared Material Assets (Transport & Access) chapters for multiple permitted and proposed developments which have been subject to EIA.

13.1.2 Methodology

13.1.2.1 Assessment Methodology

This assessment used the following method, further details of which are provided in the following sections:-

- Legislation and guidance review;
- Desk study, including review of available maps and published information;
- Wind farm site walkover;
- Windshield survey of the turbine component haul route and grid connection route including a walkover survey of all noteworthy locations (e.g. haul route upgrade locations);
- Walkover survey of access points to forestry replant lands;
- Evaluation of likely effects;
- Evaluation of the significance of these effects; and,
- Identification of measures to avoid and mitigate any likely effects.

13.1.2.2 Planning Policy & Guidelines

This assessment has been prepared and carried out in accordance with guidance contained in the following published documents:

- European Commission (2017) *Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report*;
- Department of Housing, Local Government & Heritage (August 2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*;
- Environmental Protection Agency (September 2015) *Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements)*;
- Environmental Protection Agency (2003) *Advice Notes on Current Practice (in the Preparation on Environmental Impact Statements)*;
- Environmental Protection Agency (May 2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*;
- *Carlow County Development Plan 2022–2028* ('the Carlow CDP 2022-2028');
- *Kilkenny City and County Development Plan 2021–2027* ('the Kilkenny CDP 2021-2027');
- The Design Manual for Urban Roads and Streets ('DMURS')³;
- The Design Manual for Roads and Bridges ('DMRB') published by Transport Infrastructure Ireland ('TII'); and,
- Traffic and Transport Assessment Guidelines⁴.

An assessment of the relevant transport policies and objectives of the Carlow CDP 2022-2028 are set out in **Table 13.1**, below. Policies and objectives which are not

³ <https://www.gov.ie/en/publication/c808c-design-manual-for-urban-roads-and-streets-2019-low-res/>

⁴ <https://www.tijpublications.ie/library/PE-PDV-02045-01.pdf>

considered to be relevant have been excluded from further assessment.

Planning Policy / Objective	Assessed	Comment
LR. P1: It is the policy of the Council to:- <ul style="list-style-type: none"> Ensure that the safety and capacity of the local road network is maintained and improved where funding allows to a suitable standard to accommodate the needs of the County. 	Yes	While this policy is not directly relevant, the project will be undertaken to ensure that there are no adverse effects on the safety or capacity of the local roads network.
LR. O1: It is an objective of the Council to:- <ul style="list-style-type: none"> Maintain and improve all local roads in accordance with Department requirements. 	Yes	While this objective is not directly relevant, the project will be undertaken to ensure that all associated works are undertaken in accordance with Department requirements..

Table 13.1: Carlow CDP 2022-2028 Transport Policies and Objectives

Table 13.2 details the relevant transportation policies contained within the Kilkenny CDP 2021-2027.

Planning Policy / Objective	Assessed	Comment
12AK: To improve substandard sections of regional\county roads throughout the County, in particular those most heavily trafficked, and those providing access to existing or proposed industrial, residential or commercial developments as required and as resources permit.	Yes	The construction of the proposed grid connection and undertaking of upgrade works to the turbine component haul route will require permanent and temporary upgrade works. These upgrade works are likely to improve conditions locally at each works location and are fully assessed at Section 13.1.4 below.
12AL: To maintain, develop and improve existing roads and to construct new roads as needs arise and resources permit in accordance with the Annual Roadworks programme.	Yes	The effects of the project on existing local roads are fully assessed at Section 13.1.4 below. While no new roads will be constructed; the project will ensure that no existing roads experience long-term adverse effects.

Table 13.2: Kilkenny CDP 2021-2027 Transport Policies and Objectives

13.1.2.3 Desk Study

A desk study of the proposed wind farm, grid connection route, turbine component haul route and the surrounding area was undertaken. The sources of information included documentary sources, outlined at **Section 13.1.2.2**, and an evaluation of aerial imagery and visualisations (e.g. Google Maps and Streetview) to assess the nature and condition of the local road network.

13.1.2.4 Fieldwork

A site visit; including a windshield survey of the proposed turbine component haul route, likely construction material haul routes, and grid connection route; was

undertaken on 2 September 2021. All proposed site entrances and noteworthy locations along the turbine component haul route and grid connection route were the subject of a walkover survey. The site visit was used to verify information obtained as part of the desk study and to visually assess site entrance locations and associated vehicle visibility splays.

13.1.2.5 Evaluation of Likely Effects

Following the assessment of the baseline environment, the available data was used to identify and categorise likely effects to affect the local road network used for the turbine delivery route and construction materials haul route.

The statutory criteria for the assessment of impacts require that likely impacts are described with respect to their magnitude, nature (i.e. negative, positive or neutral), transboundary nature (if applicable), intensity and complexity, probability, duration, frequency, reversibility, cumulation and possibility of reducing the effects. The descriptors used in this chapter are those set out in the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022).

Impacts may be categorised as follows:-

- Direct: where the existing traffic and transport environment in proximity to the project is altered, in whole or in part;
- Indirect: where the traffic and transport environment beyond the project is altered by activities related to the construction, operation, and decommissioning of the project; and,
- No Impact: Where the project has neither negative nor a positive impact upon the traffic and transport environment.

Sensitivity

The sensitivity of the local transport infrastructure has been identified using the criteria outlined within the TII Guidance. These criteria are outlined in **Table 13.3** below.

Importance	Criteria
Very High	Attribute has a high quality, significance or value on a regional or national scale.
High	Attribute has a high quality, significance or value on a local scale.
Medium	Attribute has a medium quality, significance or value on a local scale.
Low	Attribute has a low quality, significance or value on a local scale.

Table 13.3: Criteria for Rating Site Attributes

Magnitude

The magnitude of likely effects has been defined in accordance with the criteria provided in the EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (2022) as outlined within **Table 13.4** below.

Magnitude of Impact	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences

Magnitude of Impact	Description
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

Table 13.4: Impact Assessment Criteria

Significance Criteria

The significance of the likely effects of the project have been classified by taking into account the sensitivity of receptors and the magnitude of the effects on them, combined with the likelihood of an event occurring as defined in **Table 13.5**.

	Magnitude of Impact				
Importance of Attribute		Negligible	Small	Moderate	Large
Extremely High		Imperceptible	Significant	Profound	Profound
Very High		Imperceptible	Significant/ Moderate	Profound/ Significant	Profound
High		Imperceptible	Moderate/ Slight	Significant/ Moderate	Severe/ Significant
Medium		Imperceptible	Slight	Moderate	Significant
Low		Imperceptible	Imperceptible	Slight	Slight/ Moderate

Table 13.5: Rating of Significant Environmental Impacts

13.1.3 Description of Existing Environment

13.1.3.1 Site Location & Road Network Context

The road network in the vicinity of the project generally comprises local roads; as evidenced by the fact that all access points to the proposed wind farm are from local roads and the vast majority of the proposed grid connection is located within the carriageway of locally-classed routes. There is a general absence of regional roads proximate to the proposed wind farm, with the R448 being located c. 6.5km to the east; while c. 1.8km of the proposed grid connection will be located within the carriageway (hard shoulder) of the R712. In terms of national routes, the N78 national secondary route is located c. 10km to the north of the proposed wind farm while the M9 motorway is located c. 6km to the east.

The L1834, L1835 and L3307; which will provide access from the N78 for turbine component and construction material deliveries; are double-carriageway local roads, with a speed limit of 80kph, which are of a good condition and would appear to be subject to regular maintenance. The roads are undulating which is reflective of

the surrounding topography and generally bounded by hedgerows and trees on either side. Given the rural location, there are no footpaths or street lighting present along the roads. Notwithstanding the rural location of the roads, it is assessed that they are utilised by notable volumes of traffic given the connectivity provided from the N78 to Leighlinbridge and Muine Bheag (Bagenalstown).

From the L3307, a site entrance and access track will be constructed to facilitate access for turbine components and construction material deliveries. This access track will intersect the L7122, necessitating the upgrade of 2 no. existing agricultural access points, before continuing into the proposed wind farm. The L7122 is a narrow single carriageway road (80kph speed limit) bounded on either side by roadside banks and hedgerows. The L7122 is assessed as carrying extremely low volumes of traffic, typically generated by local residents and landowners.

Due to the alignment of the L7122 at the existing access points proposed for upgrade, it is not possible to provide full visibility splays as specified in the Carlow CDP 2022-2028. A suite of design measures were proposed, including the removal of roadside vegetation, to maximise visibility splays to the greatest possible extent; however, full visibility splays cannot be achieved. The Carlow CDP 2022-2028 provides for reduced visibility splays where a Road Safety Audit is completed and confirmation provided that road safety will not be adversely affected. Accordingly, a comprehensive Road Safety Audit (**Annex 13.1**), based on the preliminary design measures, was undertaken and set out a number of further recommendations to ensure that road safety is maintained. The Developer, at **Annex 13.1**, has accepted each of the recommendations which have been incorporated into the design of the development as currently proposed.

The proposed electricity substation will be accessed from the L7117 which, again, is a narrow single carriageway road fringed by grass verges and hedgerows. This road exhibits signs of deterioration; however localised remedial works (patching) has been completed.

The proposed grid connection infrastructure will be located within private lands (at the electricity substation) and within the L7117, L5892, L5893, L1851, L6656, L6657, and R712 between the proposed electricity substation and the Kilkenny 110kV electricity substation.

