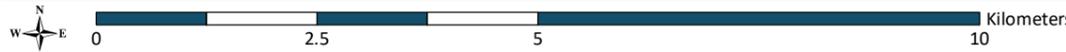


- Legend**
- Proposed Site Boundary
 - County Boundaries
 - Proposed Turbine Layout

TITLE: Site Location and Surrounding Road Network	
PROJECT: Annagh Wind Farm, Co. Cork	
FIGURE NO:	13.1
CLIENT:	EMPower
SCALE: 1:80000	REVISION: 0
DATE: 14/10/2021	PAGE SIZE: A3
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13.2 Assessment Methodology

The details of the proposed project are considered in relation to the construction, operation and decommissioning phases of the project.

The likely traffic that will be generated by each phase of the project is estimated to identify potential disruptions to existing road users within the study area. Based on the project construction methodologies described in Chapter 3, an estimate of the number of vehicles generated as a result of the project is calculated. These estimates are used to assess the impact on the road network in numerical terms.

The potential for soiling or damage to public road infrastructure through poor construction practices as well as potential health and safety hazards through poor traffic management are also identified where applicable.

The effects of the project on the existing road network are then considered and described in terms of quality, duration and significance. Mitigation measures are then proposed followed by identification of residual impacts. The potential for cumulative impacts from other developments are assessed in Section 13.9.

A 12-month construction programme was assumed for construction traffic generation movement calculations.

The assessment uses a combination of field surveys, data counters, desktop studies and consultation.

The following guidance was used during the assessment of traffic and transport in this EIAR:

- TII Publication: Traffic and Transport Assessment Guidelines, 2014;
- TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections, 2019;
- EPA Guidelines on The Information to Be Contained In Environmental Impact Assessment Reports (DRAFT), 2017;
- Cork County Council – County Development Plan 2015 – 2021;
- TII Project Appraisal Guidelines for National Roads: Estimating AADT on National Roads, October 2016;
- Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017;
- TII Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated, and compact grade separated junctions) DN-GEO-03060 April 2017.

Traffic count data was obtained from open-source TII traffic counter information and private automatic traffic count (ATC) surveys. Other key sources of information used to assess traffic impacts include the following;

- Ordinance survey and aerial mapping;
- Project construction methodologies;
- Site Layout plans; and
- Route Survey Report for the Turbine Delivery Route carried out by Exceptional Load Services (ELS) on 03/03/2021, included in Appendix 13-1.



13.2.1 Consultation

Transport Infrastructure Ireland (TII) were consulted through the EIAR scoping process. A copy of the correspondence from TII is included in Appendix 13-2.

Details of the above response and further consultation responses are contained in Chapter 5 of this EIAR.

13.3 Existing Environment

13.3.1 Existing Road Network

Roads in the Republic of Ireland are classified as motorways, national (primary and secondary), regional and local roads. Transport Infrastructure Ireland (TII) has overall responsibility for the planning and supervision of the construction and maintenance of motorways, national primary and secondary roads. The local authorities have responsibility for all non-national roads. The hierarchy of roads throughout Ireland is outlined in Table 13.1:

Table 13-1: Road Categories

Road Category	Description
Motorways	These are high quality multiple lane roads with limited grade separated junctions. They are high speed (120kmph) road predominantly provided to facilitate strategic traffic with reduced journey times.
National Primary Roads	These are predominantly single carriageway, with some that are dual carriageway. Generally high speed (100kmph) roads that facilitate strategic traffic, with reduced journey times.
National Secondary Roads	These are medium distance through-routes connecting towns, serving medium to large geographical areas and link to primary routes to form a homogeneous arterial network.
Regional Roads	Predominantly single carriageway roads of regional and local importance. These roads generally receive more frequent maintenance criteria than Local Roads and therefore tend to be structurally sound.
Local Roads (Primary, Secondary and Tertiary)	The local road system is operated in three tiers defining local importance, usage and maintenance priorities. They form a network of single carriageway roads of varying quality.

Motorways

The nearest motorway to the site is the M20 which connects to the N20 and the M7. The M7 is the arterial route for traffic connecting Limerick to Dublin. The M20 is located approximately 30km to the North of the wind farm site. As part of the turbine delivery route it is proposed to utilize the M20 motorway for approximately 10km. The AADT for the M20 in 2019 according to TII automatic traffic counter data was approximately 32142 with approximately 5.6% of this total comprised of HGV traffic.



National Primary Routes

5km to the east of the site, the closest national primary route is the N20 which connects the M20 at Limerick to Cork City, it is proposed that approximately 30km of this road will be part of the turbine delivery route. The AADT for the N20 in 2019 according to TII automatic traffic counter data was 11,125 with 8.5% of this total comprised of HGV traffic.

Another primary road which is along the proposed turbine delivery route is the N18 which is located North East of the site near Limerick, the delivery route continues from the N69 along the N18 for approximately 4km before joining the M20.

National Secondary Routes

The closest national secondary route to the south of the site is the N73. The N73 runs from the M8 motorway to Mallow and is located approx. 25km from the site boundary. The AADT for the N80 in 2019 according to TII automatic traffic counter data was 3335 with 9.6% of this total comprised of HGV traffic.

The proposed turbine delivery route starts along the N69 and continues for approximately 30km until it joins the N18. The AADT for the N69 in 2019 according to TII automatic traffic counter data was 6210 with 7.5% of this total comprised of HGV traffic.

Regional Roads

The closest regional road is the R578 which is located approximately 4km to the north of the proposed wind farm site. The R578 connects the R522 to the R578 at Newtownshandrum.

Local Roads

There are several local roads in the vicinity of the proposed project. The proposed delivery route proposes the use of one of the local roads to the North of the site, the local road which connects the proposed site entrance to the N20 at Ballyhea (L-1322).

Local roads associated with the grid connection are located between the Charleville substation and the proposed on-site substation compound to the north of the site boundary. The grid connection utilizes the L1322 road for approximately 3km before turning left onto an unnamed local road for approximately 0.5km where it reaches the Charleville 110kv Substation.

The site location and existing road network is shown on Figure 13-1.

Existing commercial operations of note within the study area:

- Lidl Distribution Centre, Charleville, Co. Cork. Located on the junction of the N20 and L1322 which forms part of the TDR.
- Dawn Meats, Ardnageehy, Charleville, Co. Cork. Located on L1322 which forms part of the proposed grid connection and TDR.



13.3.2 Existing Environment Traffic Volumes

Existing traffic volumes on roads in the study area are shown in Table 13-2 below:

Table 13-2: Baseline Traffic Volumes

Road	Projected Baseline AADT		
	HGV	LGV	AADT
M20 - TMU M20 090.0 N M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick ¹	2,087	32,702	34,789
N20 - TMU N20 080.0 N N20 Between Croom and M20, Croom North, Co.Limerick ¹	1,098	15,178	16,276
L1322 ²	18	200	218

AADT figures were projected to a proposed construction commencement year of 2023 from 2019 source data in accordance with TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections, 2019.

13.4 The Proposed Project

The proposed wind farm site is located within the jurisdiction of Cork County Council, approximately 45km north west of Cork City. The wind farm site is located approximately 6km south west of Charleville and approximately 3km north of the village of Churchtown, the most proximate settlement to the proposed wind farm site. The proposed wind farm consists of a 6 Wind Turbine layout. The 6 Wind Turbine layout will consist of turbines with a tip height of 175m and a grid connection to connect the project to the national grid at the Charleville 110kV Substation.

A detailed description of the proposed project assessed is provided in Chapter 3 of this EIAR and is comprised of three main elements:

- The wind farm (hereinafter referred to as the **'wind farm site'**);
- Turbine delivery route (hereinafter referred to as the **'turbine delivery route'** or **'TDR'**);
- Grid connection (hereinafter referred to as the **'grid connection'** or **'GCR'**);

In addition, replant lands identified in the townland of Emlagh, near Moyasta, County Clare have been assessed for potential cumulative impacts as part of the project assessment. (hereinafter referred to as the **'replant lands'**)

¹ Source: TII

² Source: Traffinomics Limited, Traffic Count Survey. Traffic count taken adjacent the proposed site entrance on the L1322



13.4.1 Construction Programme

The construction of the project in its entirety is expected to take between 12 – 18 months. 12 month programme was assumed for purposes of assessing worst case for traffic volumes as it would result in greater levels of average daily traffic.

There are a number of items which will be conducted in parallel, but the basis of the construction programme will involve site establishment, site access road and drainage construction, hardstanding construction and substation works. The grid connection works are likely to be done in parallel with the site works and the turbine installation works will be completed before commissioning, reinstatement and landscaping. However, it is also possible that the grid route could commence prior to the on-site infrastructure or subsequent to the construction of the on-site infrastructure. Carrying out the grid connection works in parallel with the site works represents the worst-case scenario.

An indicative construction programme upon which vehicle trip distribution calculations are based is shown in Figure 13-2:

Activity	Month												
	1	2	3	4	5	6	7	8	9	10	11	12	
Mobilisation and site setup	█												
Site clearance and felling	█	█											
Internal access tracks			█	█	█	█	█						
Turbine hard standings				█	█	█	█	█					
Turbine foundations					█	█	█	█	█				
Turbine Installation									█	█			
Onsite substation													
Grid connection cable works													
Private electrical network													
Landscaping, reinstatement, demob													█

Figure 13-2: Proposed Construction Programme

13.4.2 Main Wind Farm Site

As described above, the main wind farm site includes the wind turbines, internal access tracks, hard standings, the permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compound, drainage infrastructure and all associated works related to the construction of the wind farm.

13.4.2.1 Site Access

Annagh Wind Farm shall have one site entrance which will be used for both construction and operation. The location of the site entrance is shown on figure 13-1 and Figure 13-3. The site entrance is located along L1322 Local Road in the townland of Cooliney. A sightlines survey was conducted to identify an appropriate site entrance. An autotrack swept path analysis was then carried out to indicate land take required for turbine delivery at the site entrance. Folios CK42782 and CK19669 were identified for potential land take.

The new site entrance shall be designed in accordance with TII design guidelines DN-GEO-03060.



Figure 13-4: View to LHS of existing field entrance along the L1322 at 'X' = 0m³

³ The distance back along the minor road or direct access from which the full visibility is measured is known as the 'x' distance. It is measured back along the centreline of the minor road or direct access from the continuation of the line of the nearside edge of the paved surface (including hard strip or hard shoulder) of the major road.



Figure 13-5: View to RHS of existing field entrance along the L1322 at 'X' = 0m

13.4.2.2 Felling

Felling of approximately 12.6 ha of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of turbines, hardstands, crane pads, access tracks, the proposed onsite substation and to provide for mitigation for Bat species, as detailed in Chapter 8: Biodiversity. The potential impact of the replant lands has been assessed for cumulative impacts in this assessment.

13.4.2.3 Permanent Met Mast

1 no. permanent meteorological (Met) mast shall be erected on site. The permanent met mast shall be of the following configuration:

- 100m high free standing lattice steel mast with a shallow concrete foundation. The mast will include a concrete base measuring 8m by 8m and will be up to 1.5m in depth.

The mast will be accessed from the south of the site via an existing agricultural laneway. A section of new track will lead from the existing agricultural track to the met mast location. A turning head will be constructed adjacent the mast site. The met mast access track will be 3.5m in width and will include drainage.



13.4.2.4 Construction Haul Routes

In constructing the wind farm, materials and plant will need to be delivered to the site. The material haul routes will include some of the surrounding road network which will need to cater for the additional traffic associated with the project. The Haul Route Map is shown in Fig. 13-6.

Traffic associated with the construction phase include:

- HGVs carrying aggregates, pipes and other materials associated with construction of the internal access tracks, hard standings and drainage infrastructure;
- HGVs (Concrete wagons) carrying concrete for turbine foundations and substation foundations;
- HGVs carrying building materials for the substation as well as electrical equipment and cabling;
- HGVs carrying plant and fuel;
- HGVs exporting site waste;
- Cranes and associated elements for erecting the turbines; and
- Private cars and vans for the commuting workforce.



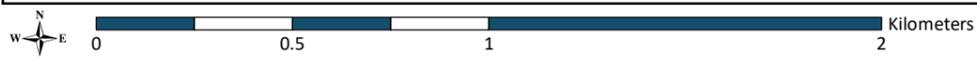
Legend

- - - Proposed Haul Route
- ▲ Met Mast
- Turbine Layout
- Turbine Hardstanding
- Substation
- Construction Compound

Roads

- New
- Upgrade

TITLE:	Proposed Haul Route		
PROJECT:	Annagh Wind Farm, Co. Cork		
FIGURE NO:	13.6		
CLIENT:	EMPower		
SCALE:	1:18000	REVISION:	0
DATE:	12/10/2021	PAGE SIZE:	A3





The surrounding quarries currently in operation and indicative haul routes to the site have been identified shown in Fig 13-7.. The nearest supplier of quarry stone (TII Class 6 products):

- Roadstone - Lackanamona, Mallow, Co. Cork. Located approximately 25km from Annagh.

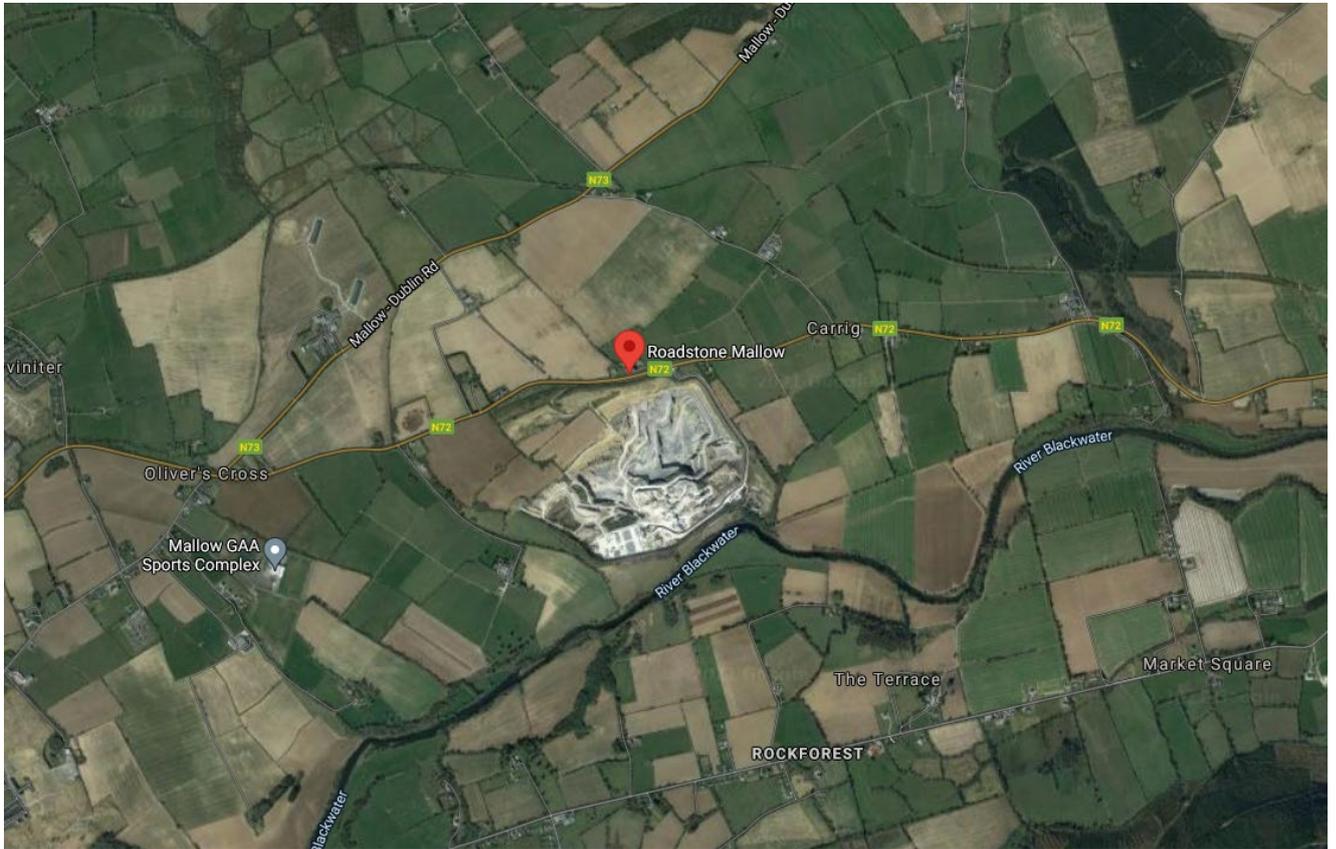


Figure 13-7: Surrounding Quarry: Roadstone - Lackanamona, Mallow, Co. Cork

Authorised waste management facilities have been identified in the greater County Cork area as listed on the Local Authority Waste Facility Register by the National Waste Collection Permit Office. The authorised waste facilities utilised during the construction and decommissioning of the proposed project will depend on the contractors appointed and will depend on the capacity of the various facilities at the time of construction and decommissioning. A list of existing licensed waste facilities in proximity to the wind farm site is presented in Table 3-3 below. These facilities were identified at the time of the preparation of this EIAR.



Table 13-3: Licensed Waste Facilities in the Vicinity of Annagh Wind Farm

Licensed Waste Facility Location	Type of Waste
Tooreen South/Glashaboy South Carrignavar	Soil and Stone
Ballykenly, Glanworth	Soil and Stone
Newcastle, Blarney	Concrete, bricks, tiles, ceramics, soil and stone
Booldurrigha North, Ballynoe, Mallow	Sludges from on-site effluent treatment
Spa Road, Mallow	Plastics, materials unsuitable for consumption or processing, sawdust, shavings, cuttings, wood, paper, cardboard, copper, bronze, brass, aluminium, lead, zinc, iron, steel, cables, glass, textiles, mixed construction and demolition waste, biodegradable kitchen and canteen waste, mixed municipal waste and other non-biodegradable wastes

13.4.3 [Grid Connection](#)

The grid connection for this project will consist of a 38kV new on-site substation connected to the Charleville 110kV substation located approximately 3km north east of the site, via underground cable. The finalised route consists of approximately 5.7km of underground cabling. This includes 2.3km of underground cabling in private lands at the wind farm site and approximately 3.4km of cabling to be installed in the public road. The proposed grid route will be contained within onsite access tracks and will leave the project site at the proposed site entrance. The grid route then proceeds east along the L1322 local road where it turns north to meet the Charleville 110kV substation.

A substation is proposed on-site which will collect the electricity produced by the wind farm. The substation has been located at the west of the wind farm site.

Underground grid route connection works to on-site substation will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables predominantly along the existing road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches.

It is expected that full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. These works shall be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section. There will be no overlap of the cable works in the public road with the turbine deliveries or construction of onsite infrastructure. The minimum road width requirement for 2 lane traffic is 6 meters, therefore sections of the L1322 will require lane closure to allow for passing traffic. This lane closure starts at Dawn Meats Charleville (ITM: 552664, 619467) and continues west to the site entrance.



The proposed 38kV grid connection from the on-site substation to the existing 110 kV substation at Charleville crosses 2 watercourses and a number of minor water features as shown on Figure 10-5, Chapter 10 – Hydrology and Water Quality. These crossings are listed in Table 10-12. The method of crossing over the watercourses is proposed for each crossing location.

The proposed grid connection trench will be 600 mm wide and 1200 mm deep . Where the proposed grid connection cable route encounters minor culverts, the ducts will be installed above or below the culvert depending on its depth in accordance with construction methodologies outlined in the CEMP (Volume 3, Appendix 3.1). The cable ducting will be installed so as not to impact the existing culvert

A detailed description of the onsite substation is contained in Chapter 3 of this EIAR.

13.4.3.1 Watercourse Crossings Along the GCR

The following table summarises the proposed water crossing methods along the grid connection within the public road:

Table 13-4: Grid Connection Crossings within the Public Road

Feature ID	ITM_X	ITM_Y	Grid cable method crossing
GCR-WCC2	552635	619466	HDD in public road corridor

There is one existing watercourse located along the proposed GCR on the public road. This watercourse is the Rathnacally Stream, also part of the Awbeg [Buttevant] sub-catchment. The existing road bridge at this point consists of a shallow concrete bridge with a 5.3m carriageway and 0.7m and 0.8m verge. It is proposed to install ducting beneath this stream using horizontal directional drilling (HDD). Therefore, construction and installation of the ducts shall not require works within the watercourse and shall not affect the watercourse. A description of construction methodologies for watercourse crossings is presented in in the CEMP and Chapter 3.

A careful approach will be taken to planning the works to ensure minimal impacts on road users and the general public. The cable trenching will be carried out with the aid of either a lane closure or road closure, which will ensure that the trenching works are completed as expeditiously as possible.

Due to the length of cabling within the road corridor, these works are expected to be conducted just over a 3-month period (ca. 14weeks, assuming 75m of cable laid per day). The road closures will be applied for by the appointed contractor and will outline local diversions whilst maintaining local access at all times for residents, farms and businesses.

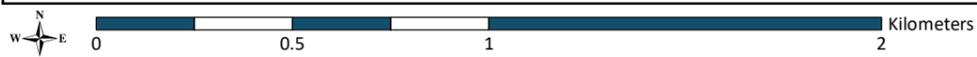
Road closures will be subject to the applicable statutory processes as implemented by the roads authority. Road closures will be facilitated by the existing network of roads in the area. ‘Rolling road closures’ will be implemented, whereby the site will progress each day along a road, which will have the effect of reducing the impact for local residents.



Legend

- Site Boundary
- Turbine Layout
- Substation (110-220kV)
- Underground Cable Route
- Onsite Substation
- Special Area of Conservation (SAC)
- Construction Compound

TITLE:	Grid Connection	
PROJECT:	Annagh Wind Farm, Co. Cork	
FIGURE NO:	13.8	
CLIENT:	EMPower	
SCALE:	1:18000	REVISION: 0
DATE:	14/10/2021	PAGE SIZE: A3





13.4.4 Turbine Delivery Route

The proposed turbine delivery route is presented in Figure 13-9. A Delivery Route Selection and Assessment was carried out to identify the optimum delivery route to site and is presented as Appendix 13-1 of this EIAR.

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). The proposed access route to site is as follows:

- Loads will depart Foynes Port and travel West-East via the N69 for approximately 30km until it joins the N18;
- Loads will travel south along the N18 for approximately 4km before exiting onto the M20;
- Loads will continue west on the M20 and then join the N20;
- Loads will continue to travel south on the N20 before turning off onto L1322;
- Loads will continue west on the L1322 to the proposed site entrance.

The table below outlines accommodation works which will be required along the turbine delivery route. Any accommodation works will be carried out in advance of the turbine deliveries, following further consultation and agreement with the local authority. The location and exact details of works required are detailed on vehicle swept path analysis drawings contained within the Turbine Delivery Route Survey Report in Appendix 13.1.

Table 13-5: Accommodation Works on Turbine Delivery Route

TDR Node Reference Number (POI__)	Location	Summary Description of Proposed Temporary Accommodation Works
2	Foynes Port Access Road/N69	Vegetation on right will require trimming to 2.5m over road level to boundary fence. Road sign will require temporary removal. Lampposts require temporary removal and vegetation on left will be trimmed above 1m in height for mid oversail. The top 40cm (approx.) of the wall on the left-hand side will be removed to allow for mid oversail.
4	Clarina Roundabout	Temporary hard surface in the form of compacted aggregate hard standing required on roundabout to provide a cut-through track through the centre island. This will require tree removal in the area identified on the vehicle swept path drawing and temporary signage removal.
5	Mungret Interchange – West Roundabout	Temporary load bearing surface required on roundabout to provide a cut-through track through the centre island. This will require vegetation removal and temporary signage removal.
6	Mungret Interchange – East Roundabout.	Temporary load bearing surface required on roundabout to allow for turn and oversail. Temporary removal of signage and public lighting required.
7	M20- N20 off ramp Southbound	Temporary removal of signs and street lamp on left side and scrub clearance on left and right for mid and rear oversail.

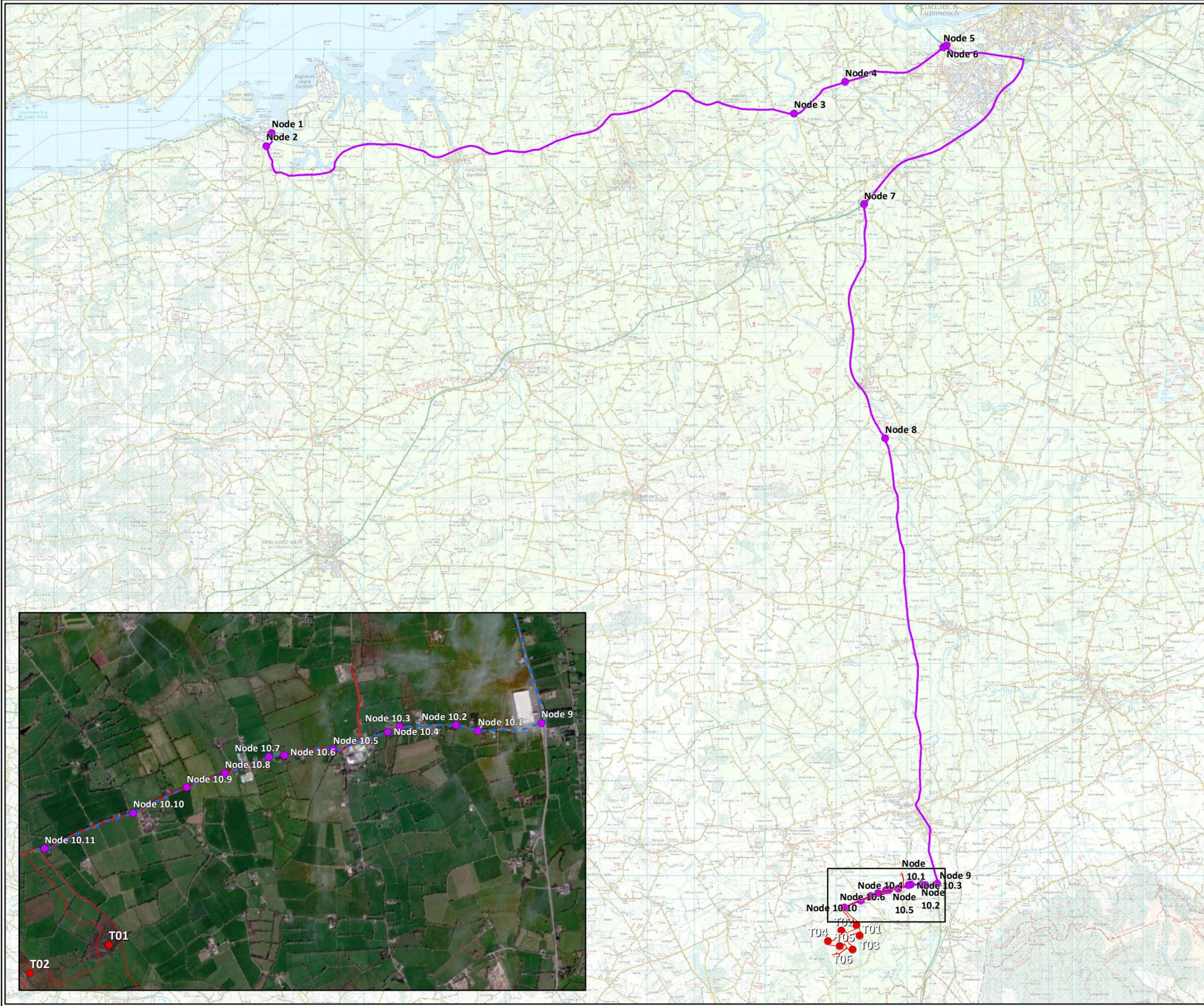


TDR Node Reference Number (POI__)	Location	Summary Description of Proposed Temporary Accommodation Works
8	N20 Right Curve. Ballymacrory	Vegetation trimming required to facilitate vehicle oversail on both sides of the road. Hedgerow to be lowered to 0.5m above road level on the right hand side to facilitate mid-oversail.
9	N20 – L1322 Junction, Ballyhea	Regrading and temporary load bearing surface required. Temporary removal of road signs to facilitate oversail.
10	L1322 Local Road – from Ballyhea to Site Entrance	Road will require upgrading and widening at various points to facilitate blade transport. There are ten POIs along the L1322 described below and illustrated in Appendix 13.1.
10.1	L1322	Temporary removal of fence and road markers to facilitate mid-oversail. Hedge trimming to facilitate vehicle oversail.
10.2	L1322	Vegetation trimming to facilitate vehicle oversail. Temporary removal of utility pole.
10.3	L1322	Vegetation trimming to tree canopy required. Vegetation removal to facilitated vehicle oversail.
10.4	L1322	Vegetation trimming to facilitate vehicle oversail.
10.5	L1322	Hedge and pump enclosure wall to be lowered to 0.5m above road level to facilitate vehicle oversail. Road narrows from this point onwards.
10.6	L1322	Section of wall to be lowered to 0.5m above existing road level to facilitate mid-oversail.
10.7	L1322	Vegetation trimming and temporary removal of utility pole.
10.8	L1322	Hedgerow and tree branch trimming to facilitate vehicle oversail.
10.9	L1322	Hedgerow trimming required on both sides of the road throughout this section to facilitate vehicle oversail.
10.10	L1322	Hedgerow trimming on the right-hand side to facilitate vehicle oversail.
10.11	L1322	This node forms the main site entrance as described in section 3.5.8.

All temporary accommodation works associated with the project shall be fully reinstated following the construction stage. Overhead utilities and obstructions will need to be removed at several locations to provide adequate overhead clearance. The removal of overhead utilities will involve temporary disconnections. Such works will be carried out by the utility providers in advance of turbine delivery to site.

Temporary accommodation works will only be required during the operational phase in the unlikely event of a major turbine component replacement. It is expected that these temporary accommodation works will not be required for the decommissioning phase as turbine components can be broken up on site and removed using standard HGVs.

The locations of the above accommodation works are indicated in Figure 13-9. Specific details of the proposed temporary works are presented in the accompanying route assessment report in Appendix 13.1.

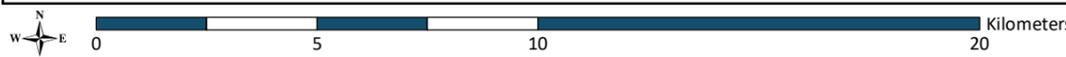


Legend

- Site Boundary
- Turbine Layout
- TDR Nodes
- Turbine Delivery Route

TITLE:	Turbine Delivery Route	
PROJECT:	Annagh Wind Farm, Co. Cork	
FIGURE NO:	13.9	
CLIENT:	EMPower	
SCALE:	1:160000	REVISION: 0
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13.5 Potential Impacts of the Proposed Project

Potential impacts of the proposed project are outlined below, these are categorised in relation to the construction phase, operational phase and decommissioning of the project. The Do-nothing Scenario is also detailed.

13.5.1 Do-Nothing Scenario

If the proposed project is not constructed, there will be no change to the current road network and existing traffic patterns within the study area.

13.5.2 Construction Phase Impacts

13.5.2.1 Main Wind Farm Site

The construction activities associated with the project will lead to additional construction related traffic on the existing public road network over the duration of the construction works. These impacts will include:

- Heavy Goods Vehicles (HGVs) transporting materials to and from the site, including road making materials, concrete, building materials, drainage/ducting materials, cabling, electrical components and excavated material.
- HGVs transporting conventional earthworks machinery such as excavators, dumper trucks and rollers.
- Fuel trucks transporting fuel for plant to each site compound during the construction phase
- Light Goods Vehicles (LGVs) such as cars, 4x4s and vans used by the workers and supervisory staff involved in the construction works.
- Oversized loads including turbine components (more details below).

Without appropriate mitigation measures, the proposed works have the potential to lead to a negative impact on the existing road network including:

- Delay and disruption to road users;
- Road safety issues should the works not be carried out in line with good traffic management practices;
- Inappropriate parking of construction related vehicles along the route of the works;
- Soiling of the public road leading to a general lack of cleanliness and poor skid resistance on roads;
- Damage to existing road surface.



13.5.2.2 Grid Connection

Cable Works

The traffic impact associated with the grid connection cable works will fall into two main categories, the construction traffic related impacts and the road/lane closure related impacts.

The proposed grid connection is shown on Figure 13.8.

Construction Phase

The cable route construction works will involve constantly moving the working area as the cable installation works progress. Grid works within the public road corridor are estimated to take approximately just over 3 months on the assumption that an average of 75m of cable is installed each day, with a 6 day working week. These works will lead to additional traffic associated with the cable route construction.

The construction activities associated with the grid connection works will generate construction related traffic on the existing public road network while the grid connection works are ongoing. These impacts will include:

- Heavy Goods Vehicles (HGVs) transporting materials to and from the main site, including road making materials for reinstatement works, drainage/ducting materials, cabling, electrical components and excavated material.
- Light Goods Vehicles (LGVs) such as cars, 4x4s and vans used by the workers and supervisory staff involved in the grid connection works.
- There will be construction traffic throughout the Grid connection works between the main site and working area involving the transport of materials when required

Road/Lane Closure Related Impacts

The grid connection construction works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed route.

All road works will be subject to a road opening licence, but it is anticipated that the cable installation along local roads will be advanced using a combination of rolling lane closures and temporary road closures where the existing road width is insufficient to accommodate an open lane for traffic to pass the works area.

The grid connection cable works by its nature will be isolated to a relatively small works area which will move on a daily basis. Impacts associated with the works will be experienced on the road network in the immediate vicinity to the works area.

Where lane closures are implemented, the traffic will be allowed to travel in both directions. A stop/go system will be used to control the flow of traffic passing the works. This will have a temporary negative effect on road users in the form of a disruption to normal traffic flows.

Temporary road closures will be required at specific locations for the installation of joint bays and cable pulling and jointing operations at later dates. These activities are isolated and carried out in under a day at each location. The location of joint bays are shown on planning application drawings.



In terms of traffic and transportation, the activities associated with horizontal directional drilling are isolated and typically carried out in under one working day. The works will be conducted within the public road. These works will require a road closure at the HDD location.

13.5.2.3 Turbine Delivery Route

The delivery of turbine components including blades, tower sections and nacelles is a specialist transport operation owing to the oversized loads involved. The blades are the longest component and have been considered for the purpose of this assessment.

Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will also be escorted by An Garda Síochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.

As described in Section 13.4, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and temporary local road widening through the laying of compacted aggregate to verges.

Without appropriate mitigation measures, the construction of the proposed temporary accommodation works have the potential to lead to a negative impact on the existing road network including:

- Delay and disruption to road users;
- Road safety issues should the works not be carried out in line with good traffic management practices;
- Inappropriate parking of construction related vehicles in the public road in the vicinity of the works areas;
- Soiling of the public road leading to a general lack of cleanliness and poor skid resistance on roads;
- Damage to existing public road infrastructure.

13.5.3 Operation Phase

A small number of full-time wind farm personnel are expected to be present during the operational phase of the project. Traffic associated with the operational phase of the project will be associated with the wind farm owner/operator and grid network operator personnel visiting the substation, and maintenance staff. There will also be a limited infrequent attendance by routine environmental monitoring/compliance staff.

Routine turbine maintenance is generally conducted by personnel climbing inside the tower. However, there may be circumstances where a crane may need to be mobilised to site to conduct non-routine maintenance.

The proposed substation has been designed in accordance with network operator requirements with welfare facilities however they will not require full time operational staff and shall be largely automated with occasional visits from maintenance teams.

Unforeseen or unplanned events such as emergency turbine repair works could potentially require the mobilisation of construction plant and personnel to site. The replacement of a large turbine component such as a blade will require a crane and the re-installation of some TDR temporary accommodation works. In such an event the impacts associated with these works will be less than those associated with the construction stage.



A cable fault along the grid connection could potentially require temporary road works for intrusive investigations and repair. The above unplanned events are extremely unlikely to occur, however.