The local roads referred to above are generally in good condition; however, localised surface-deterioration was identified at a number of locations. The local roads are generally single-carriageway routes fringed by grass verges, hedgerows and tree-lines. Private residences and agricultural premises are also common along the route. The local roads are not assessed as likely to carry notable volumes of traffic; with the majority of traffic being generated by local residents and landowners.

The R712 is a high quality double-carriageway regional road which connects Kilkenny City and Paulstown. Along the section of the R712 where it is proposed to install the grid connection infrastructure, the carriageway is supplemented by a hard-shoulder on either side thus significantly increasing its running width. To the east of the Kilkenny 110kV substation, the R712 passes beneath the N10 national primary route. Given the connectivity provided by the R712 to/from Kilkenny City, it is assessed that the road is likely to carry substantial traffic volumes on a daily basis, including heavy goods vehicles (HGVs).

The forestry replant lands, located in Co. Monaghan, are accessed from the L3710 local road. Once again, this is a rural single-carriageway road bounded by

hedgerows and is only likely to experience low levels of traffic, generated by local residents and landowners.

13.1.3.2 Construction Material Haul Routes

Turbine Component Haul Route

The likely turbine component haul route is described in the Route Access Survey at **Annex 3.5** and utilises the N29, N25, N9, M9, N78, L1834 and L1835 (Kilkenny), and L3037 (Carlow). While the selection of a precise port of entry can only be determined following appointment of the chosen turbine manufacturer (to be completed post-consent subject to a competitive procurement process), it is considered likely that the Port of Waterford will be utilised in this case⁵. Consequently, it is proposed that the Planning Authority will be advised of the selected port of entry as part of a final Transport/Traffic Management Plan, and that any specific traffic control measures arising from the selected route (between the port of entry and the M9/N78 junction) will be agreed with the Planning Authority prior to the commencement of development. Given that access from all potential port options to the M9/N78 junction is readily achievable via the national road/motorway network, the ultimate selection of a port of entry has no bearing on the findings of the assessment undertaken in this chapter.

The delivery of turbine components along this route will require the completion of both permanent and temporary upgrade works at a number of locations. The extent of these works are described in full at **Chapter 3** and at **Annex 3.5**.

Construction Material Haul Routes

The undertaking of civil engineering works during the construction phase; including the construction of site entrances, access tracks, crane hardstands, and turbine foundations; will require the importation of aggregates and other general construction materials to the subject site. However, the importation of construction materials will not require abnormal or over-sized loads to be brought to site and no specific road improvements are required.

Site investigations have indicated that rock will be encountered during the excavation of turbine foundations etc. and will be suitable for re-use in the construction of access tracks and crane hardstandings. Consequently, it is assessed that the only rock/stone to be imported to the proposed wind farm site will be capping material (CL804). Other construction material, such as ready-mix concrete and sand, will be sourced from local licensed quarries, subject to a competitive tendering process.

As the selection of material suppliers will be subject to a competitive tendering process prior to construction, it is not possible to confirm the precise source of these materials at this stage. However, a number of candidate quarries have been identified as potential suppliers and are identified at **Annex 2.4**. In addition, the likely haul routes from these suppliers to the main site entrance are also identified. While the haul routes do not always represent the most direct route to site, these routes have been selected to ensure, insofar as is practicable, that all movements occur on national and regional roads and, insofar as possible, avoid local roads which may not

⁵ Turbine components may also be imported through other ports including Dublin Port, Port of Galway or Foynes/Shannon/Limerick Port. Each of these ports are regularly used in the transportation of turbine components and are readily accessible without the need for significant road upgrade works between their location to the national road network.

be suitable to accommodate HGVs. The Planning Authority will be advised of the selected material suppliers as part of the Transport/Traffic Management Plan to be agreed prior to the commencement of development.

Other material deliveries will use standard HGVs and utilise the local, regional and national road network, as necessary. Staff employed on the site will use the site entrance closest to the temporary construction compound but, as they majority of associated vehicular movements will comprise light goods vehicles (LGVs) or cars, they will not be restricted to the use of specific roads.

Substation & Grid Connection

Construction materials for the proposed grid connection will, as above, subject to a competitive tendering process prior to construction. It is likely that materials will be sourced from one (or more) of the quarries identified at **Annex 2.4**. Once again, suppliers will be encouraged to utilise the national and regional network and to avoid the local network insofar as practicable; however, the use of local routes will be unavoidable given the location of the grid connection infrastructure.

Forestry Replanting

The replanting of forestry will require the delivery of plant, machinery, conifer saplings and other materials to the identified replant lands. Access to the replant lands will be provided by existing agricultural entrances from the L3710. Prior access to the L3710 will; depending on the supplier of plant, machinery and various materials; be provided by the national, regional and local road network likely comprising the use of the N2, N53, R135, R181, and R182.

13.1.3.3 Road Access to the Project Site

Access arrangements to the various elements of the project will comprise either the upgrading, and use, of existing agricultural access points or the creation of new entrances. All access points have been carefully considered as part of the project design process which has been particularly cognisant of the provision of appropriate vehicle visibility splays (sightlines) to ensure compliance with the requirements of the Carlow CDP 2022-2028⁶, Kilkenny CDP 2021-2027⁷, and the Monaghan CDP 2019-2025⁸.

13.1.3.4 Delivery Vehicle Specification

The delivery of wind turbine components will be carried out by specialised HGVs. The largest vehicles to be used will facilitate the delivery of the wind turbine blades. **Figures 13.1-13.3** illustrate the typical suite of transportation vehicles which will be used in the delivery of components, including a transportation vehicle used to transport the blade component.

⁶ Table 16.5 of the Carlow CDP 2022-2028.

⁷ Section 13.22.1 of the Kilkenny CDP 2021-2027.

⁸ Table 15.5 of the Monaghan CDP 2019-2025.

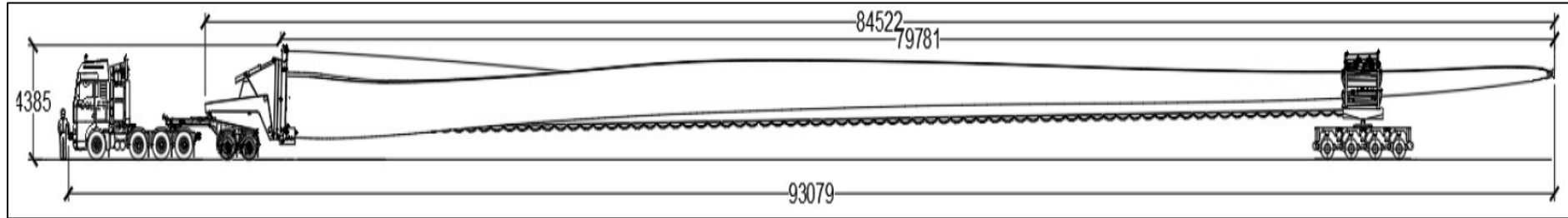


Figure 13.1: Typical Blade Section Transporter

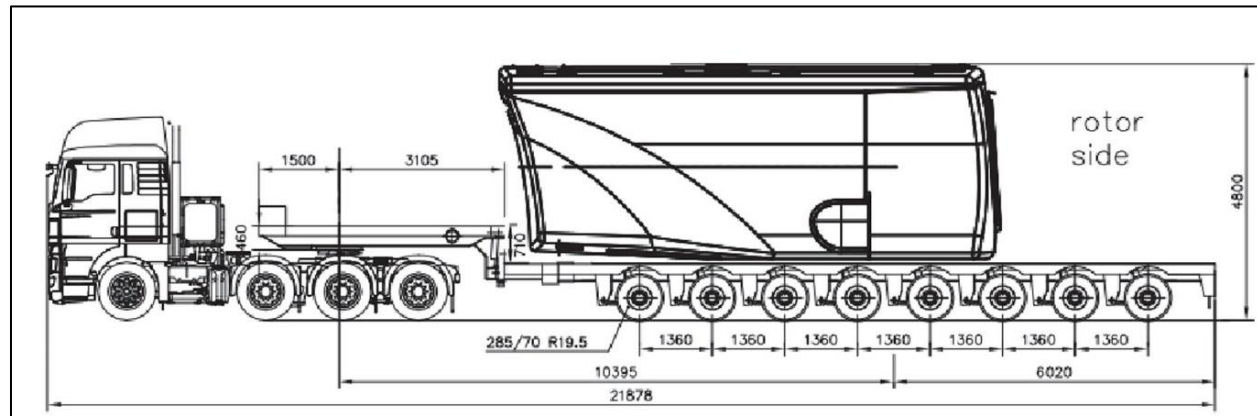


Figure 13.2: Typical Nacelle Transporter

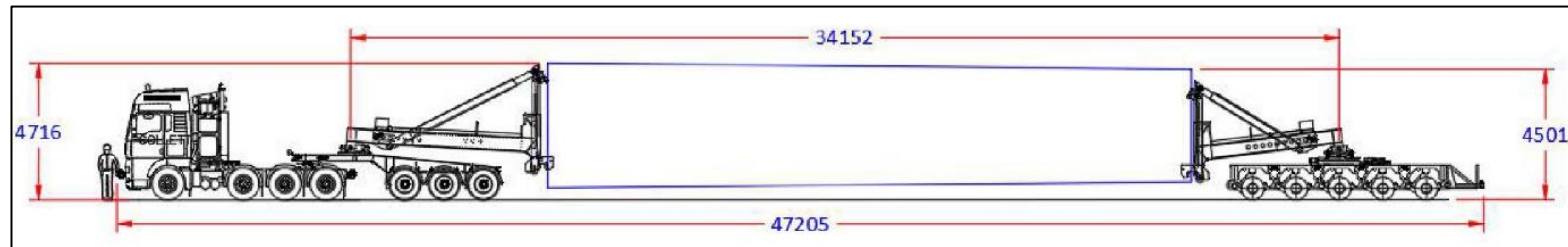


Figure 13.3: Typical Tower Section Transporter

Delivery of general construction materials and aggregates to site for the construction of the proposed wind farm will be undertaken using standard HGVs, cement mixer trucks, and dump trucks (see **Figure 13.4**), the largest of which is anticipated to be a 16.5m articulated vehicle as shown in **Figure 13.5** below.