13.5.4 Decommissioning Phase

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. The foundations will be covered over and allowed to re-vegetate naturally if required. It is proposed that the internal site access tracks and hard standings will be left in place.

Infrastructure associated with the grid connection will form part of the national transmission network and will be left in-situ.

The traffic impact associated with the decommissioning phase will be significantly less than the construction phase due to the considerably lower number of vehicle movements.

The decommissioning phase of the project is described in Chapter 3 of this EIAR and these works will be subject to a decommissioning plan which will be similar to the CEMP contained in Appendix 3.1 of this EIAR.

13.6 Impact Assessment

13.6.1 Construction Phase

The construction phase traffic generated by the project on the surrounding road network has been calculated by estimating the number of vehicles required for each phase of the project (construction, operation and decommissioning). The number of vehicles is then converted to the equivalent two-way trips, whereby every vehicle will generate two trips, one to and one from the site.

In order to assess the impact of the additional construction related traffic on the existing road network it is first required to estimate the amount of construction traffic that will be generated (trip generation) as a result of the proposed project.

This assessment was completed by estimating the amount of traffic, in the form of heavy goods vehicles (HGV) and light goods vehicles (LGV) that will be generated during the construction phase and then distributing it over the duration of the construction programme. In determining the number of 'trips' the estimated number of HGV vehicles was multiplied by a factor of 2 to account for a single trip 'in' and a corresponding single trip 'out'.

In the case of LGVs, the estimated number of vehicles was multiplied by 2.5 to account for some additional LGV movements e.g. some workers taking lunch breaks in the local area. The analysis allowed for a total number of trips per month to be calculated. This could be translated to annual average trips per day (AADT).

Some key assumptions taken when preparing the trip generation estimates include:

- An average ready mix concrete truck carries a load of approximately 8m³ of concrete;
- An average tipper truck carries approximately 10 m³ of soil/rock/aggregate;



- A construction period of 12 - 18 months is expected based on the nature and scale of the proposed works. In order to assess for worst case in terms traffic volumes per day, a 12-month construction programme has been assumed here;
- It has also been assumed that cable trenching works associated with the construction of the grid connection, which is expected to take 3 months to complete, there will be no overlap with the cable works in the public road with the turbine deliveries or construction of onsite infrastructure.
- It is expected following intrusive site investigations that site won material from the site will provide sufficient aggregates for general and engineering fill purposes and that surface course stone shall be imported from local quarries. Details of site investigations are contained in Chapter 9 of this EIAR.

Project related traffic will vary over the course of the construction programme. Activities can be broken up into the following main categories:

- Mobilisation and site setup
- Site clearance and felling
- Internal access tracks
- Turbine hard standing
- Turbine foundations
- Turbine Installation
- Onsite substation
- Grid connection cable works
- Private electrical network.
- Landscaping, reinstatement, demobilisation.

Table 13-6 and Figure 13-10 show construction stage vehicle trips and their distribution across the 12-month construction programme for the entire project.



Table 13-6: Vehicle Trip Distribution – Project Including Grid Connection Cable Works

Activity	One-Way Movements	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Total Trips per month	27392	2756	2576	2774	2774	2948	2974	2364	1799	1454	1651	1651	1671
Total HGV Trips per month (x2)	16266	1950	1770	1967	1967	2142	2168	1235	670	326	684	684	704
Total LGV Trips per month (x2.5)	11126	806	806	806	806	806	806	1129	1129	1129	968	968	968
Total Trips Per Week	6370	641	599	645	645	686	692	550	418	338	384	384	389
Total HGV Trips Per Week	3783	454	412	458	458	498	504	287	156	76	159	159	164
Total LGV Trips Per Week	2588	188	188	188	188	188	188	263	263	263	225	225	225
Total Trips Per Day	1062	107	100	108	108	114	115	92	70	56	64	64	65
HGV Trips Per Day	630	76	69	76	76	83	84	48	26	13	26	26	27
LGV Trips Per Day	431	31	31	31	31	31	31	44	44	44	38	38	38
Total Trips Per Hour	106	11	10	11	11	11	12	9	7	6	6	6	6
Total HGV Trips Per Hour	63	8	7	8	8	8	8	5	3	1	3	3	3
Total LGV Trips Per Hour	43	3	3	3	3	3	3	4	4	4	4	4	4

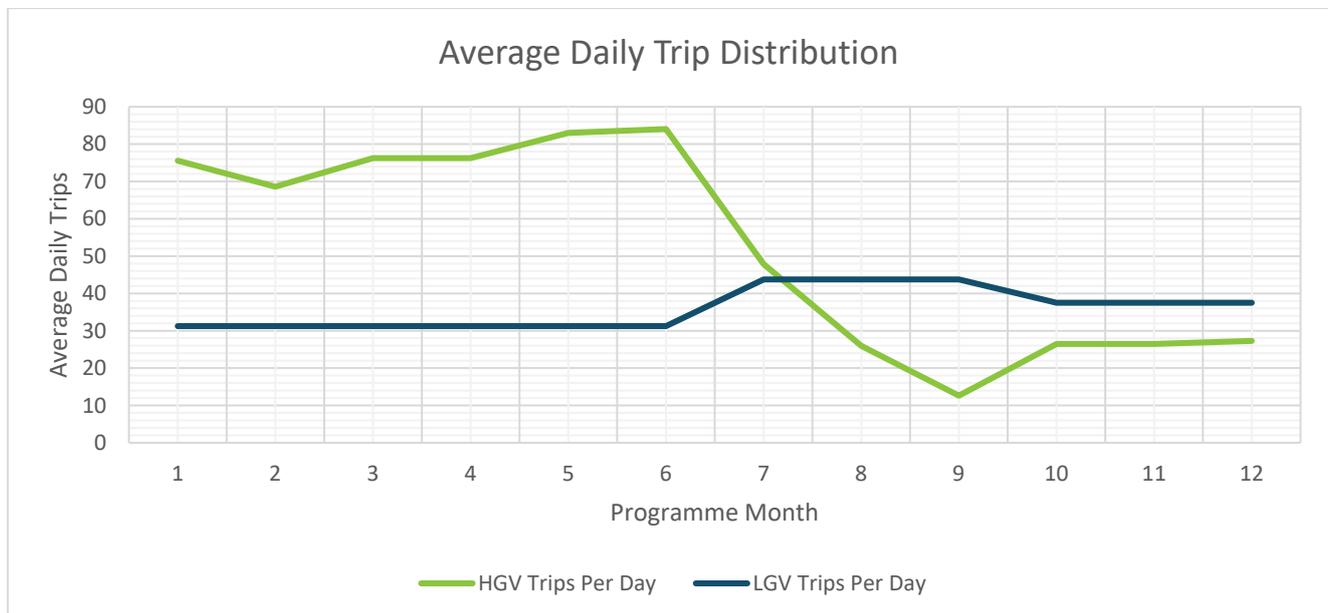


Figure 13-10: Average Daily Trip Distribution – Project Including Grid Connection Cable Works

The construction phase for the entire project will lead to 16,266 additional HGV trips (two-way) over the duration of the construction works.

Calculations of HGV movements associated with the construction of the project indicate an average daily increase of 53 HGV trips per day over a construction period of 12 months. This increases to an average of 84 HGV trips per day during the peak month which occurs in month 6 of the programme for HGV traffic.

An average workforce of 30 persons is anticipated, increasing to 40 persons during peak periods. This is estimated to give rise to an increase of LGV traffic of 36 trips per day on average rising to 44 trips during peak construction periods which occur for LGV traffic during months 7, 8 and 9.

The combined HGV and LGV average daily increase is 88 trips per day throughout the construction programme.

The predicted AADT during the construction phase of the proposed project is presented in Table 13-7. The impact on predicted future traffic on the surrounding road network is also presented in this table.



Table 13-7: Predicted AADT with Average Daily Construction Phase Traffic

Location	Predicted AADT During Construction (Estimated Site Start 2023)	HGV Pre-Development AADT	Average Daily Trips Generated by Development	Average Daily Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV Pre-Development AADT	AADT Development	Average Daily Trips Generated by Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
M20 - TMU M20 090.0 N M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,789	2,087	53	53	2,140	2.5%	32,702	32,702	36	36	32,738	0.11%	88	34,877	0.25%
N20 - TMU N20 080.0 N N20 Between Croom and M20, Croom North, Co. Limerick	16,276	1,098	53	53	1,150	4.8%	15,178	15,178	36	36	15,214	0.24%	88	16,365	0.54%
L1322	218	18	53	53	71	290.4%	200	200	36	36	235	18.01%	88	306	40.66%



The busiest period during the construction programme is expected to occur in month 6 when multiple construction activities take place concurrently. These activities include turbine hard standings, turbine foundations construction, turbine installation and on-site substation construction. During this month, combined HGV and LGV traffic increases to 115 average daily trips.

The predicted AADT for the project during peak months of the construction phase of the proposed project is presented in Table 13-8.



Table 13-8: Predicted AADT with Peak Construction Phase Traffic

Location	Predicted AADT During Construction (Estimated Site Start 2023)	HGV AADT Pre-Development	Average Daily Trips Generated by Development Peak Construction Month	Predicted HGV Trips During Peak Construction Month	% Increase	LGV Pre-Development	Average Daily LGV Trips Generated by Development Peak Construction Month	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined) During Peak Construction Month	Predicted Combined AADT During Peak Construction Month	% Increase
M20 - TMU M20 090.0 N M20 Between Jn02 Loughmore and Jn03 Ballycummi n, Co. Limerick	34,789	2,087	84	2,171	4.0%	32,702	44	32,746	0.13%	92	34,881	0.26%
N20 - TMU N20 080.0 N N20 Between Croom and M20, Croom North, Co. Limerick	16,276	1,098	84	1,182	7.7%	15,178	44	15,222	0.29%	92	16,368	0.56%
L1322	218	18	84	102	464.4%	200	44	243	21.93%	92	309	42.10%



The following sub-sections assess the impacts associated with the various elements of the project.

The construction of the proposed grid connection cable works has been separated from the rest of the project as these works will be isolated from the main wind farm site and carried out by a largely independent construction team.

13.6.1.1 Main Wind Farm Site

The volume and distribution of vehicle trips generated by the construction of the main wind farm site are presented in Table 13-9 and Figure 13-11.

Table 13-9: Vehicle Trip Distribution - Project Excluding Grid Connection Cable Works

Activity	One-Way Movements	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Total Trips per month	25232	2756	2576	2774	2774	2948	2974	2364	1799	1454	931	931	951
Total HGV Trips per month (x2)	14590	1950	1770	1967	1967	2142	2168	1235	670	326	125	125	145
Total LGV Trips per month (x2.5)	10643	806	806	806	806	806	806	1129	1129	1129	806	806	806
Total Trips Per Week	5868	641	599	645	645	686	692	550	418	338	217	217	221
Total HGV Trips Per Week	3393	454	412	458	458	498	504	287	156	76	29	29	34
Total LGV Trips Per Week	2475	188	188	188	188	188	188	263	263	263	188	188	188
Total Trips Per Day	978.0	107	100	108	108	114	115	92	70	56	36	36	37
HGV Trips Per Day	565.5	76	69	76	76	83	84	48	26	13	5	5	6
LGV Trips Per Day	412.5	31	31	31	31	31	31	44	44	44	31	31	31
Total Trips Per Hour	97.8	11	10	11	11	11	12	9	7	6	4	4	4
Total HGV Trips Per Hour	56.5	8	7	8	8	8	8	5	3	1	0	0	1
Total LGV Trips Per Hour	41.3	3	3	3	3	3	3	4	4	4	3	3	3

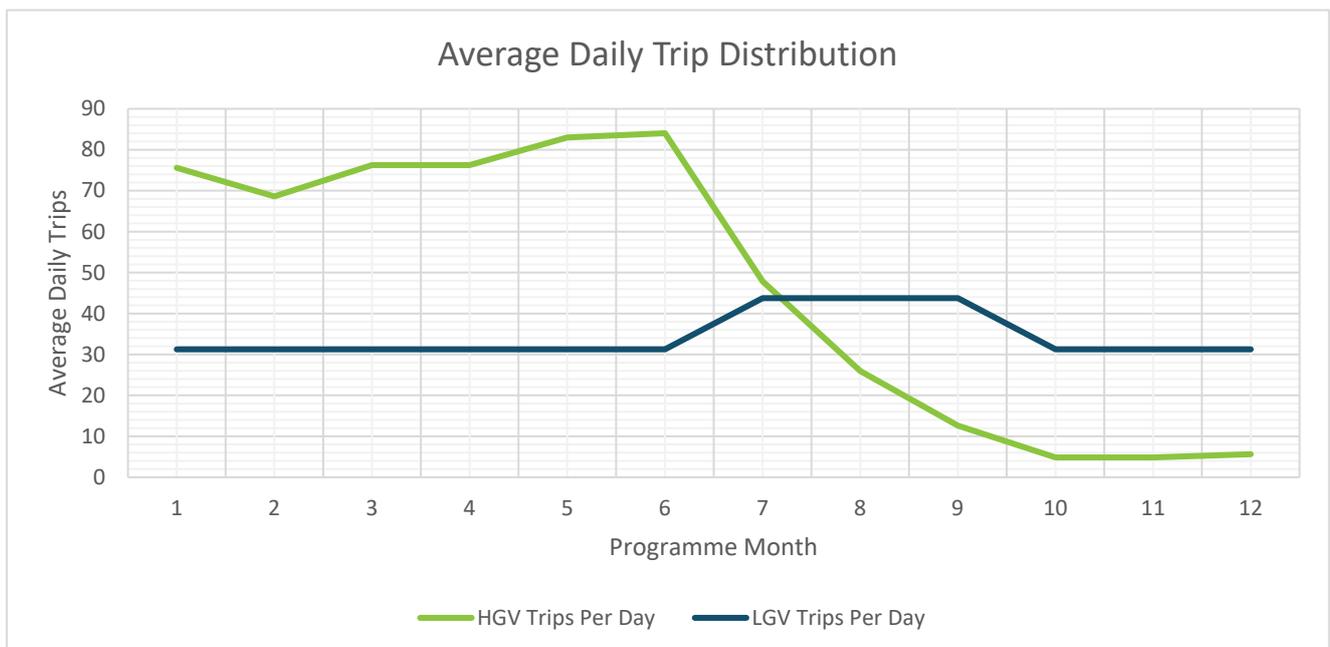


Figure 13-11: Average Daily Trip Distribution - Project Excluding Grid Connection Cable Works



It is estimated that the construction phase for the main wind farm site will lead to 14,590 additional HGV trips (two-way) over the duration of the construction works.

Calculations of HGV movements associated with the construction works indicate an average daily increase of 47 HGV trips per day over the course of the construction programme. The peak month for HGV trips occurs in month 6 where average daily HGV trips rises to 84.

An average workforce of 25 persons is anticipated, increasing to 30 persons during peak periods. This is calculated to give rise to an average daily increase of 34 LGV trips per day over a construction period of 12 months. The peak month for LGV trips occurs in month 7, 8 and 9 where average daily LGV trips rises to 44.

The combined HGV and LGV average daily increase is 81 trips per day throughout the construction programme.

The predicted AADT during the construction phase of the main wind farm site is presented in Table 13-10. The impact on predicted future traffic on the surrounding road network is also presented in this table.



Table 13-10: Predicted AADT with Construction Phase Traffic - Main Wind Farm Site Only

Location	Predicted AADT During Construction (Estimated Site Start 2023)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
M20 - TMU N20 090.0 N M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,789	2,087	47	2,134	2.3%	32,702	34	32,736	0.11%	81	34,870	0.23%
N20 - TMU N20 080.0 N N20 Between Croom and M20, Croom North, Co. Limerick	16,276	1,098	47	1,145	4.3%	15,178	34	15,213	0.23%	81	16,358	0.50%
L1322	218	18	47	65	260.4%	200	34	234	17.23%	81	299	37.45%



The works will result in a less than 1% temporary increase in traffic volumes on the M20 and N20. These roads form part of the TDR and haul routes for the construction of the project. The L1322 will see a more significant temporary increase in traffic volumes over the course of the construction phase of 37.45% respectively according to the table. The L1322 forms part of the proposed grid connection cable route, TDR and haul routes.

Based on the above, negative or adverse effects on the receiving environment associated with the construction works at the main wind farm site are considered to be short-term in duration and slight to moderate in significance without appropriate mitigation.

13.6.1.2 Grid Connection

The volume and distribution of vehicle trips generated by the construction of the grid connection cable works are presented in Table 13-11 and Figure 13-12:

Table 13-11: Vehicle Trip Distribution - Grid Connection Cable Works

Activity	One-Way Movements	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Total Trips per month	2160	0	0	0	0	0	0	0	0	0	720	720	720
Total HGV Trips per month (x2)	1676	0	0	0	0	0	0	0	0	0	559	559	559
Total LGV Trips per month (x2.5)	484	0	0	0	0	0	0	0	0	0	161	161	161
Total Trips Per Week	502	0	0	0	0	0	0	0	0	0	167	167	167
Total HGV Trips Per Week	390	0	0	0	0	0	0	0	0	0	130	130	130
Total LGV Trips Per Week	113	0	0	0	0	0	0	0	0	0	38	38	38
Total Trips Per Day	83.7	0	0	0	0	0	0	0	0	0	28	28	28
HGV Trips Per Day	65.0	0	0	0	0	0	0	0	0	0	22	22	22
LGV Trips Per Day	18.8	0	0	0	0	0	0	0	0	0	6	6	6
Total Trips Per Hour	8.4	0	0	0	0	0	0	0	0	0	3	3	3
Total HGV Trips Per Hour	6.5	0	0	0	0	0	0	0	0	0	2	2	2
Total LGV Trips Per Hour	1.9	0	0	0	0	0	0	0	0	0	1	1	1

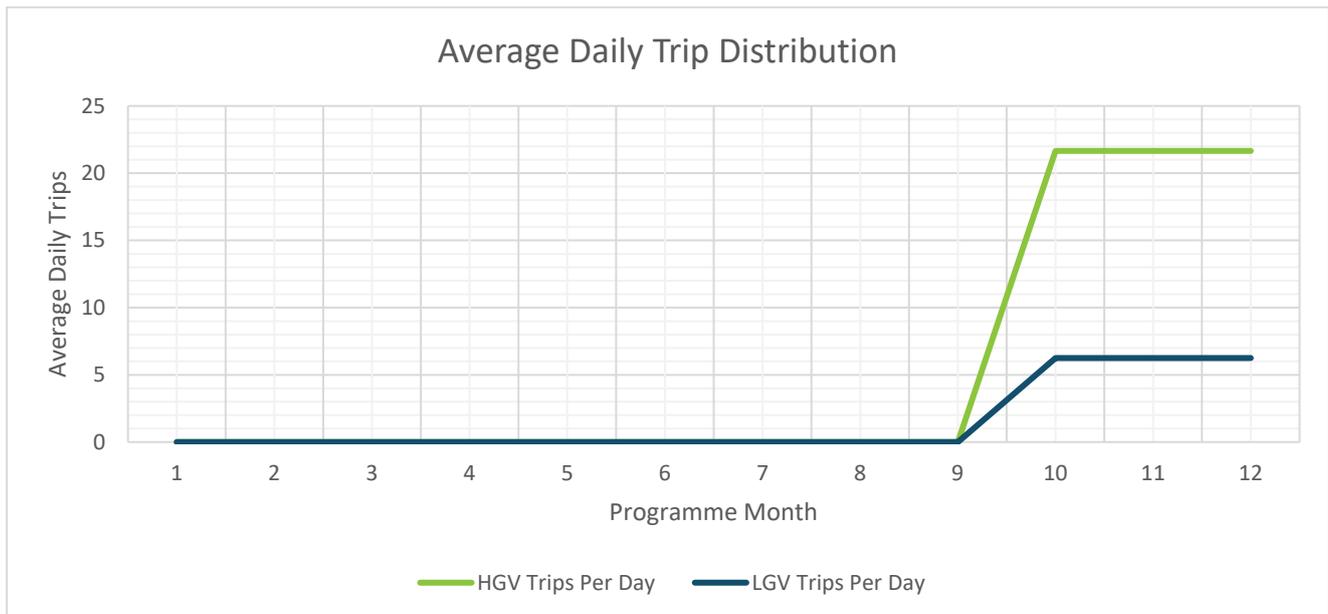


Figure 13-12: Average Daily Trip Distribution - Grid Connection Cable Works



It is estimated that the construction phase for the grid connection cable works will lead to 1,676 additional HGV trips (two-way) over the duration of the construction works.

Calculations of HGV movements associated with the construction works indicate an average daily increase of 5 HGV trips per day over the course of the overall project construction programme. The pattern of HGV trips shall remain relatively steady throughout the construction works and does not exceed 22 HGV trips per day on average over a 3-month duration.

The workforce associated with this activity is expected to give rise to an average daily increase of 2 LGV trips per day over a total construction programme period of 3 months. The pattern of LGV trips shall remain relatively steady throughout the construction works and does not exceed 6 LGV trips per day on average over a 3-month duration.

The combined HGV and LGV average daily increase is 7 trips per day throughout the overall project construction programme and 28 over a 3-month grid connection works construction programme.

As described in Section 13.5.2.2, the grid connection cable works by its nature will be isolated to a small works area which will move on a daily basis as the construction progresses along the route. Adverse impacts associated with the works will therefore be experienced on the road network in the immediate vicinity to the works area. Should the construction of the grid connection works be split over two or more works areas, this would result in a significant reduction in overall construction time. This approach would also have the effect of increasing the overall average number of construction vehicle trips per day associated with the construction of the grid connection, albeit over a shorter timeframe.

The predicted AADT during the construction phase of the grid connection cable works is presented in Table 13-12.



Table 13-12: Predicted AADT with Construction Phase Traffic – Grid Connection Cable Works

Location	Predicted AADT During Construction (Estimated Site Start 2023)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
M20 - TMU N20 M20 090.0 N M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,789	2,087	5	2,093	0.3%	32,702	2	32,703	0.00%	7	34,796	0.02%
N20 - TMU N20 080.0 N N20 Between Croom and M20, Croom North, Co. Limerick	16,276	1,098	5	1,103	0.5%	15,178	2	15,180	0.01%	7	16,283	0.04%
L1322	218	18	5	24	29.9%	200	2	201	0.78%	7	225	3.21%



The works will result in a less than 1% temporary increase in traffic volumes on the M20 and N20. These roads form part of the TDR and haul routes for the construction of the project. The L1322 will see a more significant temporary increase in traffic volumes over the course of the construction phase of 3.21% respectively according to the table. The L1322 forms part of the proposed grid connection cable route, TDR and haul routes.

While the overall temporary increase in traffic volumes can be considered low, there will be a noticeable temporary uplift in HGV traffic as a result of the grid connection cable works along these local roads throughout the duration of the works. HGV traffic associated with the grid connection cabling works will average 2no. trips per hour and is not expected to exceed this throughout the duration of the works.

As described in Section 13.5.2.2, the local roads associated with the proposed grid connection have very low levels of traffic and therefore the impact that the temporary proposed road works will have on the wider road network will be limited to the vicinity of the works area and surrounding local roads where diversions will be in place.

The cable route construction works will involve constantly moving the working area as the cable installation works progress.

The grid connection construction works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed route. The impact of the traffic diversions and lane closures on a section of road will depend on the location of the grid connection works and active traffic at the time of installation. All road works will be subject to a road opening licence. The cable installation along local roads will be advanced using a combination of rolling lane closures and temporary road closures where the existing road width is insufficient to accommodate an open lane for traffic to pass the work.

Where lane closures are implemented, the traffic will be allowed to travel in both directions. A stop/go system will be used to control the flow of traffic passing the works. This will have a temporary negative impact on road users.

Off-line sections of the proposed grid connection through private lands within the wind farm site will not generate any impact to existing traffic flows.

As described in Section 13.5.2.2, the grid connection cable works by its nature will be isolated to a small works area which will move on a daily basis as the construction progresses along the route. Traffic management measures associated with the works that will impact existing road users in the form of delays and diversions, will therefore be experienced on the road network in the immediate vicinity to the works area, where lane or road closures, and diversions would be implemented. Should the construction of the grid connection works be split over two or more works areas, additional lane/road closers and diversions will be required, however as mentioned above, this approach would result in a significant reduction in overall construction time over the entirety of the route.

Horizontal directional drilling operations will be required at a single location along the grid connection. The HDD activities are isolated and carried out in less than a day. A temporary road closure will be required for HDD operations within the public road corridor.

Based on the above negative or adverse effects on the receiving environment associated with the construction of the grid connection cable works, the impacts are considered to be short-term in duration and slight to moderate in significance without appropriate mitigation.



13.6.1.3 Turbine Delivery Route

Impacts along the TDR will be limited to specific locations where temporary accommodation works are required and on occasions where large turbine component deliveries are brought to the site. Temporary accommodation works are at isolated locations and will not generate significant construction traffic.

Negative or adverse effects on the receiving environment associated with the turbine delivery route are considered to be temporary in duration and slight to moderate in significance without appropriate mitigation.

13.6.2 Operational Phase

The trip generation for the project once operational is anticipated to be minimal as both the wind farm and substation will be operated remotely.

Effects on the receiving environment associated with the operation phase of the project are considered to be neutral in terms of quality, long-term in duration and imperceptible in significance.

For unforeseen or unplanned works, it is predicted that negative or adverse effects on the receiving environment will be temporary in duration and slight in significance without appropriate mitigation.

13.6.3 Decommissioning Phase

Negative or adverse effects on the receiving environment associated with decommissioning works at the main wind farm site are considered to be temporary in duration and slight in significance without appropriate mitigation.

Infrastructure associated with the grid connection will form part of the national grid network and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the grid connection and no mitigation is required.

Negative or adverse effects on the receiving environment associated with the turbine delivery route are considered to be temporary in duration and slight in significance without appropriate mitigation.

Impacts are summarised in Table 13-13 over.

Table 13-13: Impact Summary

Phase	Project Element	Main Receiving Environment	Description of Potential Effect		
			Duration	Quality	Significance
Construction	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Short-term	Negative/Adverse	Slight Moderate -
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Temporary	Negative/Adverse	Slight Moderate -



Phase	Project Element	Main Receiving Environment	Description of Potential Effect		
			Duration	Quality	Significance
	Grid Connection	Local road network along Grid connection, L1322	Short-term	Negative/Adverse	Slight - Moderate
Operation	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Long-term	Neutral	Imperceptible
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Long-term	Neutral	Imperceptible
	Grid Connection	Local road network along Grid connection, L1322	Long-term	Neutral	Imperceptible
Decommissioning	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Short-term	Negative/Adverse	Slight
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Temporary	Negative/Adverse	Slight
	Grid Connection	Local road network along Grid connection, L1322	N/A	N/A	N/A
Unplanned Events (i.e. Accidents)	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Temporary	Negative/Adverse	Slight
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Temporary	Negative/Adverse	Slight
	Grid Connection	Local road network along Grid connection, L1322	Temporary	Negative/Adverse	Slight



13.7 Mitigation Measures

This section outlines the mitigation measures that will reduce, minimise or eliminate the potential impacts created by the proposed project and outlined above.

13.7.1 Construction Phase

13.7.1.1 *Main Wind Farm Site*

The following mitigation measures are proposed to reduce the impact of the construction activity in relation to the construction phase of the project:

Traffic Management Plan

A detailed traffic management plan (TMP) will be agreed with the road's authority and An Garda Síochána prior to commencing construction. The TMP is included in the CEMP contained in Appendix 3.1. This includes the following:

Traffic Management Co-Ordinator – A dedicated Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project.

Roads and Routes: The final TMP will clearly identify roads that will be used to access the project site and roads that are not to be used. In some cases, the roads authority may wish that certain roads are not used for HGVs but can be used by LGV traffic. Haul routes to be used for this project are shown on Figure 13-6.

One-way Systems: as some of the local roads are relatively narrow, the roads authority may want to introduce a system of one-way construction traffic movements during the construction of the development. Any such one-way systems will be identified in the construction stage TMP in agreement with the roads authority.

Road Closures: with the use of the local roads network for the grid connection route, the narrow carriageway widths for some of the roads proposed may require full road closures. Any such road closures would be agreed with the roads authority in advance of construction and diversions would be incorporated into the traffic management plan.

Road Condition Survey: a pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. The specification and timing of the surveys will be agreed with the roads authority. Joint surveys shall be completed if the roads authority requests.

Road Reinstatement: All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

Site Inductions: All workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/not used to access the site.



24-Hour Emergency Contact: a 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for grid connection) and the site entrance for the wind farm site.

Traffic Management Guidance: all necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual published by the Department of Transport.

Letter Drops: a letter drop will be carried out to notify members of the public living near the proposed site and cable route to advise them of any particular upcoming traffic related matters e.g. temporary lane/road closure or delivery of turbine components.

Signage: Clear signage relating to the development, both temporary and permanent, will be provided for accessing the site.

Road Sweeper: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. When, if necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the project.

Site Entrances: The entrances to the site will be secured when the site is not in use. When necessary a flagman will be used to assist traffic movements at the site entrance or in other areas as required.

Abnormal Load Deliveries: Abnormal loads will require an abnormal load permit prior to delivery and will be delivered at times and frequencies directed by An Garda Síochána.

13.7.1.2 Grid Connection Works

Mitigation measures proposed for the grid connection works include:

Road Opening Licence: The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening license as agreed with the local authority.

Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.

Maintaining Local Access: reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated with the grid connection works. The details of this will be agreed with the roads authority in advance of the grid connection works commencing.

Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used when necessary, to ensure that the public road network remains clean.

Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the roads authority.

Haul Route Interface: Aggregates and other materials imported to the wind farm site will be managed to ensure they do not conflict with the grid connection works. Grid connection works will be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries.

Turbine Delivery Route Interface: the delivery of turbine components to the site will need to be managed to ensure there is no overlap with the grid connection works. Grid Connection works are to be scheduled so as not to conflict with turbine deliveries.



13.7.1.3 Turbine Component Delivery Mitigation

The turbine delivery route has been assessed using a detailed appraisal of potential routes and the identification of the most appropriate route including the required accommodation works along the route to mitigate the impact of the turbine delivery. The impact of the deliveries on traffic is mitigated by delivering components during off-peak or night-time deliveries.

Mitigation measures proposed for the turbine delivery route also include:

- **Programme of Deliveries:** a programme of deliveries will be submitted to the roads authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- **Garda Escort:** Turbine deliveries will be escorted by An Garda Síochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- **Reinstatement:** Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition.
- **Consultation:** Consultation with the local residents and Cork County Council will be carried out in advance to manage turbine component deliveries.

13.7.1.4 Met Mast Construction

The southern site entrance will be used only for construction of a new section of track to access the met mast location and for installation of the met mast. Appropriate sightlines are not achievable at this site entrance location so the following mitigation measures are proposed:

Banksman: During the construction phase a banksman will control traffic at the southern entrance to maintain traffic safety on the local road during construction activities relating to the installation of the proposed 100m met mast. The southern access will not be used for any other elements of the proposed development during the construction phase.

Note: the southern entrance will only be used during the operation phase for maintenance of the met mast (likely to be no more than one or two vehicles on a quarterly basis). Existing agricultural activity will continue on this laneway.

13.7.2 Operation

Site entrances at the wind farm site shall be maintained continually to ensure conditions at these entrances do not deteriorate. Hedgerow maintenance will be required to ensure continued visibility at the entrances.

13.7.3 Decommissioning

The traffic impact associated with the decommissioning phase will be significantly less than the construction phase.



All decommissioning works are to be carried out in accordance with a decommissioning plan to be prepared prior to the decommissioning phase of the project and agreed with the planning authority in advance. Traffic management measures identified will be included in the decommissioning plan for the wind farm.

Infrastructure associated with the grid connection will form part of the national grid and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the windfarm development and no mitigation is required.

Similar to the construction phase, a banksman will be required at the southern site entrance for the decommissioning (removal from site) of the proposed 100m met mast.

Mitigation measures adopted for project decommissioning shall be in line with those identified for the construction phase of the proposed development.

13.8 Residual Impacts

The implementation of mitigation measures outlined in Section 13.7 will ensure that residual impacts are minimised throughout the duration of the proposed activities.

13.8.1 Construction

Negative or adverse effects on the receiving environment associated with the construction works on the main wind farm site are considered to be short-term in duration and slight in significance following mitigation.

Negative or adverse effects on the receiving environment associated with the turbine delivery route are considered to be temporary in duration and slight following mitigation.

Negative or adverse effects on the receiving environment associated with the construction of the grid connection are considered to be short-term in duration and slight in significance following mitigation.

13.8.2 Operation

The trip generation for the project once operational is anticipated to be minimal.

Effects on the receiving environment associated with the operation phase of the project are considered to be neutral in terms of quality, long-term in duration and imperceptible in significance.

For unforeseen or unplanned works such as emergency turbine repair works described in Section 13.5.3 it is considered that negative or adverse effects on the receiving environment will be temporary in duration and not significant to slight following appropriate mitigation.

13.8.3 Decommissioning

Negative or adverse effects on the receiving environment associated with decommissioning works at the wind farm site are considered to be temporary in duration and not significant following mitigation.



Negative or adverse effects on the receiving environment associated with the turbine delivery route are considered to be temporary in duration and not significant following mitigation.

Infrastructure associated with the grid connection will form part of the national transmission network and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the project and no mitigation is required.

Table 13-14: Summary of Residual Impacts

Phase	Project Element	Main Receiving Environment	Description of Potential Effect		
			Duration	Quality	Significance
Construction	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Short-term	Negative/Adverse	Slight
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Temporary	Negative/Adverse	Slight
	Grid Connection	Local road network along Grid connection, L1322	Short-term	Negative/Adverse	Slight
Operation	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Long-term	Neutral	Imperceptible
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Long-term	Neutral	Imperceptible
	Grid Connection	Local road network along Grid connection, L1322	Long-term	Neutral	Imperceptible
Decommissioning	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Temporary	Negative/Adverse	Not significant
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Temporary	Negative/Adverse	Not significant
	Grid Connection	Local road network along Grid connection, L1322	N/A	N/A	N/A
Unplanned Events (i.e. Accidents)	Main Wind Farm Site	M20, N20, N18, N73, R578, L1322 and surrounding local road network	Temporary	Negative/Adverse	Not significant - Slight



Phase	Project Element	Main Receiving Environment	Description of Potential Effect		
			Duration	Quality	Significance
	Turbine Delivery Route	N69, N18, M20, N20, L1322	Temporary	Negative/Adverse	Not significant - Slight
	Grid Connection	Local road network along Grid connection, L1322	Temporary	Negative/Adverse	Not significant - Slight

13.9 Cumulative Impacts

All known existing and proposed projects within the study area that could potentially generate a cumulative impact with the project in relation to traffic and transportation during construction, operation and decommissioning were identified and examined as part of this assessment. Table 13-15 provides details of the projects within the study area that were considered for cumulative impacts.

Further details on existing and proposed projects assessed in the EIAR for cumulative impacts are contained in Chapter 1.

Table 13-15: Cumulative Projects

Project/Operation	Description
Replanting Works	Replant lands have been identified in the townland of Emlagh, near Kilkee, County Clare and are considered cumulatively with the project in this EIAR.
Solar Farm at Fiddane, Ballyhea, Co. Cork, Co. Cork	Consented 67.8 hectare solar farm bordering site to the north. Separate planning application for grid connection.
Solar Farm at Ballyroe, Dromin, Ballynadrideen, Ardnageehy, Rathnacally, and Clashganniv in Ballyhea, Charleville, Co. Cork	Consented 102.76 hectare solar farm and 3.4 km grid connection approximately 1km from the proposed wind farm site.
N/M20 Cork to Limerick scheme	the planned M20 project located east of the site

13.9.1 Replanting Works

Replant lands have been identified in the townland of Emlagh, near Kilkee, County Clare.

Works associated with replanting are isolated from the main project construction works and traffic associated with replanting is expected to be very low. HGV traffic associated with replanting works involve the mobilisation of an excavator for drainage works (if required) and delivery of tree saplings by truck. The works can be carried out by a small team.