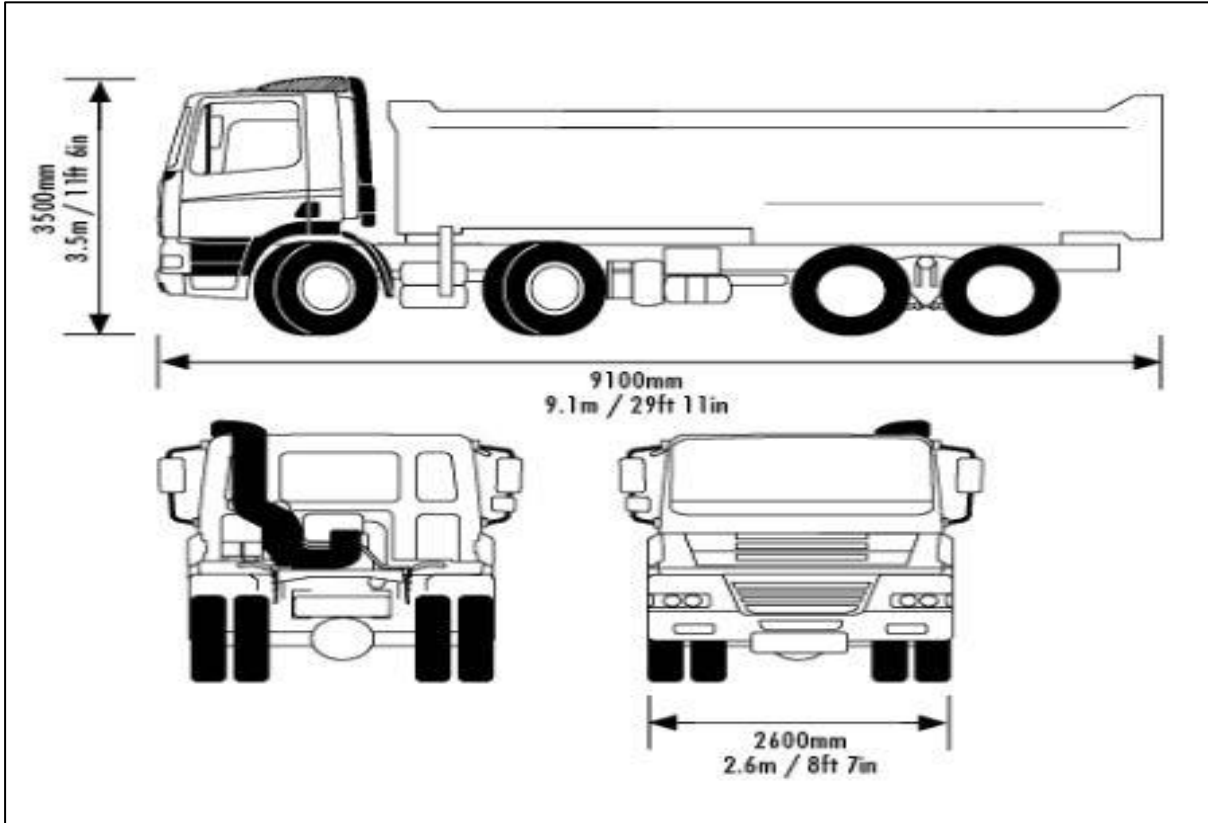


Figure 13.4: Standard Rigid Tipper Truck

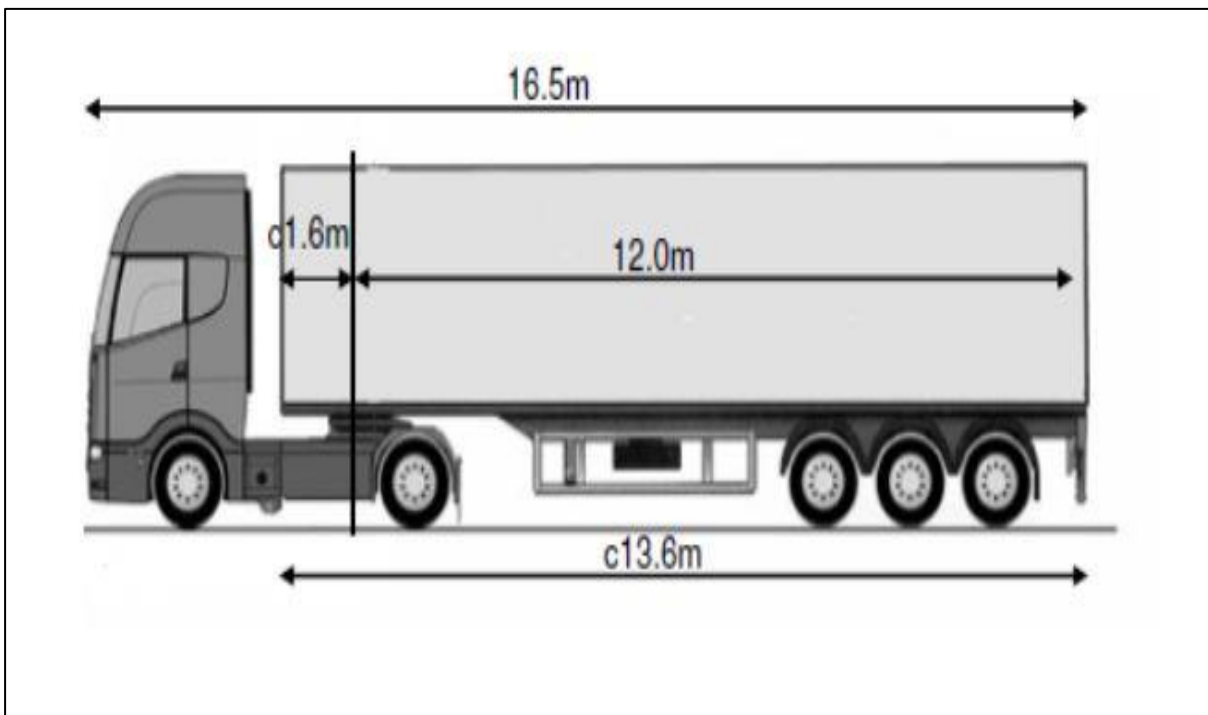


Figure 13.5: Standard HGV

13.1.4 Description of Likely Effects

13.1.4.1 Construction Phase

The construction period of the project is estimated to take approximately 15-18 months, with the majority of traffic movements being associated with the construction of access tracks, hardstands, turbine foundations, and the grid connection. During this period, there will be trips associated with the arrival and departure of construction staff and with the delivery of aggregates, reinforcing steel and ready-mix concrete. Staff trips will mainly be made using cars and vans, while deliveries of steel, concrete, stone and other general construction materials will be made by HGV.

The construction phase of the development will comprise a 6-day week with normal working hours from 07.00 to 19.00 Monday to Friday and 07.00 to 13.00 on Saturdays. It may be necessary to undertake works outside of these hours to avail of favourable weather conditions (e.g. during times of low wind speeds to facilitate turbine erection etc.) or during extended concrete pours (e.g. turbine foundation pours must be completed within 24 hours etc.). Where construction activities are necessary outside of the normal working hours, local residents and the Planning Authority will receive prior notification.

Wind Farm Site Entrances

As discussed in **Chapter 3**, there will be 3 no. site entrance to the proposed wind farm site. Appropriate visibility splays will be provided at each site entrance as described at **Section 3.4.4 (Chapter 3)**.

All works related to the construction of these entrances will be undertaken from private lands which will ensure that there are no significant direct or indirect transport and access effects on the local road network through disruption or delay to traffic flows. However, the implementation of road safety measures (e.g. Stop/Go system) may result in some brief disruption or delays.

Additionally, as construction traffic will cross the L7122 local road, local road users may experience brief disruption or delays. However, priority will be given to public road users at all times thus avoiding any significant effects on traffic flows.

Consequently, effects are assessed to be likely, slight, negative, and short-term.

Substation & Grid Connection

As described at **Chapter 3**, the proposed electricity substation will be accessed by a single entrance from the L7117. Appropriate visibility splays will be provided at each site entrance as described at **Section 3.5.3.1 (Chapter 3)**. All works related to the construction of these entrances will be undertaken from private lands which will ensure that there are no significant direct or indirect transport and access effects on the local road network through disruption or delay to traffic flows. However, the implementation of road safety measures (e.g. Stop/Go system) may result in some brief disruption or delays.

The grid connection infrastructure, from the proposed electricity substation to the existing Kilkenny 110kV substation, will, having left the proposed substation site, be located entirely within the carriageway of the L7117, L5892, L5893, L1851, L6656, L6657, and R712. Consequently, the installation of the grid connection will result in direct effects on the road network. However, as part of the design of the project; the trench will be reinstated in accordance with ESB Networks specification and to the satisfaction of the respective planning authorities. Further, all local roads within which

it is proposed to install the grid connection infrastructure will be subject to a full-carriageway reinstatement thus ensuring that there are no long-term effects on the public road network. Regarding the section of grid connection to be installed within the R712, which will be installed within the hard-shoulder, reinstatement will comprise full reinstatement of the hard-shoulder.