There is no cumulative impact associated with replanting activities due to distance from the site.

13.9.2 Solar Farm at Fiddane, Ballyhea, Co. Cork, Co. Cork

The consented development consists of a 67.8 hectare Solar PV Farm. The proposed solar farm will consist of the installation of a 30 year operation and subsequent decommissioning of a series of ground mounted solar photovoltaic (PV) panels, mounted on steel support structures 2.1m in height, together with 1 single storey ESB control room, 14 electrical transformation enclosures, underground cabling, CCTV poles and cameras, deer type security fencing, site entrance, hardstanding area, landscaping along part of the northern site boundary and other associated development works, for the purpose of generating renewable energy electricity.

It is expected that, if developed, this project will be constructed in advance of Annagh wind farm, in which case, no cumulative impact would occur a result of this development.

13.9.3 Solar Farm at Ballyroe, Dromin, Ballynadrideen, Ardnageehy, Rathnacally, and Clashganniv in Ballyhea, Charleville, Co. Cork

The proposed development consists of a 10 year planning permission for the development of a 102.76 hectare solar PV farm and 3.425 kilometre underground electricity grid connection (0.34 hectares) giving a total combined area for both the solar farm and underground grid connection of 103.1 hectares. The proposed solar farm will consist of the installation of a 40 year operation and subsequent decommissioning of a series of ground mounted solar photovoltaic (PV) panels, mounted on steel support structures, together with 1 single storey ESB control room, 12 electrical transformation enclosures, underground cabling, inverters, CCTV poles and cameras, deer type security fencing, existing site entrance from the L5529 road, access tracks, hardstanding area, landscaping and biodiversity measures and all associated ancillary development works, for the purpose of generating renewable energy electricity. The proposed solar farm is located in the townlands of Ballyroe and Dromin, Ballyhea, Charleville, County Cork. The proposed underground electricity grid connection is to be installed entirely under public roads from the proposed solar farm at Ballyroe to Charleville 110kV ESB substation, which passes through the townlands of Ballyroe, Ballynadrideen, Ardnageehy, Rathnacally and Clashganniv in Ballyhea, Charleville, County Cork. A Natura Impact Statement will be submitted to the planning authority with this application.

It is expected that, if developed, this project will be constructed in advance of Annagh wind farm, in which case, no cumulative impact would occur a result of this development.

13.9.4 N/M20 Cork to Limerick scheme

The M20 motorway project from Limerick to Cork is currently at feasibility stage. In the highly unlikely scenario that this project commences during the construction phase of Annagh Wind Farm there is the potential for a direct cumulative negative effect on the receiving environment in the form of increased construction traffic and disruption during construction of the section of motorway near the turn off for Annagh Wind Farm.

Negative or adverse effects on the receiving environment associated with these activities are considered to be temporary in duration and significant without adequate mitigation. It should be noted however that impacts associated with the M20 development would have a considerably greater adverse effect on the existing road network than Annagh Wind Farm and would form the vast majority of the overall potential cumulative impact.



Measures contained within the construction stage TMP will ensure traffic management measures for both projects do not conflict. A TMP has been prepared as part of this EIAR and can be found in the CEMP.

13.10 Conclusion

There are no significant impacts expected on the receiving environment as a result of the construction, operation and decommissioning of the proposed project.

The proposed project is likely to result in a slight to moderate short-term negative impact on the existing road network during the construction phase if adequate mitigation measures are not implemented.

Following implementation of mitigation measures outlined herein, residual impacts during the construction phase shall be reduced and are not expected to exceed 'slight' in significance.

Impacts during operation and decommissioning are considered imperceptible to not significant.

There are no significant cumulative impacts expected on the receiving environment as a result of other existing or proposed projects.

The mitigation measures identified in this Chapter will be adopted and implemented by the Contractor and incorporated into the construction stage CEMP and TMP for the project .

A TMP is contained in the Construction Environmental Management Plan (CEMP) which is included in Appendix 3-1 of Volume 3 of this EIAR. In the event planning permission is granted for the proposed development, the final TMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.



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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED ANNAGH WIND FARM, CO. CORK

VOLUME 2 – MAIN EIAR

CHAPTER 14 – ARCHAEOLOGY, ARCHITECTURAL & CULTURAL HERITAGE

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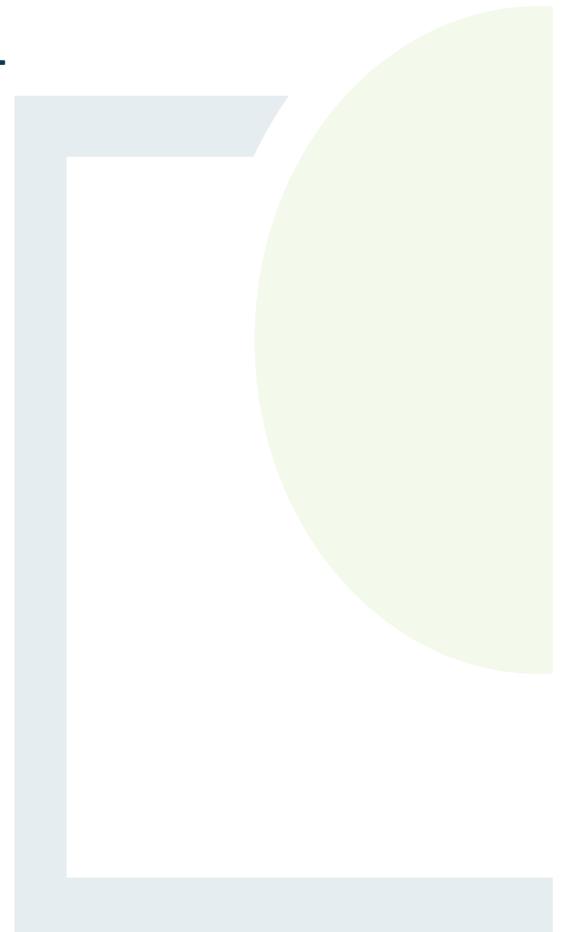


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14. ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

14.1 Introduction

This chapter assesses the impacts of the proposed project on the known and potential cultural heritage resource. The term ‘Cultural Heritage’ encompasses heritage assets relevant to both the tangible resource (archaeology, architecture heritage); and non-tangible resources (history, folklore, tradition, place names etc.). The recorded and potential cultural heritage resource within lands encompassing the proposed wind farm site and the surrounding landscape was reviewed in order to compile a comprehensive cultural heritage baseline for the assessment. The proposed grid connection and the route for the delivery of turbines to the site were also assessed.

The chapter was prepared by Tony Cummins and David Murphy of John Cronin Associates (the authors). Mr Cummins holds qualifications in archaeology (B.A. and M.A. (University College Cork (UCC), 1992 and 1994) and has over twenty-five years’ experience in the compilation of cultural heritage assessments. Mr Murphy holds a B.A. degree in archaeology (UCC, 2003) and has ten years’ experience in preparing cultural heritage assessments.

A detailed description of the proposed project assessed in this EIAR is provided in Chapter 3 and is comprised of three main elements:

- The wind farm (hereinafter referred to as the ‘Site’);
- Turbine delivery route;
- Grid connection route.

The Site includes locations of the six wind turbines and associated hardstands, site access and internal tracks, meteorological mast, internal electrical and communications cabling, temporary construction compound, drainage infrastructure and all other associated works related to the construction of the wind farm. The access and internal tracks will measure 5m wide, with localised areas measuring 5.6m at bends, other than a 3.5m wide access track to the proposed meteorological mast which will connect to an existing farm lane to the south of the Site. The side of the tracks will also include drainage channels. The grid connection will comprise a buried grid cable extending along public roads to an existing substation in Rathnacally townland, located c. 3.2km to the east of the Site. The turbine delivery route will require a number of upgrades between the Port of Foynes, County Limerick, and the wind farm site. This includes localised areas of works along the margins of the local road (L1322) extending between the Site and the N20 road which is located c. 4.2km to the east. The locations of these areas of ground works are assessed within this chapter and are described in Chapter 3.

Replant lands in the townland of Emlagh, near Moyasta, County Clare have been assessed Cumulatively in this Chapter.

The figures referred to in the Chapter are provided in Appendix 14.1 and extracts from the photographic record compiled during field surveys are presented in Appendix 14.2.



14.2 Methodology

The methodology used for this assessment is based on the EPA (2017) *Draft Guidelines for Information to be Contained in EIAR* as well as guidelines for the assessment of impacts on the cultural heritage resource as published by the International Council on Monuments and Sites (ICOMOS 2011). The assessment was based on a programme of desk-based research combined with a number of site inspections and these studies were undertaken to identify any features of archaeological, architectural or cultural heritage significance likely to be affected by the proposed project. The assessment encompasses the Site as well as the turbine delivery route work areas and grid connection route and also assesses cumulative impacts including those associated with relevant existing and permitted developments within the surrounding landscape and replant lands.

14.2.1 Desktop Survey

The assessment presents the results of a desktop study of relevant published sources and datasets undertaken in order to identify all recorded and potential archaeological, architectural and other cultural heritage sites/features/areas within the study area defined in Section 14.3.1. The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP). The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH), including its Survey of Historic Gardens and Designed Landscapes, were consulted during the review of the designated architectural heritage resource. Details on the legal and planning frameworks designed to protect these elements of the cultural heritage resource are also provided within the chapter (Section 14.3.2).

Other sources consulted as part of the assessment included the following:

Development Plan

The Cork County Development Plan (2014) was consulted as part of this assessment. This publication outlines the Council's policies for the protection of the archaeological and architectural heritage resource within the county and includes a list of Record of Protected Structures (RPS) and designated Architectural Conservation Areas (ACA). The Draft Cork County Development Plan (2021) was also reviewed.

Archaeological Inventory of County Cork Vol. 4: North Cork

This publication presents summary descriptions of the recorded archaeological sites within this area of the county and the relevant entries are included within the chapter. In addition, the current national online database resources pertaining to same were last reviewed in October 2021 (Historical Environment Viewer: www.archaeology.ie).

Irish Heritage Council: Heritage Map Viewer

This online mapping source (www.heritagemaps.ie) collates various cultural heritage datasets and includes datasets sourced from, among others, the National Museum of Ireland (NMI), the National Monuments Service (NMS), local authorities (including various Cork County heritage surveys), the Royal Academy of Ireland (RAI) and the Office of Public Works (OPW).

National Museum of Ireland Topographical Files

These files are archived in the National Museum's premises in Kildare Street, Dublin and comprise a record of information on the locations and discovery of archaeological artefacts held in the museum's collections. The files were inspected as part of the assessment and this revealed that they contain no records of the discovery of any archaeological objects within townlands in the environs of the project.



Database of Irish Excavation Reports

The Database of Irish Excavation Reports contains summary accounts of archaeological licensed excavations carried out in Ireland (North and South) from 1969 to present. Current data was last accessed via www.excavations.ie in October 2021.

Literary Sources

Various published literary sources were consulted in order to assess the archaeological, historical, architectural heritage and folklore record of the study area and these are listed in Section 14.7 of this chapter.

Historic Maps

The detail on historic cartographic sources can indicate the presence of past settlement and land use activity and may include evidence for features of archaeological and architectural heritage significance that no longer have any surface expression. A review of available map sources dating from the 17th century onward was carried out as part of the assessment and relevant extracts are presented in Appendix 14.1.

Aerial and Satellite imagery

A review of available online aerial and satellite images of the study area was undertaken in order to review modern interventions within the area and to ascertain if any traces of unrecorded archaeological sites or architectural heritage structures were visible.

Irish National Folklore Collection

A review was undertaken of transcribed material from the National Folklore Collection archive, which has been digitised and published online at www.duchas.ie.

UNESCO World Heritage Sites and Tentative List

There are two designated World Heritage sites in Ireland while a number of other significant sites have been included in a Tentative List (2010) nominated by Ireland to UNESCO for consideration as candidate sites. The locations of the designated and nominated sites were reviewed as part of the assessment.

14.2.2 Field Survey

The proposed project was surveyed by the authors on a number of occasions in 2020 and 2021 and included inspections of accessible known archaeological sites within the environs of the Site (see Section 14.3.4) as well as fieldwalking surveys of the locations and environs of the proposed project. The study area was assessed in terms of historic landscape, existing land use, vegetation cover and the potential for the presence of unrecorded archaeological sites and undesignated architectural heritage structures. The results are presented within the chapter while extracts from the photographic record compiled during the field surveys are provided in Appendix 14.2.

14.2.3 Consultations

A scoping report was issued to the National Monuments Service through the Development Applications Unit (DAU). A receipt of this consultation information was acknowledged by the DAU. A written summary of the elements of the known archaeological resource within the environs of the proposed project as well as an overview of the proposed methodology to be utilised for the assessment were also submitted to the Cork County Council Archaeologist (April 29th 2021) and no response was received.



14.2.4 Assessment of Impacts

The methodology used for this assessment has been informed by the Environmental Protection Agency (EPA) *Draft Guidelines for Information to be Contained in EIA* (2017), in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) and in Part 10 of the Planning and Development Regulations, 2001 (as amended).

The following summation of the criteria used to assess impacts is provided in order to clearly and concisely outline the methodology specifically applied to the cultural heritage resource.

Duration of Effect

The duration of effects is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year
- Short-term 1-7 years
- Medium Term 7-15 years
- Long Term 15-60 years
- Permanent > 60 years
- Reversible: Effects that can be undone, for example through remediation or restoration

Quality of Effect

The quality of an effect on the cultural heritage resource can be positive, neutral or negative.

- *Positive Effect* – a change which improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).
- *Neutral Effect* – no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- *Negative Effect* – a change which reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of an asset, physical intrusion on features/setting of a site etc.)

Type of Effect

The type of effect on the cultural heritage resource can be direct, indirect or no predicted impact.

- *Direct Impact* – where a cultural heritage site is physically located within the footprint of the proposed development, which will result in its complete or partial removal.
- *Indirect Impact* – where a cultural heritage site or its setting is located in close proximity to the footprint of the proposed development.
- *No predicted impact* – where the proposed development will not adversely or positively affect a cultural heritage site.



Magnitude of Effect

This is based on the degree of change, incorporating any mitigation measures, on a cultural heritage asset and can be negative or positive. The magnitude is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible and has been informed by criteria published in the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011) (Table 14-1).

Table 14-1: Magnitude of effect on Cultural Heritage Assets

High	<p>Most or all key archaeological or architectural materials affected such that the resource is totally altered</p> <p>Comprehensive changes to setting</p> <p>Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character</p> <p>Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation</p>
Medium	<p>Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified.</p> <p>Considerable changes to setting that affect the character of the archaeological asset.</p> <p>Changes to the setting of a historic building, such that it is significantly modified.</p> <p>Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character.</p> <p>Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.</p>
Low	<p>Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different.</p> <p>Slight changes to setting of an archaeological monument.</p> <p>Change to setting of a historic building, such that it is noticeably changed.</p> <p>Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character</p> <p>Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.</p>
Negligible	<p>Very minor changes to key archaeological materials or setting.</p> <p>Slight changes to historic building elements or setting that hardly affect it.</p> <p>Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; resulting in very small change to historic landscape character.</p> <p>Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.</p>



Value assessment criteria

While various national and local authority legal designations exist for elements of the Irish cultural heritage resource (see Section 14.3.2), there are currently no formal criteria for grading the values of individual elements of this resource. The National Inventory of Architectural Heritage (NIAH) does apply a ranking system (Local, Regional and National) to structures included in that inventory and, while these rankings do not confer a graduated level of protection they have been utilised as a value indicator for NIAH-listed structures for the purpose of this assessment. Given the absence of formal criteria the evaluations used in this assessment (Table 14-2) have been informed by guidelines presented in the ICOMOS *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011). The evaluation of the values of cultural heritage assets is, therefore, not intended as definitive but rather as an indicator which contributes to a wider judgment based the individual circumstances of each asset. The application of values included a consideration of their legal designations (e.g., National Monuments), condition/preservation; documentary/historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value on a case-by-case basis. It is noted that archaeological monuments, whether extant or levelled, have the potential to possess sub-surface attributes, such as artefacts, human burials or other archaeological remains, that may possess values that cannot be discerned without recourse to archaeological excavation but are unlikely to be affected in the absence of direct negative impacts. The value of all known or potential assets that may be impacted by development are ranked according to the following scale as defined by ICOMOS: Very High; High; Medium; Low and Negligible. The values assigned to identified cultural heritage assets within the study area were determined following the completion of the desktop research combined with subsequent site inspections and are presented in Section 14.4 of this chapter.

Table 14-2: Factors for assessing the Value of Cultural Heritage Assets

Indicative Value	Example of Asset Types
Very High	International Significance which may potentially include: <ul style="list-style-type: none"> • World Heritage Sites (including Tentative List properties) • Assets of acknowledged international importance • Assets that can contribute significantly to international research objectives
High	National Significance which may potentially include: <ul style="list-style-type: none"> • Designated <i>National Monuments in State Care</i> • Assets of significant quality, rarity, preservation and importance, including designated RMP sites • Assets that can contribute significantly to acknowledged national research objectives • Protected Structures/National NIAH Grade Buildings • Conservation Areas containing significant buildings of importance, including group value • Archaeological Landscapes with significant group value
Medium	Regional Significance which may potentially include: <ul style="list-style-type: none"> • Assets of moderate quality, preservation and importance • Assets that can contribute significantly to acknowledged regional research objectives • Regional Grade NIAH structures • Other undesignated buildings that can be shown to have exceptional qualities in their fabric or historical associations



Indicative Value	Example of Asset Types
	<ul style="list-style-type: none"> Undesignated structures of potential importance (archaeological, potential ‘new sites’) Conservation Areas containing buildings that contribute significantly to its historic character Historic townscape or built-up areas with notable historic integrity in their buildings and settings
Low	Local Significance which may potentially include: <ul style="list-style-type: none"> Assets of local importance, including structures graded as Local by NIAH Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Negligible	<ul style="list-style-type: none"> Assets with very little or no surviving archaeological interest Buildings of no architectural or historical note; buildings of an intrusive character

Significance of Effects

This is based on an assessment of the Magnitude of the Impact (graded from High to Negligible, based on a consideration of character, duration, probability and consequences) combined with the Value (graded from High to Negligible, based on a consideration of significance/sensitivity) of the cultural heritage asset. The Significance can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Tables 14-3 and 14-4).

Table 14-3: Significance of Effects (per EPA Draft EIAR Guidelines 2017)

Significance	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
Slight	An effect which causes noticeable changes in the character of the environment but 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 14-4: Significance of Effects Matrix (after EPA Draft EIAR Guidelines 2017)

Magnitude of Impact	High	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	Low	Medium	High
		<i>Value/Sensitivity of the Asset</i>			

14.3 Existing Environment

14.3.1 Introduction

A study area extending for 1km in all directions from the proposed locations of turbines, hardstands, access tracks, site compound, met mast and substation and 100m in all directions from the grid connection route and turbine delivery work areas was reviewed in order to assess the potential for direct impacts on known and potential elements of the cultural heritage resource. The extent of this study area was chosen in order to assess potential impacts on the locations and settings of known archaeological sites and architectural heritage structures within the environs of the project. In addition, the wider landscape extending for 10km from the Site was also reviewed to assess the potential for indirect impacts on the settings or visual attributes (e.g., ritual alignments or intervisibility) of monuments with notable visual sensitivities, e.g., National Monuments in State Care (Ownership / Guardianship) and other extant recorded monuments with potential ritual visual alignments across the landscape. The nearest National Monuments to the Site are Liscarroll Castle (CO016-015001-/National Monument Ref. no. 333) which is located c.7km to the southwest and Ardskeagh Church (CO003-014002-/National Monument ref. 314) located 6.7km to the east. There are no extant monuments with potential ritual alignments across the landscape (e.g., megalithic tombs, stone circles, stone rows) located within 10km of the Site.

The following sections present summaries of the legal and planning frameworks designed to protect the cultural heritage resource and details on the recorded and potential elements of this resource within the study area and the surrounding landscape.

14.3.2 Legal and Planning Context

This section presents a concise summary of the legal and planning policy frameworks relevant to this assessment in order to provide a context for the statutory protection assigned to the cultural heritage resource. The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the Granada Convention (1985) (formally the European Convention on the Protection of Architectural Heritage), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015.



The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were reviewed and none are located within the region containing the proposed project.

The National Monuments Service (NMS), which is currently based in the Department of Housing, Local Government and Heritage is responsible for the protection and promotion of Ireland's archaeological heritage. The national legal statutes and guidelines relevant to this assessment include:

- National Monuments Acts 1930-2014;
- Heritage Act 1995, as amended;
- National Cultural Institutions Act 1997;
- The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous) Provisions Act 1999;
- Planning and Development Act 2000, as amended;
- Dept. of Arts, Heritage and Gaeltacht 2011 *Architectural Heritage Protection: Guidelines for Planning Authorities* .
- Department of Arts, Heritage, Gaeltacht and the Islands 1999 *Framework and Principles for the Protection of Archaeological Heritage*.

14.3.2.2 Relevant Archaeological Legislation and Planning Policies

The National Monuments Act 1930 and its Amendments, the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains. There are a number of mechanisms under the National Monuments Acts that are applied to secure the protection of archaeological monuments. These include the designation of National Monument status, the Register of Historic Monuments (RHM), the Record of Monuments and Places (RMP) and the Sites and Monuments Record (SMR), and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites¹.

A National Monument is described as 'a monument or the remains of a monument, the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (Section 2, National Monument Act, 1930). There are no National Monuments in State Care located within the Site or its close environs and the nearest example is Lisscarroll Castle (CO016-015001-/National Monument Ref. no. 333) which is located c.7km to the southwest.

The RMP was established under Section 12 (1) of the National Monuments (Amendment) Act, 1994 and was based on the earlier SMR and RHM. It comprises lists and maps of all known archaeological monuments and places for each county in the State and all listed archaeological sites receive statutory protection under the National Monuments Act 1994. No works can be undertaken at their locations or within their surrounding designated Zones of Notification without providing two months advance notice to the NMS. There is one recorded archaeological site located within the redline boundary of the Site and this comprises a levelled fulacht fia (CO07-175) located within a forestry plantation. This is not located within the footprint of proposed any construction area within the Site.

¹ <https://www.archaeology.ie/sites/default/files/media/publications/NMS%20-%20Managing%20and%20Protecting%20Ireland%27s%20Archaeological%20Heritage%202013.pdf>



There are 22 other known archaeological sites within 1km of the redline boundary (Table 14-5) and six recorded archaeological sites in the lands located within 100m of either side of the local road extending to the east of the Site which will form sections of the grid connection route and turbine delivery route (Table 14-10). Details on these archaeological sites are provided in Section 14.3.3 which includes their inventory descriptions as published by the Archaeological Survey of Ireland. None of these archaeological sites are included in the current list of archaeological monuments that have been assigned Preservation Orders by the NMS².

The County Cork Development Plan 2014³ includes a number of policies and objectives in relation to the protection of the archaeological resource within the county including the protection of recorded sites (Plan ref. HE 3-1) and their environs (Plan ref. HE 3-3) and also requires that appropriate mitigation measures are enacted for newly discovered archaeological materials (Plan ref. 12.3.6). The Draft Cork County Development Plan 2021 was also reviewed and this revealed that there are no proposed additional archaeological constraints located within the study area.

14.3.2.2 Relevant Architectural Heritage Legislation and Planning Policies

The protection of the architectural heritage resource is provided for through a range of legal instruments that include the Heritage Act 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999, and the Planning and Development Act 2000. The Planning and Development Act 2000 requires Planning Authorities to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection in current Development Plans have become 'protected structures'. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. A protected structure also includes the land and other structures within its curtilage. While the notion of curtilage is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Dept. Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. In addition, planning authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance within their administrative areas through the designation of Architectural Conservation Areas (ACAs). The RPS for County Cork is published in the current Cork County Development Plan (2014) and includes one protected structure within 1km of the boundary of the Site (Cooliney House, RPS No. 020). The assessment process included a review of historical map sources to determine if any potential curtilage features associated with that house or other Protected Structures within the wider area extend into the proposed development areas. There are no ACAs located within the environs of the study area.

The NIAH was established in 1990 to fulfil Ireland's obligations under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architectural heritage of Ireland. While inclusion in a NIAH inventory does not provide statutory protection to a structure, the inventory is used to advise local authorities on compilation of their Records of Protected Structures. Two structures within the 1km study area around the Site are listed in the NIAH and these comprise the 18th century Cooliney House (NIAH Ref. 20900712) to the northeast and an early 20th century house in Ardglass (20900710) located to the west of the northern entrance to the Site.

The County Cork Development Plan 2014 includes a number of policies and objectives in relation to the protection of the architectural heritage resource within the county including the protection of designated structures (Plan refs. HE 4-1 and HE 4-2) and non-structural features such as gardens, masonry walls, railings, follies, gates, bridges and street furniture that are of built heritage significance (Plan ref. HE 4-3).

² <https://www.archaeology.ie/sites/default/files/media/publications/po19v1-all-counties.pdf>

³ http://corkcocodevplan.com/wp-content/uploads/2017/10/CCDP_Volume_1.pdf



The Development Plan also includes a number of policies and objectives in relation to the protection of the cultural heritage resource within the county, including aspects such as historical associations, place names, language and the arts (Plan refs. HE 5-1 and HE 5-2). The Draft Cork County Development Plan 2021 was also reviewed and this revealed that there are no proposed additional protected structures or Architectural Conservation Areas located within the environs of the study area.

The term ‘designated architectural heritage resource’ is hereafter used to describe structures listed in the NIAH and the County Cork RPS.

14.3.3 Desktop Study

The following section commences with a summary of the results of the desktop study on the lands within the study area extending for 1km around elements of the proposed wind farm (Section 14.3.3.1) and includes a review of the locations of National Monuments and other monuments with potential visual alignments within a wider 10km area. It then presents the results of studies on the lands within a 100m corridor centred on the sections of the local road that will form the grid connection route and also contains localised turbine delivery route work areas (Section 14.3.3.2).

Relevant datasets have been interrogated and retrieved from current state and local authority sources and are considered accurate at the time of writing in October 2021. The dating framework used for each period of the archaeological record is in accordance with the framework presented in the *Guidelines for Authors of Reports on Archaeological Excavations* as published by the National Monuments Service⁴. The published inventory entries of all recorded archaeological sites within the study area are presented along with references to relevant published sources that will provide general readers with further contextual information. A summary of the review of other sources consulted during the desktop study is also presented, including historic maps, literary sources, folklore and aerial/satellite imagery.

14.3.4.1 Wind Farm Site

There are 23 recorded archaeological sites located within 1km of the locations of proposed construction areas within the Site and these range in date from the late prehistoric to post-medieval periods (Table 14-5). The SMR does not record any unlocated archaeological sites within the townlands extending into this study area. The Archaeological Survey of Ireland has classified one of the recorded sites (CO007-041----) as a ‘redundant record’ which is non-archaeological in origin.

Table 14-5: Known Archaeological Sites Within 1km of the Wind Farm Site

Monument ref.	Class	Townland	ITM E	ITM N	Distance from nearest wind farm elements	Condition
CO007-033----	Ringfort	Ardglass	549621	618483	960m north of T2 650m west of site entrance	Levelled
CO007-036001- (RPS 00021)	Country House	Milltown	550044	619909	House is 1.26km north of the site entrance and south end of demesne	Extant

⁴<https://www.archaeology.ie/sites/default/files/media/publications/excavation-reports-guidelines-for-authors.pdf>



Monument ref.	Class	Townland	ITM E	ITM N	Distance from nearest wind farm elements	Condition
					lands is 650m to north of entrance The nearest turbine (T1) is located 2.1km to the south	
CO007-041----	Redundant record	Cooliney	550559	618009	160m southwest of compound	N/A
CO007-042----	Ringfort	Cooliney	551122	618267	415m northeast of T1 350m east of access track	Levelled
CO007-043001-	Ringfort	Cooliney	551163	618242	430m northeast of T1 380m east of access track	Extant
CO007-043002-	Moated site	Cooliney	551242	618250	500m northeast of T1	Levelled
CO007-044----	Earthwork	Ballynoran	551501	618432	800m northeast of T1	Levelled
CO007-045001- (RPS 0020)	Country house	Cooliney	551206	618888	840m northeast of compound 1,000m northeast of T1	Extant
CO007-045002-	Graveyard	Cooliney	551251	618982	930m northeast of compound 1,120m northeast of T1	Extant
CO007-045003-	Church	Cooliney	551243	618986	930m northeast of compound 1,120m northeast of T1	Partially levelled
CO007-070----	Ring-barrow	Cloonkeen	549179	617398	440m northwest of T4	Partially levelled
CO007-071----	Ringfort	Fiddane	549317	617613	450m north of T4	Levelled
CO007-072001-	Ringfort	Annagh North	550007	616842	80m north of Met Mast access track 190m southwest of T5	Extant
CO007-072002-	Enclosure	Annagh North	550057	616840	100m north of Met Mast access track 190m southwest of T5	Partially levelled
CO007-073----	Mound	Annagh North	550142	616201	825m southwest of T6	Extant
CO007-074----	Enclosure	Annagh North	550481	617332	360m southeast of T2 370m northeast of T5 80m east of access track	Partially levelled
CO007-075----	Fulacht fia	Coolcaum	551185	617705	260m northeast of T3	Levelled
CO007-076----	Mound	Coolcaum	551351	617572	380m east of T3	Levelled



Monument ref.	Class	Townland	ITM E	ITM N	Distance from nearest wind farm elements	Condition
CO007-115----	Castle - unclassified	Annagh South	549890	615669	1,000m south of Met Mast	Levelled
CO007-135----	Fulacht fia	Coolcaum	551226	617557	250m east of T3	Extant
CO007-137----	Castle - unclassified	Coolcaum	551330	617264	390m southeast of T3	Levelled
CO007-144----	Bridge	Annagh South	549815	615636	1,000m south of Met Mast	Extant
CO007-175----	Fulacht fia	Annagh North	549890	617255	70m west of substation 170m east of T4	Levelled

Prehistoric Periods

The following presents an overview of the types of prehistoric archaeological monuments, including their published inventory entries, located within the wind farm study area and the general reader is directed to *Iverni: A Prehistory of Cork* (O’ Brien 2012) which provides contextual information on archaeological record of the prehistory of the county as well as information on various monument types identified below. Apart from the recent identification of Palaeolithic human butchery marks on faunal remains recovered from cave sites in Counties Cork and Clare, the earliest recorded evidence for human activity in Ireland dates to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the heavily wooded island. The archaeological record indicates that these mobile groups tended to favour coastal, lake and river shores which provided a transport and food resource. They did not construct any settlements or monuments that have left any above ground traces although their presence in an area can often be identified by scatters of worked stone material such as flints in ploughed fields or subsurface remains of their temporary camps revealed by ground works undertaken during development projects. The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns in farmlands created within areas of cleared forestry. As a consequence of the more settled nature of agrarian life, new site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, and artefacts such as pottery begin to appear in the archaeological record during this period. While there are no recorded Mesolithic or Neolithic sites located within the study area, examples from both of these early prehistoric periods have been identified elsewhere in County Cork.

The advent of the Bronze Age period (c. 2400–500 BC) in Ireland saw the introduction of a new artefactual assemblage, including metal and ceramic objects, to the island. This period was also associated with the construction of new monument types such as wedge tombs, standing stones, stone rows/circles and burnt mounds known as *fulachta fia*. The development of new burial practices during this period also saw the construction of funerary monuments such as cairns, barrows, boulder burials and cists. The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). Relatively little has been known about Iron Age settlement and ritual practices until recent decades when the corpus of evidence has been greatly increased by the discovery of sites dating to this period during bog-cutting works and road construction projects. It is noted that while the vast majority of prehistoric settlement sites leave no above ground remains their foundations and occupation deposits, which may contain artefactual and environmental remains, can often survive below modern ground surfaces.



There are five recorded late prehistoric monuments located within 1km of the Site redline boundary and these comprise three *fulacht fia* (CO007-075----; CO007-135----; CO007-175----), a burnt mound (CO007-073----) and a ring barrow (CO007-070----) (see Table 14-5). Two unclassified mound sites (CO007-073--- and CO007-076---) within the study area may also form the remains of prehistoric monuments.

Fulacht fia comprise mounds of heat-shattered stones in charcoal-rich soil deposits, typically found close to a natural water source, and in their undisturbed form comprise horseshoe-shaped mounds surrounding a trough, which is often found to be stone or timber-lined. Over time many of the mounds were ploughed out and now survive as sub-surface spreads of the mound material. These sites functioned by filling the trough with water, which was then brought to boiling by the introduction of fire-heated stones. While generally considered to be cooking sites, the potential that some examples were used for other functions such as bathing, saunas garment washing and dyeing, leather processing sites. Archaeological evidence indicates that while this water heating technology may have originated in the Neolithic period, these sites did not become widespread until the Bronze Age (Hawkes 2018). The following descriptions of the recorded *fulachta fia* and one burnt mound site within the study area are published in the *Archaeological Inventory of North Cork* (Power et al 2000):

Fulacht fia (CO007-075----)

In pasture, on W side of drain. Barely perceptible mound of burnt material (10m N-S; 12m E-W; H c. 0.1m). According to local information, circular mound (diam. 4.5m; H c. 0.5m) levelled in 1978. Second fulacht fiadh (10574) c. 130m to S.

Fulacht fia (CO007-135----)

In pasture, on W side of drain. Roughly oval mound of burnt material (5m N-S; 3m E-W; H 0.48m); partially obscured by dumped earth. Immediately to W is smaller mound, not apparently composed of burnt material. Second fulacht fiadh (10573) c. 130m to N.

Fulacht fia (CO007-175----)

Located in flat, wet marshy area largely covered with rushes. A low, roughly circular grass-covered mound (10m SW-NE; 9m SE-NW; H. 0.45m) displays heat-shattered stones intermittently along its outer perimeter, especially along its eroding W side. The upper surface is uneven. A partly choked-up stream flows close to the W side. A slight depression in the SW quadrant of the mound may indicated the location of the trough. It appears that some time in the past material from the stream may have been deposited in the trough, given the mound a roughly circular appearance

Burnt mound (CO007-174----)

In a flat marshy area largely covered with rushes. A low, roughly circular, grass-covered mound (10m SW-NE; 9m SE-NW; H 0.45m) of heat-shattered stones and charcoal-enriched soil. The upper surface is uneven and heat-shattered stones are visible intermittently along its perimeter, especially along its eroded W side. There is a stream to the W.

There is one ring barrow (CO007-070----) located within 1km of the Site redline boundary. This site type is associated with Bronze or Iron Age burial and ritual traditions and comprises a circular mound enclosed by one or more ditches with outer banks. The mounds are often quite low and in cases where no mound exists at all the classification 'ring bank' or 'ring ditch' is often applied. While some excavated barrows have produced evidence for burials other examples have not and the encircling ditches and banks may simply have served to demarcate an area of now unknown special importance perhaps as empty tombs built as memorial cenotaphs (Waddell 1998 and Daly & Grogan 1993).



The following description of the ring barrow in Cloonkeen is published in the *Archaeological Inventory of North Cork* (Power *et al* 2000):

Ring barrow (CO007-070----)

In pasture, on gentle SE-facing slope. Circular area (diam. 6m-8m) enclosed by shallow fosse (D 0.1m) with almost levelled external bank (int. H 0.1m; ext. H 0.15m).

There are two recorded mounds (CO007-073--- and CO007-076----) located within 1km of the Site redline boundary. This site classification can often be applied to mounds that have morphologies that do not allow an accurate interpretation of their date or function, but it is possible that many date to the late prehistoric period. Some examples may represent the disturbed remains of *fulachta fia* or the remnants of a cairn or barrow site. The following descriptions of the two examples within the study area are published in the *Archaeological Inventory of North Cork* (Power *et al* 2000):

Mound (CO007-073----)

In pasture, atop hillock. Circular mound (diam. top 2.8m, base 11m; H 1.9m), tapering towards flat top.