The excavation of trenches and installation of the ducting along this route will cause some disruption to traffic movements, although this will be temporary in duration. Due to the narrow profile of the L7117, L5892, L5893, L1851, L6656, and L6657; it is highly likely that full-road rolling closures will be implemented during construction which will necessitate the implementation of diversions and other traffic management measures to maintain traffic flows. However, it should be noted that only short sections of road will be closed at any one time and, given the extensive local road network in the environs of the proposed grid connection route, diversionary routes are readily available. Additionally, local access for residents, landowners, and business operators will be maintained while pedestrians will, where necessary, be escorted through the works area.

Therefore, the effect on transport and access is assessed to be direct, indirect, moderate, negative, and temporary in nature.

Haul Route for Abnormal Loads

While the proposed turbine delivery haul route is assessed to be generally capable of accommodating abnormal loads, works will be required at a total of 12 no. locations, with 1 of these locations requiring permanent works and 11 temporary upgrade works or removal of road signs and/or street furniture, to facilitate turbine component deliveries, as discussed at **Chapter 3** and **Annex 3.5**.

Minor permanent works will be undertaken along the L1835 at 'Black Bridge'. These works will, in summary, involve the placement of a 175mm layer of concrete across the span of the archway to increase the structural integrity of the bridge. The carriageway will then be re-surfaced, including a 20mm layer of mastic asphalt binder (SMA), to the satisfaction of the planning authorities. Traffic management measures will be implemented for the duration of the works at this location and will be agreed prior to commencement with the respective planning authorities. It is assessed that the proposed permanent works will be likely, direct, indirect, slight, and negative in the short-term; but likely, direct, slight, and positive in the long-term.

Works on the balance of the turbine component route are temporary and relatively minor in nature, and will include, for example, temporary hardcoring of roundabout islands and roadside verges, temporary removal of street furniture and signage, the temporary lowering of a parapet wall pier caps and an adjoining privately-owned wall at 'Crettyard Bridge', and the creation of a temporary access track to avoid the N78/L1834 junction. The effects of the proposed temporary works are assessed to be likely, indirect, slight, negative, and short-term.

Therefore, the effect on transport and access is assessed to be likely, direct, indirect, permanent, temporary, and moderate-to-slight.

HGV Deliveries

Wind Farm

The estimated timescale for the completion of the construction phase is approximately 15-18 months, inclusive of all works related to the construction of the

wind farm, electricity substation and grid connection, haul route upgrade works and erection and commissioning of turbines. This allows approximately 12 months for civil construction and approximately 3-6 months for erection and commissioning of the turbines.

As detailed at **Table 13.6**, it is estimated that during civil construction, approximately 5,850 no. loads will be delivered to site. Assuming a 12-month civil works construction phase, this equates to approximately 488 no. loads per month or an average of 21 no. loads per day excluding Sundays and public holidays. It should also be noted that vehicular movements will occur throughout the day and will not be concentrated at particular times.

The peak number of deliveries per day will occur during the concrete pours for turbine foundation construction. An estimated 100 no. ready-mix trucks and other truck deliveries will be required per turbine foundation. Other materials are also likely to be delivered on such days, and therefore a realistic estimation of peak deliveries during the 7-days of foundation pours (1-day per foundation) is approximately 110-120 no. deliveries per day. These pours may take place from 06:00 and typically take 12-hours to complete and involve approximately 9-10 no. trucks per hour.

The majority of civil construction material, such as aggregates (as required) and concrete, will be delivered to site using standard rigid trucks, HGVs and ready-mix trucks. Given the presence of suitable rock material; for the construction of access tracks and crane hardstandings; the volume of HGV deliveries to the proposed wind farm site is substantially reduced; and aggregates to be imported to the wind farm will generally comprise capping material.

Full details of the volumes of construction materials to be sourced on-site and those to be imported from local suppliers are detailed at **Table 3.6 (Chapter 3)**; while the traffic/HGV volumes associated with imported materials are detailed at **Table 13.6** below. All spoil generated within the proposed wind farm site will be re-used for reinstatement of landscaping purposes or, where excess arises, stored permanently in the spoil deposition area.

Turbine components will be delivered to site over a period of approximately 4-9 weeks after civil works are substantially completed. It is estimated that approximately 105 no. loads of turbine components and crane parts will be delivered during this period. Some of these loads (turbine tower sections, nacelles and blades) will be classified as oversized abnormal loads and the relevant approvals and permits will be obtained by the turbine supplier, or its appointed haulage contractor, before deliveries take place.

Following completion of the construction works, it is estimated that approximately 20 no. loads will be needed to remove all temporary equipment, plant and machinery and materials used on site e.g. temporary compound, fencing, cabins, storage containers etc.

Substation & Grid Connection

All construction materials associated with the proposed grid connection (incl. stone and concrete) will be imported from approved local suppliers. Full details of the volumes of construction materials are detailed at **Table 3.7 (Chapter 3)**; while the traffic/HGV volumes associated with imported materials and removal of excavated material are detailed at **Table 13.6** below.

It should be noted that the vast majority of excavated material (>99%) will be removed from the grid connection route and disposed of at the proposed spoil deposition area

or, in the case of tarmacadam (tar & chip) road cuttings, disposed of at an approved waste handling facility.

Despite its linear extent, the grid connection is not assessed as likely to give rise to significant volumes of vehicle movements at any specific location. Furthermore, due to the linear nature of the grid connection, vehicle movements will be spread out across the route and will result in an indirect, likely, slight, and short-term effect on transport & access.

Haul Route Upgrade Works

The completion of haul route upgrade works will require the delivery of aggregates and other materials to the respective works locations. Full details of the volumes of aggregates to be imported from local suppliers are detailed at **Table 3.6 (Chapter 3)**; while the traffic/HGV volumes associated with imported materials are detailed at **Table 13.6** below.

It is assessed that all excavated material, with the exception of tarmacadam road cuttings, will be re-used in the reinstatement process at each works location. The effect on transport & access as a result of these HGV movements is assessed to be indirect, likely, slight, and short-term.

Forestry Replanting

The afforestation of the identified lands in Co. Monaghan will generate HGV movements associated with the delivery of plant, machinery and saplings etc. The volume of vehicular movements associated with these works are described at **Table 13.6** below.

Table 13.6 details the estimated volume of HGV movements associated with the construction phase, including the importation of construction materials and movement/disposal of excess materials.

Material	Quantity	No. of Movements
Wind Farm		
Site mobilisation (incl. construction compound setup, plant, machinery, traffic management measures/equipment, etc.)	-	20
Miscellaneous construction materials (incl. geotextile mats, fencing, electrical ducting and cables, pipes/culverts, etc.)	-	25
Imported stone for access tracks & crane hardstandings	10,000m ³	1,250
Tree felling	15ha	185
Concrete (turbine foundations)	5,250m ³	657
Turbine tower sections	-	28
Nacelles	-	21
Turbine blades	-	21
Wind turbine electrical equipment (incl. transformers, panels, cabling, etc.)	-	14

Material	Quantity	No. of Movements
Crane deliveries (incl. ballast, booms, etc.)	2 Cranes	21
Meteorological mast materials	-	4
Site de-mobilisation (removal of plant, machinery, temporary structures, etc.)	-	35
Substation & Grid Connection		
Site mobilisation (incl. plant, machinery, traffic management measures/equipment, etc.)	-	15
Imported stone for substation access track & compound	620m ³	78
Concrete (substation compound & building)	105m ³	14
Miscellaneous construction materials (incl. blocks, slates, doors, fencing, joint bays, communication chambers etc.)	-	30
Internal & external electrical equipment (incl. transformers, circuit breakers, lighting, energy storage modules, inverters, etc.)	-	82
Removal of excavated material from grid connection trench	12,531m ³	1,567
Electrical ducting & cabling	-	40
Imported backfill material (stone)	6,176m ³	772
Imported backfill material (concrete)	5,288m ³	661
Road re-surfacing material (tar & chips)	1,240m ³	155
Site de-mobilisation (removal of plant, machinery, temporary structures, traffic management measures/equipment, etc.)	-	15
Haul Route Upgrade Works		
Site mobilisation and de-mobilisation (incl. plant, machinery, traffic management measures/equipment, etc.)	-	10
Imported stone	878m ³	110
Imported concrete	14m ³	2
Road re-surfacing material (tar & chips)	16m ³	8
Forestry Replanting		
Site mobilisation and de-mobilisation (incl. plant, machinery, traffic management measures/equipment, etc.)	-	9
Importation of saplings, etc.	15ha	1
Total	-	5,850

Table 13.6: Estimated Construction Materials and No. of Deliveries (based on

Manufacturer's Specifications)

The expected number of HGV deliveries is based on best estimates of trips generated by similarly sized wind farms, previous experience in wind farm planning and civil construction, and based on the design of the project to date. Subject to planning permission being granted, these figures will be subject to refinement following the detailed design process, detailed pre-construction site investigations and consultation with the appointed contractor.

Based on the above estimated vehicular movements, the predicted effect on the road network as a result of the increase in HGV movements associated with the entire construction phase is assessed to be moderate, negative, direct, likely but short term. This assessment has been reached in consideration of the temporary duration of the proposed construction phase and the modest estimated average daily increase of 21 no. HGV movements.

Construction Personnel

The number of staff employed at the project site will vary according to the phase of works, likely peaking at approximately 100 no. It is expected that the majority of workers will arrive on site in LGVs and crew vehicles. Vehicle sharing, subject to public health guidance, will be actively encouraged to reduce vehicular movements. It is expected that c. 30 no. vehicles will visit the site on a daily basis during the peak construction period.