Mound (CO007-076----)

In pasture, on gentle NW-facing slope. Depicted as hachured D-shaped platform (straight side c. 20m N-S; projecting c. 15m to W) with straight side abutting W side of field boundary. According to local information, 'mound' levelled in early 1970s. No visible surface trace of site.

Early Medieval Period

The early medieval period (c.400–1169 AD) in Ireland broadly commenced with the arrival of Christianity to Ireland. While the later stages of this period saw the emergence of the first phases of urbanisation around the Hiberno-Norse ports, the dominant settlement pattern continued to be rural-based and a detailed overview of the archaeological context of the period is provided in *The Archaeology of Early Medieval Ireland* (Edwards 1999). For much of the early medieval period the study area was in the territory of the Eóganacht Glendamnach, a sept of the Eóganachta dynasty which dominated the Munster area during the period between the 6th and 10th centuries. Prior to Eóganacht control, this area was dominated by the Orbraige tribe whose name is preserved in the name of the barony in which the study area is located, Orrery (and Kilmore). Powerful clans associated with Eóganacht Glendamnach included the O'Keefe's who were dominant in the region containing the study area during this period. During the latter part of this period the study area fell within the Kingdom of Desmond which was ruled by the McCarthy dynasty.

The most common early medieval sites within the Irish landscape are ringforts which comprise circular enclosures delimited by earthen banks formed of material thrown up from a concentric external ditch while stone-built variants known as cashels are common within western counties. The ubiquity of these enclosures within the Irish landscape is attested to by the fact that their original Gaelic names (*rath, lios and dun*) still form some of the most common place-name elements in the country. Archaeological excavations have demonstrated that the majority comprised enclosed farmsteads containing the foundations of domestic and agricultural buildings. Ringforts may form the visible element of wider farmlands (known as *airlise*) that may contain unrecorded, sub-surface archaeological features such as associated field systems, stockades, barns, mills and drying kilns. There are five recorded ringforts within the study area and these are located in the townlands of Ardglass (CO007-033----), Cooliney (CO007-042---- and CO007-043002-), Fiddane (CO007-071----) and Annagh North (CO07-072001-).



The following descriptions of these sites are published in the *Archaeological Inventory of North Cork* (Power et al 2000):

Ringfort (CO007-033----)

In pasture, on SE-facing slope. Depicted as hachured circular enclosure (diam. c. 25m) skirted to NE by field boundary on 1842 OS 6-inch map; as hachured circular raised area (diam. c. 25m) on 1905 and 1936 OS 6-inch maps, skirted to NW and NE by field boundary. Levelled; circular area (30m N-S; 29m E-W) enclosed by shallow fosse, distinguished in parts by differential growth pattern. Surrounding field fences removed.

Ringfort (CO007-042----)

In pasture. Depicted as hachured circular enclosure (diam. c. 20m) on 1842 OS 6-inch map. Levelled; no visible surface trace. Ringfort (CO007-04301-) lies c. 40m to ESE in adjoining field.

Ringfort (CO007-043001-)

In pasture. Circular, slightly raised area (25.6m NW-SE; 25.5m NE-SW) enclosed by earthen bank (int. H 0.9m; ext. H 1.15m) NNE->ESE and SW->NW, with external fosse (D 0.25m); scarp ESE->SW. Enclosure truncated on NNW side by field boundary. Possible moated site (CO007-04302-) lies c. 40m to E; levelled circular enclosure (CO007-042---) lies c. 50m to WNW.

Ringfort (CO007-071----)

In pasture, on gentle SE-facing slope. Depicted as hachured circular raised area (diam. c. 25m) skirted by field boundary S->N on 1936 OS 6-inch map. Levelled; circular area (29.6m N-S) defined by two low rises (H 0.15m) to S, W and N, with intervening fosse; scarp elsewhere. Interior slopes down to E. Surrounding field fence levelled.

Ringfort (CO007-072001-)

In southern portion of Annagh bog. Circular area (31m NE-SW; 30m NW-SE) enclosed by two earthen banks with intervening fosse and external fosse S->E; counterscarp bank (H 0.25m) to S and E. Inner bank (int. H 0.3m) survives best to W; disturbed NE->SE by drains. Outer bank (H 1.85m) more substantial than inner bank. Intervening fosse and external fosse (D 0.25m) mainly muddy and waterlogged. To SE two parallel banks edge opening through outer bank and external fosse. Oval enclosure (CO007-07202-) lies 22m to E.

Two other recorded enclosure sites are located within the wind farm study area and, while this classification can theoretically date from any period from prehistory onwards, many may form the remains of unclassified ringforts. The following descriptions of the recorded enclosure sites within the study area are published in the *Archaeological Inventory of North Cork* (Power et al 2000):

Enclosure (CO007-072002-)

In southern portion of Annagh bog, c. 22m to E of bivallate ringfort (12036). Depicted as hachured mound on 1936 OS 6-inch map. Oval slightly raised area (18m NW-SE; 14.5m NNE-SSW) enclosed by low earthen bank (int. H 0.2m; ext. H 0.4m), with external fosse (D 0.2m) to S and N. Break (Wth 1.2m) in bank to SE; numerous gaps in bank worn down due to animal activity. Bank and interior grass-covered; interior surface uneven.

Enclosure (CO007-074----)

Cropmark of bank and external fosse of subrectangular enclosure (diam. c. 30m) visible in aerial photographs (GSIAP, R646-7, R610); three sides straight while fourth, the SW, is curved.



High and Late Medieval Periods

The arrival of the Anglo-Normans in the late 12th century broadly marks the advent of the Irish high medieval period which continued to c.1400 and was followed by the late medieval period which extended to c.1550. Following the arrival of the Anglo-Normans, the eastern half of Desmond kingdom was conquered by the Anglo-Normans and became the Earldom of Desmond, which was ruled by the FitzGerald's and Fitzmaurices. Underlords of the FitzGerald's, the de Barry's, held extensive lands in the area of north Cork which contains the study area. Other landowners in this area included the Fitzgibbons who are connected with the site of a now levelled castle (CO007-137----) in Coolcaum townland which is described as follows in the *Archaeological Inventory of North Cork* (Power *et al* 2000):

Castle – unclassified (CO007-137----)

In pasture, on gentle W-facing slope. No visible surface trace of castle. Landowner described raised area (H c. 4ft) in field, where area some cut stone was uncovered when area levelled.

Castle of the FitzGibbons (Healy 1988, 324).

Further evidence of Anglo-Norman settlement within the study area during this period is evidenced by the presence of a moated site (CO007-043----) in Cooliney townland and a reference in the Papal Taxation of 1291 to a church in the same townland which was likely at the same location as the 17th century Cooliney parish church (CO007-045003-) (Brady 1863, vol. 2, 175-6). Moated sites are square, rectangular or occasionally circular areas, sometimes raised above the ground, enclosed by a wide, often water-filled, fosse, with or without an outer bank and with a wide causewayed entrance. They date to the late 13th/early 14th centuries and typically comprised the farmsteads of Anglo-Norman settlers, though they were also built by Gaelic groups. The moated site in Cooliney, which was potentially constructed by a Geraldine settler perhaps connected with the de Barry family, is described as follows in the *Archaeological Inventory of North Cork* (Power *et al* 2000):

Moated site (CO007-043----)

Depicted as hachured rectangular enclosure (c. 45m N-S; c. 25m E-W) on 1842 OS 6-inch map; as hachured rectangular enclosure on 1905 and 1936 OS 6-inch maps, with N end rounded. According to local information, levelled early 1970s. In low-lying pasture. Some rush growth and waterlogging in area of site to S which may indicate line of infilled fosse. Roughly rectangular enclosure clearly visible in aerial photograph (GSIAP, R610; May 1977) as soilmark of levelled bank, narrowing to N end. Listed by Barry (1981, 82, no. 23). Ringfort (12351) c. 40m to W.

Post-Medieval and Early Modern Periods

The centuries following 1550 comprise the post-medieval period which continued into the middle of the 19th century and the period thereafter is often described as early modern. The early part of the post-medieval period was a turbulent time in Ireland history and saw a period of wars between the 1560s and 1603 and further conflict during the Cromwellian Wars (1649–53). This period saw the extensive dispossession of forfeited Gaelic lands which included the dismantling of the Earldom of Desmond with the dispossession of the Fitzgerald's and many associated families following the defeat of the Desmond rebellions of the 1570s and 1580s. The final disintegration of the Gaelic order in the early 17th followed the Battle of Kinsale (1601), the conclusion of the Nine Years War (1603) and the Flight of the Earls (1607). In 1641 the forfeited lands within and surrounding the study area were in the possession of Roger Boyle, 1st Earl of Orrery who possessed a total of 28 townlands within the barony of Orrery alone. In 1670, following the turbulence of the Cromwellian Wars, the lands within the study area formed part of the possessions of Philip Percival who had obtained grants of forfeited lands in Ireland to the amount of 101,000 statute acres. His descendants remained in possession of these holdings into the 18th and 19th centuries with titles such as the Baron of Burton and the Earls of Egmont bestowed upon them.



The former parish church (CO007-045003-) and graveyard (CO007-045002-) in Cooliney townland date to the 17th century with the church recorded as 'in repair' in 1615 but abandoned by 1694. The church and graveyard are described as follows in the *Archaeological Inventory of North Cork* (Power et al 2000):

Church (CO007-045003-)

In centre of graveyard. Ruin of rectangular church (int. 16.8m E-W; int. 7.61m N-S); most of E and W walls fallen, but N and S walls stand to full height (H 4.8m). Entered through doorway W-of-centre in S wall: inside of doorway much ruined; outside covered by segmental relieving arch, possibly rebuilt; part of W door jamb survives, as does part of drawbar socket on E side. Featureless gap (Wth 2.5m) near E end of N wall. Small openings through walls probably putlog holes. According to Grove White (1905-25, vol. 2, 249), in 1909 'of the E gable about 3 ft. or 4ft. of masonry existing, and about 9ft. of W end standing.' Remains of parish church of Cooliney. Reported 'in repair' in 1615, abandoned by 1694 (Brady 1863, vol. 2, 175-6). A church here listed in Papal Taxation of 1291 (ibid.).

Graveyard (CO007-045002-)

Approached by short avenue from road to E. Triangular graveyard (c. 40m N-S; c. 60m E-W), enclosed by stone wall to E, earthen banks elsewhere. Ruin of parish church of Cooliney (14414) in centre. In occasional use; many 18th- and 19th-century headstones noted; also many low uninscribed gravemarkers. Cross-inscribed graveslab to Thomas Dore, dated 1633 with Latin and English inscriptions, within church; cover of chest tomb outside S wall of church dated 1678 (Grove White 1905-25, vol. 2, 250; Anon. 1888-91).

The 17th-century Down Survey (1660s) and accompanying Books of Survey and Distribution (1670s) records of the place names and landowners of townlands within the Site prior to and following the Cromwellian wars are presented in Table 14-6. There is also an early 17th century reference to Annagh in the Calendar of Patent Rolls of James I of 1604 (www.logainm.ie).

Table 14-6: Down Survey records of 17th century landowners within study area

Townland	17 th century name	1641 Landowner	1670 Landowner
Annagh North	Boannagh	Boyle, Roger Baron Broghill (Protestant)	Perceval, Sir Philip (Protestant)
Annagh South	Boannagh	Boyle, Roger Baron Broghill (Protestant)	Perceval, Sir Philip (Protestant)
Coolcaum	Carhy na Maddery	Downe, Teige Carty alias (Catholic)	Earl of Cork (Protestant)
Cooliney	Unforfeited Lands	Land, Unforfeited (Protestant)	Land, Unforfeited (Protestant)
Fiddane	Ffedanes	Slingsby, Henry (Protestant)	Bowerman, Colonel Henry (Protestant)

An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for both tillage and dairy produce which resulted in landlords investing in extensive land improvement works within their holdings to increase productivity and this included the widespread enclosure of formerly open lands into field systems.



The post-medieval period saw the development of high and low status stone houses throughout the Irish countryside and rural settlement clusters at this time typically consisted of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common during the 19th century. The settlement pattern throughout much of the rural landscape was greatly impacted by the famine period and its aftermath during the middle of the 19th century which saw the depopulation of many areas. The Site extends into two civil parishes (Aglisdrinagh and Churchtown) and the following is a summary 19th century descriptions of these areas as published in the *Topographical Dictionary of Ireland* (Lewis 1837). The description of Aglishdrinagh parish notes that it comprises 4770 statute acres in area and that the land under tillage is in general of good quality, but a very large portion of the parish consists chiefly of hilly pasture. Churchtown parish is described as comprising 7029 ½ statute acres and the land is described as generally good, and mostly in pasture; and agriculture is improving. Some bog, limestone, and a reddish-coloured marble are found within the parish.

There are a number of recorded post-medieval archaeological sites located within the study area and its environs and these include two country houses and their associated lands. The 18th century Cooliney House (CO007-045001-/RPS 00020) is located in lands c. 1km to the northeast of the nearest turbine (T1) and is a Palladian-style country house which is likely built on site of an earlier structure shown on the 17th Down Survey map. The original house appears to have burnt down in the 1730s and was subsequently replaced by the existing structure. A review of Ordnance Survey (OS) maps from the 19th century indicates that the property did not have any associated extensive demesne lands and the NIAH Survey of Historic Gardens and Designed Landscapes does not include any entries for the property. The house is described as follows in the *Archaeological Inventory of North Cork* (Power *et al* 2000):

Country house (CO007-045001-)

Two-storey 18th-century house. Entrance front (S) of 6 bays with central 2-bay pedimented breakfront, pediment contains D-shaped niche. Central door ope approached by sweep of stone steps; vertical half-door flanked by large sidelights, door and sidelights framed by ashlar limestone surround topped by wide open pediment; fanlight in pediment has prominent keystone. Sash windows, with curved sills. String course divides floors; moulded cornice at eaves level. Side elevations 4 bays deep. Double hipped roof with projecting eaves, of 19th-century appearance. Front of house has basement but not rear half which appear to be added to front. Off-centre addition to rear. Two-storey farm buildings to N. Land granted to Henry Bowerman 1659 (Grove White 1905-25, vol. 2, 251); house shown in this location on Down Survey (1655-6) (1655-6) barony map. According to owner house burnt c. 1730; however, in 1750 (Smith 1750, vol. 1, 307) it was occupied and 'beautified with fine plantations'.

An 18th century country house known as Milltown Castle (CO007-036001-/RPS 00021), while located outside the study area at a distance of c. 2.1km to the north of the nearest turbine (T1), contains associated demesne lands which are included in the NIAH Survey of Historic Gardens and Designed Landscapes (ref. 2754). A review of the NIAH garden survey record as well as historic OS maps indicated that these demesne lands did not extend into the Site and their southern boundary was located c.650m to the north of the Site entrance. The house itself is described as follows in the *Archaeological Inventory of North Cork* (Power *et al* 2000):

Country House

Two-storey rectangular house, over basement; late 18th-century in appearance. Hipped roof with central valley. Entrance front (NE) of 3 bays with ashlar limestone quoins; central 1-bay pedimented breakfront framed by limestone quoins, oculus in pediment. Central wide round-headed door ope atop stone steps, wide fanlight and sidelights with astragals incorporated into frame, rusticated ashlar pillars between lights and door ope.



Riveted wooden door with diamond panels and large L-shaped hinges, said to have come from nearby castle (14316). Camber-headed sash windows; ground-floor opes use top of basement plinth as sill; central 1st-floor sash window flanked by slim windows all using single sill. SE elevation of 3 bays. NW elevation weatherslated with broad 1-storey porch slightly off-centre. Rear irregular in plan with hipped roof of main body of house continuing over shallow projection on SE side. Short extension indicated on 1842 OS 6-inch map on NW side of rear, longer extension indicated on 1902 and 1936 OS 6-inch maps; neither survives. Central curved cantilevered staircase within, lit by overhead light (Bence-Jones 1978, 206). Long U-shaped farm buildings to NW with central broad curved gable of ashlar limestone topped with bellcote; two niches contain busts similar to those at lodge. Entrance piers topped with eagles atop balls. Ruined 1-storey lodge adjacent: coursed ashlar front facade with three niches, two containing busts of men dressed in late-17th century style; according to owner, these represent Oliver Cromwell and William of Orange.

In 1750, writing in his *'The Ancient and Present State of the County and City of Cork'*, Charles Smith recorded the existence of a small village settlement in the Annagh area which was located within the environs of Annagh Bridge (CO007-144----) and the former site of Annagh Castle (CO007-115----) both of which are c. 1.5km to the southwest of the nearest turbine (T6). The village, which apparently had a thriving linen industry, contained a chapel, castle and two taverns. The castle within the village was originally a possession of the FitzJames Barry's but was transferred into the ownership of the Percival family when they were dispossessed in 1629. Smith describes the village as 'within a tract of fertile land and lied on the verge of a great marsh...this place, with a large tract of the adjacent land, were, at a very great expense, reclaimed from a deep and dangerous morass'. Local folklore records that the last surviving building in the village was a tavern known as the Blackhouse and that the cross from the village chapel is now located in the grounds of the new Church in Churchtown village⁵. The extant bridge and levelled castle are described as follows in the *Archaeological Inventory of North Cork* (Power et al 2000):

Castle – unclassified (CO007-115----)

In low-lying reclaimed land, c. 75m NE of Awbeg River. No visible surface trace of castle of the MacJames Barrys (MacCotter and Nicholls 1996, 207), granted to Percival in 1629 (Grove White 1905-25, vol. 1, 45), apparently demolished in 18th century (ibid., 46).

Bridge (CO007-144----)

Slightly hump-backed road bridge (Wth c. 3m; long axis NE-SW) over Awbeg River; site of castle (14279) c. 80m to NE. Two segmental arches (span c. 2.4m) with rough limestone voussoirs; central pier and arch to W have been repaired, cement cutwater added. Widened on upstream side (NW) by c. 3.9m. Vertical stone coping atop parapet; badly weathered plaque in SE parapet wall reads 'Wm Flynn M../ Built this Bridge/for £60 .../1811'.