Parking for staff will be provided at the temporary construction compound. No parking will be allowed for construction workers on the public road network. The additional vehicular movements associated with staff travelling to site are not assessed as likely to result in significant effects on transport and access. Effects are assessed to be imperceptible-slight, negative, short-term and likely.

Overall Classification of Effects

The above sections have assessed the effects of the project on transport and access which may arise as a result of the construction phase. Overall, the effects are not assessed to be significant and are concluded to be likely, negative, of short-term duration and ranging between slight and moderate.

13.1.4.2 Operational Phase

During the operational phase, the project will generally be unmanned. Operational and remote monitoring activities will be carried out on an ongoing basis. However, regular visits to the site will be undertaken for routine inspections and maintenance. Under normal circumstances, the operation of the wind farm would require an average of 1-2 no. visits to the site per week by maintenance personnel. Parking will be provided at the site office, electrical substation or at the turbine hardstands during maintenance visits. In the case of a major fault; e.g. breakdown of a turbine component; larger machinery may require access to the site.

Overall, the volume of traffic predicted to be generated during the operational phase is very low. Therefore, the effect of traffic associated with the operation of the project on the existing public road network will be imperceptible as a result of the type of traffic and the low volumes typically generated.

13.1.4.3 Decommissioning Phase

During the decommissioning phase of the project, the total volume of HGV traffic will be significantly reduced compared to the construction period. This phase could be

expected to last approximately 3-months. Overall, the impact of the decommissioning phase is assessed to be slight and negative of short-term duration and likely.

13.1.4.4 Cumulative Effects

The above assessment has included consideration of the likely in-combination effects which may arise from the construction, operation and decommissioning of the overall project (wind farm, grid connection, & haul route works). In addition, it is necessary to assess the likelihood for the development to result in cumulative effects with other existing, permitted or proposed developments, including other wind farms.

Cumulative effects are assessed as only likely to occur during the construction and decommissioning phases of the project. Cumulative effects are unlikely to occur during the operational phase as wind farms do not generate a significant amount of traffic during operation as outlined in **Section 13.1.4.2**.

Other developments which have been included within the cumulative assessment are listed at **Chapter 1**. The majority of developments listed; for example one-off rural dwellings, agricultural developments and forestry plantations; do not generate significant volumes of traffic during either the construction or operational phases such that would have the likelihood to result in cumulative effects. Furthermore, operational wind energy developments listed; including the Gortahile Wind Farm; do not generate notable traffic volumes during their operational phase.

In relation to other permitted or proposed wind energy developments; but which, at the time of writing, have not yet constructed; located within the wider environs of the project, the closest such development is the Seskin Wind Farm located c. 2km to the northeast of the subject project. The Freneystown Wind Farm is located c. 4.5km southwest of the proposed development. The permitted Bilboa Wind Farm is located c. 5km to the northeast while the Pinewoods Wind Farm is located c. 17km to the northwest. We are also aware of the Ballynalacken Wind Farm (c. 14km north-west) and Coolglass Wind Farm (c. 18km to the north) which are currently the subject of pre-application consultations with An Bord Pleanála to formally determine whether the constitute strategic infrastructure developments.

It is understood that the pre-construction development processes of both the Bilboa Wind Farm and the Pinewoods Wind Farm are at an advanced stage and it is anticipated that construction of these developments will commence in the short-term. Consequently, it is assessed that the construction of these developments will not be undertaken concurrently with that of the subject project; and during the construction of the subject development, the Bilboa Wind Farm and the Pinewoods Wind Farm will be operational and generating extremely low volumes of traffic. Therefore, it is assessed that there is no likelihood of significant cumulative transport & access effects arising and any effects will be likely, negative, negligible, short-term (construction phase), and long term (operational phase).

Conversely, the Seskin Wind Farm, Freneystown Wind Farm, Ballynalacken Wind Farm, and Coolglass Wind Farm are at an early stage in their development cycle and their construction phases could, potentially, overlap with that of the project. Given the intervening distance to the Ballynalacken Wind Farm and Coolglass Wind Farm, it is assessed that significant effects are unlikely to arise due to the extremely low likelihood of similar construction material haul routes being utilised. Similarly, based on the location of the Freneystown Wind Farm and following a review of the surrounding road network, it is unlikely that the subject project and Freneystown Wind farm will share construction material haul routes.

The Seskin Wind Farm is proposed to be located on lands c. 2km north-east of the project. If this development and the White Hill Wind Farm were to be constructed concurrently, cumulative effects on the local road network and increased disruption to local residents/landowners could, in the absence of appropriate mitigation and traffic management measures, be likely, significant, indirect, but of temporary duration. Mitigation measures relevant to the project are described below (**Section 13.1.5**) while it is presumed that the Seskin Wind Farm will incorporate a similar suite of measures.

There is also the possibility of the 2 no. developments utilising similar turbine component haul routes; thus giving rise to a scenario where works carried out by one could be of a positive benefit for the other and negating the requirement for works to be carried along multiple routes; however, it should be noted that no information has been made publicly available regarding the proposed haul route(s) for the Seskin Wind Farm.

Cumulative effects, with the above developments, during the respective operational phases are assessed as unlikely due to the low traffic volumes generated by each development.

13.1.5 Mitigation & Monitoring Measures

13.1.5.1 Mitigation

The likely adverse effects of the project have been identified as being slight-to-moderate, direct, indirect and associated with short-term construction and decommissioning activities. Cumulative effects could, in the absence of mitigation, potentially rise to 'significant' if the project is constructed at the same time as the proposed Seskin Wind Farm, which is located within 2km of the subject project.

In order to ensure the avoidance of significant effects and reduce the predicted magnitude and significance of effects to the greatest possible extent during the construction and decommissioning phases, the following mitigation measures will be implemented:-

- Traffic movements will be limited to 07:00-19:00 Monday to Friday and 07:00-13:00 on Saturdays with no movements on Sundays or public holidays. It may be occasionally necessary to undertake works outside of these hours to avail of favourable weather conditions or during extended concrete pours. Where construction activities are necessary outside of the normal working hours, local residents and the Planning Authority will receive prior notification;
- A wheel washing facility will be provided, as necessary, to prevent any debris being transferred from site to the adjacent public roads. All drivers will be required to ensure that their vehicle is free from dirt and stones prior to departure from the project site. Where conditions exist for dust to become friable, techniques such as damping down of the affected areas will be employed and vehicles/loads will be covered to reduce dust emissions;
- A Traffic Management Plan shall be agreed as part of the Construction Environmental Management Plan (CEMP) with the Local Authority prior to the commencement of development. The Traffic Management Plan shall include *inter alia* confirmed details of construction material haul routes; confirmed details of vehicle specifications; a materials delivery programme; traffic management measures including details of 'Stop/Go' systems, signage, road closures and diversionary routes; and road reinstatement details;

- All works to the public road shall be undertaken in consultation with, and agreed in advance with, the relevant local authority;
- All reasonable steps shall be taken to ensure that only national and regional routes are used to transport all materials to the site, in so far as is possible;
- Prior to, and post, construction; pavement condition surveys will be undertaken along all non-national access routes proposed to be utilised in the delivery of construction materials. Given the high-quality and well-maintained nature of motorways and national routes, it is not assessed as necessary to carry out surveys of these carriageways or structures. Following the completion of the pre-construction survey, any works which are assessed as necessary to facilitate the delivery of components and materials to the project site shall be undertaken, while any deterioration of carriageways or structures identified in the post-construction survey shall be put right at the expense of the developer and to the satisfaction of the relevant local authority;
- Adequate signage shall be provided at entrances providing access, safety and warning information;
- Speed limit compliance; particularly along the L1834, L1835, L3037, L7117 and along the grid connection route; will be emphasised to all staff and contractors prior to the commencement of construction during site induction, and will be strictly enforced throughout the construction phase;
- Sufficient car parking spaces will be available at the temporary construction compound during the construction phase. Additionally, during construction of the proposed grid connection, it is likely that agricultural premises will be used for the temporary storage of materials (e.g. ducting, cabling, etc.) and for the parking of construction plant, machinery, and work vehicles (cars, vans, etc.). No parking of cars by persons associated with the project will be permitted on any part of the public road that is not closed to traffic. All staff will be instructed to ensure that private entrances remain unobscured (particularly along the grid connection route);
- Road sweeping, particularly along the proposed grid connection route, will be carried out as appropriate to ensure construction traffic does not adversely affect road conditions;
- Traffic restrictions shall be kept to minimum duration and extent;
- Appropriate traffic management; including maintenance of local access, pedestrian access (where safe to do so) and diversions (where required); shall be implemented to facilitate continued public use of roads where temporary traffic restrictions have to be put in place. Precise details of these measures will be detailed in the Traffic Management Plan to be agreed with the Planning Authority prior to the commencement of development;
- The timing of oversized/abnormal loads shall be agreed with the relevant local authorities and An Garda Síochána, and all relevant licenses and permits shall be obtained in advance. All oversized/abnormal loads shall be accompanied by escort vehicles to ensure the maintenance of public safety;
- Maximum axle loadings for abnormal/oversized loads shall be strictly enforced in accordance with the Road Traffic (Construction and Use of Vehicles) Regulations 2003 (S.I. No. 5 of 2003);
- A designated contact point and coordinator will be put in place to manage all access arrangements and to interface with the public and the respective local authorities; and,
- The site shall be closed, and strictly secured, to the public during the construction phase.

Likely effects during the operational phase have been assessed as being imperceptible and hence mitigation measures are not assessed as being required.

13.1.5.2 Monitoring

As described above; prior to and post construction, pavement condition surveys will be undertaken along all non-national access routes proposed to be utilised in the delivery of construction materials. Following the completion of the pre-construction survey, any works (additional to those which have been identified and described at **Chapter 3**) which are assessed as necessary to facilitate the delivery of components and materials to the project site shall be undertaken. Any deterioration of carriageways or structures identified in the post-construction survey shall be put right at the expense of the developer and to the satisfaction of the relevant local authority.

13.1.6 Residual Effects

13.1.6.1 Construction Phase

There are no significant residual effects, positive or negative, assessed as likely to occur during the construction phase. Mitigation measures have been proposed to offset any likely effects, including in-combination with the proposed Seskin Wind Farm, and any residual effects are assessed to be slight, negative and short-term. The residual negative effects are likely to arise as a result of upgrade works along the turbine component haul routes, increases in traffic volumes on local roads in the vicinity of the project site and direct construction activities along the L7122 and grid connection route. Positive residual effects are likely to accrue as a result of permanent road upgrades (L7122) and improvements to the carriageway condition along the grid connection route.

13.1.6.2 Operational Phase

There will be no significant residual effects during the operational phase as only occasional LGVs are envisaged as likely to visit the site during operation for routine monitoring and maintenance. Positive residual effects are likely to accrue as a result of permanent upgrades to local roads (L7122) and improvements to the carriageway condition along the grid connection route.

13.1.6.3 Decommissioning Phase

Decommissioning phase effects are assessed to be similar to those of the construction phase but of a reduced scale. In particular, the public road upgrades and improvements will be retained thus eliminating any likelihood of significant effects. Similarly, access tracks and some ancillary wind farm infrastructure is likely to be retained resulting in a reduction in vehicular movements associated with the decommissioning phase. Much of the site infrastructure, such as turbine foundations and crane hardstands, may simply be covered in topsoil and allowed to revegetate without removing the structures, which would significantly reduce the amount of vehicular movements during this phase.

13.1.7 Summary

This section has assessed the likelihood of significant effects arising from the project on transport and access. The project has generally been assessed resulting in effects which are likely, slight-to-moderate, direct, indirect, negative (temporary), and positive (long-term). Following mitigation, the likely residual effects have been assessed as likely, imperceptible-to-slight, direct, indirect, negative (temporary), and positive (long-term).

Likely cumulative effects, with other developments in the vicinity, have been assessed as being potentially significant but short-term should the proposed Seskin Wind Farm be constructed concurrently with the project. However, with the implementation of appropriate traffic management measures for the subject project, and the implementation of a similar suite of measures in respect of that development, the magnitude of effects can be substantially reduced and will not be significant.

Overall, this assessment has identified no likelihood of significant effects on transport and access which could arise as a result of the construction, operation or decommissioning of the project either individually or in combination with other existing, permitted or proposed developments.

13.2 Aviation

13.2.1 Introduction

This section assesses the likelihood of effects on aviation arising from the construction, operation or decommissioning of the project. The requirement for an assessment of the likely effects on aviation is set in the *Wind Energy Development Guidelines for Planning Authorities 2006* which state:-

“The siting of wind turbines may have implications for the operations of communications, navigation and surveillance systems used for Air Traffic Control for the separation and safety of aircraft. Wind turbine siting may also have implications for the flight paths of aircraft.”

13.2.2 Methodology

The assessment involved consultation with various stakeholders including the Irish Aviation Authority (IAA) and Department of Defence. In addition, publications issued by the IAA and the Department were reviewed to determine if the project site was assessed as being of significance or if significant effects were likely. A desktop study was also undertaken to determine the presence of aerodromes or airstrips within 20km of the subject site.

This assessment has had particular regard to the *Draft Air Corps Wind Farm/Tall Structures Position Paper* (August 2014) (**Annex 13.2**) which sets out the Air Corps position on the appropriate siting and management of wind farms and tall structures. This assessment includes a detailed review of this position paper, a comparison of the project site with identified ‘Danger Areas’, ‘Restricted Areas’ and ‘Low Level Flying Areas’.

13.2.3 Consultation

Consultation was undertaken with the IAA and Department of Defence to establish if any effects on aviation were likely. A consultation letter was issued to both in April 2021 (see **Chapter 1**), which included a Preliminary Scoping Report, a general description of the project and site location drawings.

Correspondence received from the IAA (see **Annex 1.8**), advised that the project is located c. 17km north east of Kilkenny Airport and in the event of planning consent being granted, suggested that a number of conditions be attached including in respect of future consultation.

At the time of writing, a response from the Department of Defence has not been received.

13.2.4 Description of Existing Environment

There are no major airports in the vicinity of the project and the site is therefore assessed as being unconstrained. The proposed wind turbines are located c. 95km south-west of Dublin Airport, c. 60km north of Waterford Airport, and c. 125km east of Shannon Airport.

There are also a number of aerodromes, airfields, and airstrips located within 40km of the proposed wind turbines including:-

- Maganey Airstrip (Carlow) located c. 21km north-east;
- Hacketstown Airfield (Carlow) located c. 38km east;
- Abbeyleix Airfield (Laois) located c. 26km north-west; and,

- Kilrush Airfield (Kildare) located c. 38km north.

The project site is not located within any 'Danger', 'Restricted' or 'Military Operating' area as identified at Annex A, B or C of the *Draft Air Corps Wind Farm/Tall Structures Position Paper*. Similarly, the subject site is not located within 3 no. nautical miles of any critical low level route identified at para. 2(2)(c) and illustrated at Annex D of the Paper. The nearest wind turbine to the M9 motorway is located at a distance of 3.15 nautical miles.

Air traffic control radar is of two types. Primary Surveillance Radar (PSR) equipment sends out pulses of electromagnetic energy which will reflect off objects in their path. The radar's receiver antenna detects the returning 'echoes' and these are displayed on the radar screen. The time taken for the pulse to travel out to the target and back gives an indication of the range of the object from the radar

Secondary Surveillance Radar (SSR) is the second type of radar equipment used for air traffic control. Like primary radar, SSR relies on an antenna rotating continuously through 360°. However the radar does not transmit raw pulses of energy; it transmits an interrogation signal. The signal is received at the SSR antenna, decoded, and the height and location of nearby aircraft are presented on the radar screen. This enables controllers to positively identify radar returns on their screens and (after verbal confirmation from the pilot) to confirm the aircraft's height.

Rotating wind turbine blades within radar range can impart a Doppler shift to any radar energy reflecting off the blades. The radar's processor could detect this as a non-static target and therefore display the turbines as objects on the radar screen.

13.2.5 Description of Likely Effects

13.2.5.1 Construction Phase

Due to the general low altitude of activity during the construction phase, it is assessed that there will be no likely impact on aviation. During the erection of wind turbines, cranes will be fitted with appropriate aviation warning lighting to alert pilots to the presence of tall structures. Likely effects are assessed to negative, indirect, imperceptible, and short-term.

13.2.5.2 Operational Phase

Following the completion of the construction phase, no significant effects are assessed as likely to occur. The installation of aviation warning lighting is inherent to the project design; and its operation during the operational phase will ensure that any civil and military aviation activities occurring within the vicinity of the project are sufficiently aware of the presence of the project.

The project site is not located within any low flying areas, restricted areas, danger areas, military operating areas or low level routes identified within the *Draft Air Corps Wind Farm/Tall Structures Position Paper*.

It is concluded, therefore, that the operation of the project will not result in any likely significant effect on aviation, with effects being likely, negative, indirect, imperceptible, and long-term (for the operational duration of the wind farm).

13.2.5.3 Decommissioning Phase

The likely effects during the decommissioning phase are assessed to be similar to those during the construction phase with no significant effects assessed as likely to occur. Likely effects are assessed to negative, indirect, imperceptible, and short-term.

13.2.5.4 Grid Connection

No significant effects on aviation are assessed as likely as a consequence of the construction, operation or decommissioning of the proposed grid connection and electricity substation. Infrastructure associated with the proposed grid connection will be underground, therefore there is no likelihood for effects on, or interactions with, aviation.

13.2.6 Cumulative Effects

Given the presence of other existing, permitted and proposed wind energy developments (tall structures) in the vicinity of the project, it is assessed that cumulative effects could occur. However, the implementation of aviation warning lighting is standard across all such developments and, consequently, cumulative effects are assessed to be likely, negative, indirect, imperceptible, short-term (construction & decommissioning phases), and long-term (for the operational duration of the wind farm).

Accordingly, significant effects are not likely to occur.

13.2.7 Mitigation & Monitoring Measures

13.2.7.1 Construction Phase

Due to the absence of likely effects, there are no specific mitigation measures proposed during the construction phase. As requested by the IAA in its consultation response, a minimum of 30-days prior notification will be provided regarding the commencement of crane operations at the project site. Additionally, as is best practice and implemented as standard, warning lights will be fitted to cranes during the erection of the wind turbines.

13.2.7.2 Operational Phase

The proposed wind turbines will, as requested by the IAA in their consultation response and implemented as standard, be fitted with aviation warning lighting in accordance with specification to be agreed with the IAA and the Planning Authority prior to the commencement of development.

At a maximum of 30-days following the installation of all proposed turbines, 'as-constructed details' will be provided to the IAA to allow for the updating of mapping charts, including:-

- The number of wind turbines;
- WGS-84 coordinates of each turbine;
- Ground elevation of each turbine (Malin Head OD);
- Blade tip elevation of each turbine (Malin Head OD);
- Height of Turbine;
- Contour maps at the requisite scale; and,
- A note of which turbines have been fitted with obstacle warning lights.

In the event that the obstacle warning lights fail or if there are plans to withdraw them from use for a period of time, the IAA will be contacted, via AISOPs@iaa.ie, as a matter of urgency, to request that a NOTAM (Notice to Airmen) is issued concerning the absence of obstacle lighting. The following information will be provided to the IAA:-

- Obstacle ID;
- Obstacle type;
- Obstacle Position;

- Elevation; and,
- Colour of Light.

It should also be noted, however, that the proposed wind turbines will be fitted with an uninterruptable power supply (UPS) to ensure that the aviation warning lights remain operational even in the event of a power outage. This UPS is sufficient for a period of 12-hours; after which, the warning lights can be powered by a small generator should the power outage continue.

13.2.7.3 Decommissioning Phase

Mitigation measures proposed during the construction phase will also be implemented during the decommissioning phase.

13.2.7.4 Grid Connection

Given that no significant effects are assessed as likely to occur as a result of the construction, operation or decommissioning of the proposed grid connection, no specific mitigation measures are proposed, or required.

13.2.8 Residual Effects

No significant residual effects are assessed as likely to occur.

13.2.9 Summary

This assessment concludes that the project, including grid connection, is unlikely to result in any significant effect on aviation. The project site is not located within an area identified as being of particular sensitivity or importance in the *Draft Air Corps Wind Farm/Tall Structures Position Paper* on military aviation or located close to any civilian aerodrome, airfield or airport. Accordingly, with the installation of appropriate aviation warning lighting and the implementation of appropriate mitigation measures, no significant effects are assessed as likely to occur. Therefore, it is assessed that significant effects on aviation are unlikely to arise as a result of the project, either individually or in combination with other existing, permitted or proposed developments.

13.3 Telecommunications

13.3.1 Introduction

As noted in the *Wind Energy Development Guidelines for Planning Authorities 2006*⁹, wind turbines, like all electrical equipment, produce electromagnetic radiation, and this can interfere with broadcast communications. This section considers the likely effects of the project upon a range of communications infrastructure, including telecommunications networks, broadcast radio and television and fixed infrastructure such as telecommunication masts. In theory, interference could affect all electromagnetic communications including:-

- Satellite Communications;
- Cellular Radio Communications; and,
- Television Broadcasting Signalling.

13.3.2 Methodology

The methodology employed in assessing the likelihood of significant effects on telecommunication networks consisted of desk based research¹⁰ and consultation with various telecommunication companies and relevant authorities. Desk based research was undertaken to identify:-

- Locations of known telecommunications facilities;
- Known telecommunication fixed links; and,
- Known television broadcast and re-broadcast facilities.

During the EIAR scoping process (see **Chapter 1**), the following telecommunication service providers and authorities were consulted with:-

- Airspeed Telecom
- An Garda Síochana;
- Broadcasting Authority of Ireland;
- BT Communications Ireland;
- Commission for Communications Regulation;
- Eir Ltd;
- Enet Telecommunications Networks Limited
- Imagine Group;
- Irish Aviation Authority;
- JFK Communications Limited;
- Kildare FM Radio Limited;
- Mosaic Net;
- National Ambulance Service;
- Netshare Ireland;
- Open Eir;
- Radio Services and Building Ltd;
- Ripplecom;
- 2rn (RTE Transmission Network Ireland);
- Tetra Ireland Communications Ltd;
- Three (3) Ireland;
- Towercom;
- Viatel Ireland Ltd

⁹ And acknowledged in the *Draft Revised Wind Energy Development Guidelines 2019*

¹⁰ <https://siteviewer.comreg.ie/>

- Virgin Media Ireland; and,
- Vodafone Ireland Ltd.

The responses received from these organisations are summarised at **Chapter 1** and can be viewed at **Annex 1.8**.

13.3.3 Description of Existing Environment

The desktop research and consultations undertaken confirmed that while there is telecommunications infrastructure located in the wider vicinity of the project site and there are microwave, and other, links present, the project site is not a strategically important location for telecommunication links.

During consultation, Enet had advised that a microwave link would be affected by the project. Following further detailed discussions, a technical solution (described at **Section 13.3.6** below) was agreed upon to avoid any disruption to Enet's service.

In consultation with Vodafone Ireland, the Developer was advised that a link was located in the immediate vicinity of turbine T2 (formerly known as Turbine B). Further to consultation with Vodafone, the location of T2 was revised to increase the separation distance to the link and ensure the avoidance of disruption. Subsequently, Vodafone Ireland confirmed that it does not anticipate any impact on their services.

2rn (RTE Transmission Network) advised that there is potential for localised interference to the terrestrial television network. 2rn have requested that the Developer enter into a protocol arrangement to ensure the appropriate remediation of any adverse effects which may be experienced.

Radio Services & Building Limited (KCLR Radio)¹¹ advised that the location of turbines T6 and T7 poses a risk of interference to an existing transmission link between Johnswell (Co. Kilkenny) and Rathmore (Co. Laois).

13.3.4 Description of Likely Effects

13.3.4.1 Construction Phase

No significant effects are assessed as likely to occur during the construction phase.

13.3.4.2 Operational Phase

Interference of Wind Turbines with Electromagnetic Transmissions

The operation of wind turbines can affect electromagnetic transmissions in two ways: by blocking or deflecting line of sight radio or microwave links or by 'scattering' transmission signals. However, given the findings of the desk based survey and consultation process, significant levels of blocking, deflecting or scattering are not assessed as likely to arise.

As described at **Section 13.3.3** above, Enet, Vodafone, 2rn, and Radio Services and Building Limited (KCLR Radio) identified that the proposed development poses a risk to the effective operation of their telecommunication services; however, following the re-siting of turbines, Vodafone has confirmed that its service will not be affected.

In the absence of mitigation, it is assessed that the proposed development is likely to result in a likely, direct, moderate-significant, negative, and long-term effect on Enet and Radio Services & Building Limited (KCLR Radio) services and a likely, direct, moderate-slight, negative, and long-term effect on 2rn broadcast services.

¹¹ The KCLR telecommunications network is operated and managed by Radio Services & Building Limited

Analogue and Digital Television Signals

The United Kingdom's Office of Communications (OFCOM) document *Tall structures and their impact on broadcast and other wireless services*¹² provides an overview for developers and planning authorities on how tall structures such as wind turbines may affect reception of wireless services.

There are two potential problems that can occur due to interference from tall structures: (1) signal blocking, and (2) reflection. Signal blocking can occur when a tall structure is situated between the transmitter and receiver. This causes a shadow behind the structure that can reduce signal levels. The severity of the reduced signal can vary depending on a number of factors such as the height of the structure.

Signal reflection can occur when wireless signals are reflected from the sides of structures. In the case of wind turbines, because the blades are rotating, the reflections can fluctuate and be quite complex. Reflections from turbines can also vary depending on the speed at which the blades are rotating and the angles of the blades. According to OFCOM, digital television signals are much better at coping with signal reflections, and pictures do not experience ghosting.

As analogue television has been phased out in Ireland, problems with ghosting and signal reflection due to interference from turbines will be reduced. The digital television signal is much better at coping with signal reflection. Since the digital switchover, the power of transmitters emitting the digital signal has been increased to deal with the demand. This higher output is likely to overcome any signal interference and is not likely to effect the reception received on televisions. Overall, the likely extent of any potential problems is much less significant with digital television than with analogue television.

While 2rn have confirmed that there is no fixed link traversing the project site, it has been identified that there is a risk of interference to local digital terrestrial television viewers in the vicinity of the project. While any effects may be significant on an individual or residential basis; in EIA terms, effects are assessed to be indirect, negative, slight, and long-term.

Mobile Phone & Broadband Signals

Notwithstanding the presence of a number of telecommunication (mobile phone & broadband) masts in the wider area, the consultation process has not identified the likelihood for significant interference to occur. Vodafone Ireland advised that a link was located proximate to turbine T2; however, following the re-location of this turbine, it was confirmed that no adverse effects were anticipated. Consequently, no effects on mobile phone and broadband signals are not assessed as likely.

As described above, Enet advised that a microwave link would be affected by the project. In the absence of any mitigation measures, the effects of this disruption are assessed to be direct, likely, negative, significant-moderate, and long-term (for the duration of the proposed wind farm).

13.3.4.3 Decommission Phase

No significant effects are assessed as likely to occur during the decommissioning phase.

¹² OFCOM: Tall structures and their impact on broadcast and other wireless services, August 2009, http://licensing.ofcom.org.uk/binaries/spectrum/fix-ed-terrestrial-links/wind-farms/tall_structures.pdf

13.3.5 Cumulative Effects

Given that effects on Enet, Radio Services & Building Limited (KCLR Radio) and 2m broadcast services have been identified as likely (in the absence of design/mitigation measures), there is the possibility of cumulative effects with other tall structures in the wider landscape. In particular, it is assessed that; in the absence of design/mitigation measures; significant, negative, direct, long-term effects could arise in respect of Enet and Radio Services & Building Limited (KCLR Radio) services in combination with the permitted Bilboa Wind Farm and proposed Seskin Wind Farm and Freneystown Wind Farm.

While effects on 2m broadcast services, arising from the subject project, are not assessed as likely to be significant; effects in combination with other existing, permitted and proposed developments may arise and are assessed to be negative, moderate and long-term.

13.3.6 Mitigation & Monitoring Measures

13.3.6.1 Construction Phase

As significant effects are not assessed as likely to occur during the construction phase, no specific mitigation measures are proposed.

13.3.6.2 Operational Phase

As assessed above; Enet, Radio Services & Building Limited (KCLR Radio) and 2m broadcast services are likely to be subject to long-term effects, of varying magnitudes, as a result of the project.

With regards to Enet, following extensive consultation, a technical solution has been identified and agreed with the service provider. The solution comprises the re-routing of the affected microwave link to avoid the project site. The cost of the solution shall be borne by the Developer and shall be implemented and operational prior to the erection of the proposed wind turbines. The implementation of this measure shall be undertaken in consultation with Enet to ensure that there is no interruption to broadcast services.

Similarly, with respect to Radio Services & Building Limited (KCLR Radio), it is proposed to re-route the affected transmission link between Johnswell (Co. Kilkenny) and Rathmore (Co. Laois) to avoid the proposed development site. The cost of the solution shall be borne by the Developer and shall be implemented and operational a minimum of 6-months prior to the installation of turbines T6 & T7. The implementation of this measure shall be undertaken in consultation with Radio Services & Building Limited (KCLR Radio) to ensure that there is no interruption to broadcast services.

In its consultation response, 2m recommended that a protocol agreement be entered into to ensure that any complaints received from members of the public are appropriately managed, addressed, and remediated. This is a standard protocol for wind energy developments and has been agreed between the parties. A signed copy of the protocol is enclosed at **Annex 13.3**.

While assessed to be unlikely, if significant signal interference in any form is identified and is directly attributed to the project, appropriate remedial measures will immediately be undertaken. A range of technical measures are available to mitigate any instances of interference including signal amplifiers, active deflectors and relay transmitters, repeater stations, booster units, realignment of domestic aerials, installation of higher quality aerials and the installation of suppression equipment.

Remedial works will be promptly undertaken, at the Developer's expense, to ensure uninterrupted telecommunication, broadcasting and mobile phone service provision.

13.3.6.3 Decommissioning Phase

As no significant effects are assessed as likely to occur during the decommissioning phase, no specific mitigation measures are proposed or required.

13.3.7 Residual Effects

No likely significant residual effects are assessed as likely to occur.

13.3.8 Summary

It can be concluded that, on the basis of this desktop assessment and extensive consultation with stakeholders, the project will not result in likely significant effects on the telecommunications network. The implementation of mitigation measures will ensure that identified effects on telecommunication signals or links are appropriately managed and mitigated. Therefore, it is assessed that significant effects on telecommunications are unlikely to occur as a result of the project, either individually or in combination with other existing, permitted or proposed developments.

13.4 Resources & Utility Infrastructure

13.4.1 Introduction

This section assesses the likelihood of significant effects on or interactions with existing renewable and non-renewable resources and existing utility infrastructure. Within the wider environs of the project site there is evidence of the extraction and use of resources; particularly in relation to quarrying activities.

Utility infrastructure is also present, with overhead electricity lines connecting to the majority of dwellings, medium and high voltage electricity lines traversing the landscape, and telecommunication lines located adjacent to the majority of local roads.

13.4.2 Description of Existing Environment

13.4.2.1 Renewable Resources

The 2013 Sustainable Energy Association of Ireland (SEAI) Wind Speed Atlas identified the project site as having a wind speed of 8.7m/s. An existing meteorological mast has been measuring wind speed at the project site since June 2021 and has, to date, recorded a mean wind speed of c. 7.8m/s, extrapolated to 104m (i.e. proposed turbine hub height).

There is currently 1 no. operational wind farm in County Carlow; at Greenoge; while there are a number of micro-generation developments including Tullow Mushroom Growers, Ballon Wind, and a single turbine development at Kilcarrig, Bagenalstown (Muine Bheag). The permitted Bilboa Wind Farm has not yet been constructed while planning permission has also been sought for the proposed Croaghaun Wind Farm¹³.

There are a number of existing wind farms in Co. Kilkenny including Bruckana Wind Farm (partial), Lisheen Wind Farm (partial), Ballybeagh Wind Farm, Foyle Wind Farm, Lisdowney Wind Farm, Rahora Wind Farm, Ballymartin Wind Farm, and Smithstown Wind Farm; while a number of micro-generation developments have also been constructed/permited. Additionally, the Castlebanny Wind Farm was granted planning permission by An Bord Pleanála¹⁴ in September 2022.

13.4.2.2 Non-Renewable Resources

There are a number of extant quarrying activities within County Carlow and County Kilkenny. There are no quarries located within the project site or in its immediate vicinity. While borrow pits for the extraction of stone are proposed, capping material for access tracks and crane hardstandings, and concrete for turbine foundations and other uses, will be sourced from local quarries. The source of such material will be selected during the pre-construction procurement process; however, a range of alternative construction material sources are provided at **Chapter 2** while further details on the importation of such materials are provided at **Section 13.1**.

13.4.2.3 Utilities Infrastructure

The electricity transmission network in County Carlow predominately comprises 38kV and 110kV electricity transmission lines; with lower voltage distribution lines connecting individual properties to the transmission network.

¹³ Currently subject to appeal pursuant to An Bord Pleanála Reference ABP-309937-21 (Carlow County Council Planning Register Reference 21/13).

¹⁴ An Bord Pleanála Reference ABP-309306-21

EirGrid is the transmission system operator (TSO) responsible for both the planning and operation of Ireland's high voltage national grid ($\geq 110\text{kV}$) while ESB Networks are responsible for the development of medium and low voltage lines ($\leq 38\text{kV}$). Given the overall electrical output of the proposed White Hill Wind Farm, a connection to the transmission network, at 38kV , is considered the most appropriate connection method.

In addition to the microwave-telecommunications network discussed at **Section 13.3** above, there is an extensive physical telecommunications network in the wider environs of the project site with poles and wires running along the majority of local and regional roads; while local services such as water schemes (public and group schemes) and local authority roadside drainage infrastructure is also present along local roads.

13.4.3 Description of Likely Effects

13.4.3.1 Construction Phase

The construction phase of the project is not likely to have any significant effect on existing renewable or non-renewable resources, or utilities infrastructure. The construction phase will not inhibit the export of renewable energy generated from other sources, inhibit the development of other renewable energy projects, nor will it affect existing utility services. While there is a potential for interaction with utility services (e.g. accidental collision with overhead wires or sub-surface cables/pipes during the construction phase), this can be mitigated through good construction practices.

During the process of connecting the project to the national grid, some minor, temporary disruption to electricity supply, at a local level, may occur. However, during this process, EirGrid will balance the loading on the network to ensure that no significant disruption occurs and significant effects do not arise.

The construction phase will result in the extraction of non-renewable resources in the form of aggregates for the construction of access tracks and areas of hardstanding and concrete for turbine foundations and substation construction. However, aggregates, which are not obtained from on-site excavation, will only be sourced from quarries which have full planning permission and have been subject to EIA, and therefore the effects of this extraction have already been fully assessed.

Construction activities associated with the completion of haul route upgrades and felling/re-planting operations are not assessed as likely to impact on resources or utility infrastructure. Where an interaction may occur; e.g. utility infrastructure proximate to upgrade works along the proposed haul route or present within the selected re-plant lands; appropriate best-practice construction methodologies will be followed to avoid any significant effect occurring.

As a result, it is assessed that significant effects on the environment are unlikely to occur as a result of the project, either individually or in combination with other existing, permitted or proposed developments; with effects being likely, slight-imperceptible, direct, indirect, and short-term.

13.4.3.2 Operational Phase

The operational phase of the project will not result in any likely effect on existing utility infrastructure or renewable or non-renewable resources.

It may be necessary to occasionally import aggregates to the site during operations

to maintain access for service vehicles; however, materials will again be sourced from authorised quarries with full planning permission and no likely significant effects will occur.

The project will have no likely operational phase effects on existing renewable resources. It is assessed that the project will have a likely overall positive effect in terms of carbon reduction and climate change (see **Chapter 8**).

Effects during the operational phase are assessed to be likely, imperceptible-negative, positive, direct, indirect, and long-term. It is assessed, therefore, that significant effects on the environment are unlikely to occur in respect of resources and utility infrastructure during the operational phase as a result of the project, either individually or in combination with other existing, permitted or proposed developments.

13.4.3.3 Decommissioning Phase

No significant effects are assessed as likely to occur during the decommissioning phase in respect of resources and utility infrastructure.

13.4.3.4 Grid Connection

The construction, operation, and decommissioning of the grid connection will not result in any likely effect on existing utility infrastructure or renewable or non-renewable resources. The project will significantly increase the volume of renewable electricity generated in Co. Carlow and Co. Kilkenny without resulting in any likely adverse effects on resources or utility infrastructure.

13.4.3.5 Cumulative Effects

The project is not assessed as likely to result in any cumulative effects on resources or utility infrastructure, either individually or in combination with other existing, permitted or proposed developments.

13.4.4 Mitigation & Monitoring Measures

13.4.4.1 Construction Phase

No specific mitigation measures are proposed or required during the construction phase.

13.4.4.2 Operational Phase

No specific mitigation measures are proposed or required during the construction phase.

13.4.4.3 Decommissioning Phase

No specific mitigation measures are proposed or required during the construction phase.

13.4.5 Residual Effects

No likely significant residual effects are assessed as likely to occur.

13.4.6 Summary

This assessment concludes that the project is unlikely to result in any significant adverse effect on renewable and non-renewable resources or on utilities infrastructure. The operation of the project will bring about a benefit in terms of electricity generated from renewable sources. This assessment similarly concludes that the project is unlikely

to result in any significant adverse cumulative effects in combination with existing, permitted or proposed developments.