Excavations Database

A pre-development programme of geophysical survey (Licence 16R0210) followed by archaeological test trenching (Licence ref. 17E0221) within a solar farm development located in pasture lands to the north of the Site were carried out in 2016 and 2017. While the results are not published on the Excavations Database website (www.excavations.ie) the archaeological impact assessment report was sourced from the Cork County Council online planning enquiry system⁶. These site investigations revealed the presence of a number of previously unrecorded, sub-surface archaeological features, including burnt spreads, within the proposed development site.

⁵ <http://churchtown.net/history/annagh-village-and-bog/>

⁶ <http://planning.corkcoco.ie/ePlan/AppFileRefDetails/175799/0>



A review of proposed and consented developments, which are identified in Appendix 1.2 of this EIAR for potential cumulative impacts, within the wider landscape was carried out as part of the cumulative impact assessment and summary details on a number of other archaeological investigations at those locations are presented in Section 14.4.5.

Review of Cartographic Sources and Aerial/Satellite Imagery

The following section provides a general overview of the cartographic and aerial images of the wind farm site and further details on the depictions of the locations of proposed construction areas are also provided in Section 14.3.4 below. The reviewed cartographic sources comprised the 17th-century Down Survey mapping (Appendix 14.1; Figure 14.1), the 1st edition 6-inch Ordnance Survey (OS) map (1830s-40 series), and the 25-inch edition OS map (1888-1913 series) (Appendix 14.1; Figures 14.2 and 14.3). The consulted aerial/satellite images comprised a range of online sources including Bing Maps, Google Maps and Google Earth as well as the Ordnance Survey of Ireland (OSI) Geohive Mapviewer. The consulted images were captured between 1995 and 2018 and demonstrate the gradual expansion of the areas of planted woodland within the Site during this period.

The townland of Annagh is depicted on the 17th-century Down Survey map to the immediate southeast of an area of bog land which straddles the modern-day townlands of Annagh North, Annagh Bogs and Cullig. The only structure depicted within the townland is a bridge in its southern portion which traverses a small watercourse (which empties from the area of bog land) and extends into an area labelled as 'Ballioagh'. No such townland now exists, and this area appears to have been subsumed into the townland of Kilgrogan. The depicted bridge would appear to a precursor to the existing 19th century Annagh Bridge (CO007-144----) located to the south of the Site. A structure depicted to the south of this area may represent either Annagh Castle (CO007-115----) or the parish church of Kilgrogan, neither of which survives above surface.

The 6-inch and 25-inch OS maps both depict the lands within the Site as a mix of enclosed pastoral land, reclaimed land and marginal bog land (Appendix 14.1; Figures 14.2 and 14.3). The 25-inch map in particular shows extensive land improvement efforts in the form of extensive linear drainage channels which were likely dug during the second half of the 19th century in an attempt to drain the areas of marginal lands. Both editions of the OS maps depict Ringfort CO007-072001- and Mound CO007-073---- while the other recorded archaeological earthwork sites within fields adjoining proposed construction areas are not shown. In addition, no potential unrecorded archaeological sites were noted on the footprint or close environs of proposed construction areas.

There are no demesne lands or features associated with Cooliney House or Milltown Castle, both of which are located within surrounding lands, shown extending into the Site on either map edition. The 6-inch map shows one farmyard located within the Site which is not present on the later 25-inch map, indicating that it was demolished during the second half of the 19th century. There are no construction works proposed on the footprint its former location (ITM 550443, 616976). Two new farmyards with associated houses and outbuildings are depicted within other areas of the Site on the 25-inch edition map and the derelict remains of these structures remain extant. Neither of these farmyards are present on the 6-inch map indicating that they both date to the second half of the 19th century. The southern example comprises an extant farm complex which contains a derelict farmhouse and an adjacent walled yard with a range of outbuildings on the north side (ITM 550070, 616697). The nearest proposed wind farm element to this farmyard will be an access route to the met mast located c. 225m to the west which will utilise an existing farm lane outside the yard and no interventions to any of the farm structures are proposed. The second farmyard is located within the northern half of the Site and comprises a now derelict, overgrown farmhouse with an outbuilding to the north (ITM 550456, 617753). The nearest element of the proposed wind farm to these buildings will be an access track located c.200m to the south of the farmhouse and no interventions to the farm buildings will occur.



The detail on the consulted aerial/satellite images taken between 1995 and 2018 demonstrated that the Site was occupied by a mix of semi-improved pasture and marginal overgrown fields with areas of woodland plantations gradually expanding into the marginal fields during the 2000s. In general, the better quality pastoral lands are located within the northern end of the Site, with much of the marginal lands concentrated in the central and southern areas. The reviewed images demonstrate the widespread expansion of planted woodlands during the 2000s and this may have been a concerted effort to yield returns from poorer quality, marginal lands within the area. The locations of Ringfort CO007-072001- and Enclosure CO007-074---- are both clearly visible on the reviewed images while no surface traces of the other recorded archaeological sites within the environs of proposed construction areas are visible. No potential unrecorded archaeological sites were identified on the reviewed aerial/satellite images of the proposed wind farm, including the pre-plantation images of the lands now obscured by tree cover.

Designated Architectural Heritage Structures

There are no structures listed on the Record of Protected Structures (RPS) or NIAH for County Cork located within the Site while there are a number of examples within surrounding lands (Appendix 14.1; Figure 7). Cooliney House (RPS 00020/NIAH 20900712), which is 860m northeast of the site compound location, is the only Protected Structure located within 1km of a proposed construction area while Milltown Castle (RPS 00021/NIAH 20900708) is located c. 1.26km to the north of the main Site entrance. Both of these buildings are also recorded archaeological sites and their inventory entries are provided above. A residential house in Ardglass townland, which is located c. 300m to the west of the northern site entrance and an outbuilding adjacent to Cooliney House are also included in the NIAH (refs 20900710 and 20900721). Annagh Bridge located to the south of the Site is a recorded archaeological monument and is also listed in the NIAH (ref. 20900715). All of these architectural heritage structures have been assigned 'Regional' ratings by the NIAH. The demesne lands associated with Milltown Castle are also included in the NIAH Survey of Historic Gardens and Landscapes (ID ref. 2754) while no lands associated with Cooliney House are listed in this survey. As noted above (Cartographic Review), there are no demesne or other potential curtilage features associated with these houses shown extending into the Site on the reviewed historical OS maps. In addition, the Site and the surrounding study area do not extend into an Architectural Conservation Area.

Table 14-7: Designated Architectural Heritage Structures within 1km of Site

Structure	RPS	NIAH	RMP	ITM E	ITM N
Cooliney House	00020	20900712	CO007-045001-	551206	618888
Cooliney outbuilding	-	20900721	-	551155	618899
Milltown Castle	00021	20900708	CO007-036001-	550044	619909
Detached house (Ardglass townland)	-	20900710	-	549955	618637
Annagh Bridge	-	20900715	CO007-144----	549815	615636

Undesignated Cultural Heritage Assets

While encompassing the archaeological and designated architectural heritage resources, cultural heritage also includes various undesignated assets such as demesne landscapes, vernacular structures, folklore, place names and historical events.



As previously noted in the Cartographic Review section while there are a number of extant and former 19th century farmyards located within the Site, none are located within the footprint of any proposed construction areas. The review of historic cartographic sources also indicates that while there are a number of post-medieval country houses located within the surrounding landscape no associated demesne lands or potential curtilage features are located within the Site boundary.

The Site extends into a number of townlands which are the smallest unit of land division in the Irish landscape and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest (Table 14-8). The boundaries and names of Irish townlands were recorded and standardised by the Ordnance Survey (OS) in the 19th century and typically entailed anglicisations of their original Irish names. The Irish origins of townland names often refer to natural topographical features, past landowners, farming practices, etc. but some name elements may also give an indication of the presence of archaeological sites within the townland, e.g., lios or rath indicate the presence of a ringfort while temple, saggart, termon or kill may record associations with a church site. The translations of the townland names within the Site were sourced from the Placenames Database (www.logainm.ie) and all refer to natural landscape and topographical features.

Table 14-8: Townland name translations

Townland (parish)	Irish	Translation
Annagh North (Churchtown par.)	<i>An tEanach Thuaidh</i>	The marsh (north)
Coolcaum (Aglisdrinagh par.)	<i>An Chúil Cham</i>	crooked corner or angle
Cooliney (Cooliney par.)	<i>Cúil Eimhne</i>	corner (of Eimhne?)
Fiddane (Aglisdrinagh par.)	<i>Na Feadáin</i>	a brook or streamlet

The Schools Collection of the Irish National Folklore Collection (www.duchas.ie) records a number of folklore traditions associated with the general Annagh area which were collected from the people of the locality (Table 14-9). These include references to the former village and castle at Annagh within lands to the south of the Site and also contain references to an associated flax or linen industry which at one time operated in that area. Other folklore traditions associated with surrounding townlands in the area relate to features such as holy wells and mass caves. No traditions containing elements that have discernible associations with the lands located within the Site boundary were noted during the review.

Table 14-9: Summaries of Relevant Local Folklore Traditions (www.duchas.ie)

Source	Summary of account
Mrs Wall	There was a village in Annagh long ago but no trace of it remains. All the houses were thatched. In the penal days Mass used to be said in a farmhouse in Annagh.
Reverend J. Rice	The castle of Annagh situated in the midst of a bog was hard to take but at last taken at the loss of three hundred.
Mary O' Sullivan	Long ago flax was grown in Annagh in the parish of Churchtown, Mallow. There were flax mills in the district then. A colony of weavers from Antrim settled in the district and introduced the industry. There is a field in the locality called the "Bleach Field" where flax used to be bleached. There was an old mill worked by wind hence the name "Windmill" a town land in Churchtown. Several of the Antrim weavers are buried in the old graveyard of Kilgroggan.



Source	Summary of account
Reverend J. Rice	There was formerly a number of castles in this parish. They were as follows: (a) Annagh, (b) Ballymacow, (c) Walshestown. All these belonged to the Barry Family. They got into financial difficulties and were forced to mortgage their lands to a greedy adventurer named Percival, ancestor of the Earls of Egmont who were the late landlords of the parish. Percival closed in the mortgage.
Debbie Quinn	In the townland of Cooline there is an ancient churchyard where there is also an Abbey. In the townland of Ballynoran Baile-an-Fhuaráin there is a spring well. "Tubber-na-Griolla. It is situated in a corner of four farms and a large drain or Strután is known as the Pola-Buidhe.
Denis O' Sullivan	There is a kind of cave in Ardglass called the "Mass Cave". It is said that in the penal days the priests said Mass there. It is very hard to find it out. There was a man coming out of the bog one day, and the car got caught in a rock. When he was trying to free it he discovered a piece of an iron cross buried. It is like an underground cave. There is a narrow path leading into it. It is said that the people were afraid to make a wide path for fear it would be discovered by the enemy.

14.3.4.1 Grid Connection Route and Turbine Delivery Route

There are no recorded archaeological sites, designated architectural heritage structures or Architectural Conservation Areas directly located on the public road that will form the grid route connection to the substation in Rathnacally townland and which also forms the section of the turbine delivery route extending from the N20 road which is located c. 4.2km to the east. The tarmac-surfaced road is flanked by earthen field banks, hedgerows and the gardens of modern residences. It extends through an area dominated by pasture farmlands, and it does not enter any villages or towns or contain any masonry bridges. The road forming the grid connection does cross one minor watercourse (Rathnacally Stream) over an existing shallow concrete bridge. There are six recorded archaeological sites located within 100m of the relevant section of roadway (Table 14-10) and the Zone of Notification (ZON), as designated by the NMS, surrounding three of these sites extends into the road corridor. These comprise a ringfort (CO007-048----) in Rathnacally townland, a vernacular house (CO007-049001-) in Farranshonikeen townland and a church site (CO007-122----) in Clashganniv townland. There is one Protected Structure located just outside the study area and this comprises Cooliney House (RPS 00020) which is also a recorded archaeological site (CO007-045001-) and is detailed in Section 14.3.3.1.

Table 14-10: Recorded archaeological sites within 100m of GCR and TDR route to N20

Monument No.	Class	Townland	ITM E	ITM N	Distance from road	Extant?
CO007-045002-	Graveyard	Cooliney	551260	618990	70m to south	Yes
CO007-045003-	Church	Cooliney	551242	618986	80m to south	Yes
CO007-048----	Ringfort	Rathnacally	552072	619474	25m to north	No
CO007-049001-	Vernacular house	Farranshonikeen	552190	619404	10m to south	Yes



Monument No.	Class	Townland	ITM E	ITM N	Distance from road	Extant?
CO007-049002-	Ringfort	Farranshonikeen	552265	619348	65m to south	Partially levelled
CO007-122----	Church	Clashganniv	552943	619613	20m to north	No

The recorded archaeological sites within the study area centred on the roadways which will form the grid connection and the section of the turbine delivery route between the Site and the N20 are described as follows in the *Archaeological Inventory of North Cork* (Power et al 2000):

Church (CO007-045003-)

In centre of graveyard (14571). Ruin of rectangular church (int. 16.8m E-W; int. 7.61m N-S); most of E and W walls fallen, but N and S walls stand to full height (H 4.8m). Entered through doorway W-of-centre in S wall: inside of doorway much ruined; outside covered by segmental relieving arch, possibly rebuilt; part of W door jamb survives, as does part of drawbar socket on E side. Featureless gap (Wth 2.5m) near E end of N wall. Small openings through walls probably putlog holes. According to Grove White (1905-25, vol. 2, 249), in 1909 'of the E gable about 3 ft. or 4ft. of masonry existing, and about 9ft. of W end standing.' Remains of parish church of Cooliney. Reported 'in repair' in 1615, abandoned by 1694 (Brady 1863, vol. 2, 175-6). A church here listed in Papal Taxation of 1291 (ibid)

Graveyard (CO007-045002-)

Approached by short avenue from road to E. Triangular graveyard (c. 40m N-S; c. 60m E-W), enclosed by stone wall to E, earthen banks elsewhere. Ruin of parish church of Cooliney (14414) in centre. In occasional use; many 18th- and 19th-century headstones noted; also many low uninscribed gravemarkers. Cross-inscribed graveslab to Thomas Dore, dated 1633 with Latin and English inscriptions, within church; cover of chest tomb outside S wall of church dated 1678 (Grove White 1905-25, vol. 2, 250; Anon. 1888-91).

Ringfort (CO007-048----

In pasture, on gentle SE-facing slope. Depicted as hachured, nearly circular enclosure (c. 100m ENE-WSW; c. 90m NNW-SSE) on 1842 OS 6-inch map; as hachured circular enclosure (diam. C. 80m) on 1905 OS 6-inch map, with surrounding fosse; hachured as nearly circular area (c. 70m ENE-WSW; c. 60m NNW-SSE) on 1936 OS 6-inch map, surrounded by fosse. Levelled; faint trace of fosse visible E->SW; fosse clearly visible as shadow site in aerial photograph (AP: Dr. D.D.C. Pochin Mould). Roughly circular bivallate enclosure visible in aerial photograph (GSIAP, R609) as cropmark of banks, intervening fosse and external fosse.

Vernacular house (CO007-049001-)

On S side of road. Front (N) of 5 bays, central door concealed by porch. Hipped roof with thatch; central chimney. Abandoned.

Ringfort (CO007-049002-)

In pasture, on gentle SE-facing slope. Circular area (32.5m N-S) enclosed by worn and denuded earthen bank (H 1.45m) SSE->E. Bank levelled E->SSE; section to ESE appears to have been levelled recently; break depicted to SE on 1905 and 1936 OS 6-inch maps.



Church (CO007-122----)

Marked on 1842 OS 6-inch map as outline of T-shaped structure (c. 20m E-W; c. 8m N-S: extension to S c. 10m x c. 5m) within rectangular field (c. 40m N-S; c. 30m E-W). Not marked on later editions of map. Church levelled but sod-covered foundations of T-shaped structure (22m E-W; 6m N-S: extension to S 11m N-S; 5m E-W) remain.

All of these recorded archaeological sites are present on the historical OS maps which depict two examples located within 20m of the road margin. These comprise the vernacular house (CO007-049001-) in Farranshonikeen townland and the southern end of a levelled ringfort (CO007-048----) in Rathnacally townland, which is shown c.15m to the north of the roadside on the 25-inch map. The outline of the external ringfort ditch is clearly visible on a number of the consulted aerial/satellite images and at its nearest point remains 15m to the north of the existing road margin. The 6-inch OS map also indicates the presence of a mill site, named Cooliney Mill, in a field on the north side of the section of road opposite the Site entrance. The detail on the 25-inch map indicates that while the remains of structures still existed at this location, they are not depicted as roofed structures and the location is no longer annotated as a mill, indicating that it went out of use in the second half of the 19th century. As noted in Section 14.3.4.2, there are now no visible extant remains of this mill and its former location is not listed in the RPS, NIAH or RMP.

14.3.4 Field Survey

14.3.4.1 *Wind Farm Site*

The Site was inspected on a number of occasions in 2020 and 2021 in clear weather conditions that allowed good landscape visibility. In general, it extends across a broadly level area of poorly drained lands and is occupied by a mix of semi-improved pasture, marginal fields and areas of woodland planted in recent decades. The following section commences with an overview of the existing environment within the Site and further details on the existing environment at the locations of proposed construction areas are provided in Table 14-10. This includes approximate distances of turbine hardstands to the nearest archaeological site as well as summaries of the character of each element of the proposed wind farm as shown on the historic OS maps and the aerial/satellite images published in recent decades.

In general, the current use and layout of the lands within the wind farm site when compared to the detail shown on the historic OS maps demonstrates localised modern interventions resulting from the creation of woodland plantations within former areas of marginal farmlands with other areas of the Site retaining a similar layout to that depicted in the 19th century. Apart from sections of the hardstands for T02 and T04, the turbines and hardstands will be sited within woodland plantations occupied by regularly spaced trees rows and areas of dense undergrowth. This vegetation cover restricted access to a number of proposed turbine locations (see Table 14-11) but an assessment of the ground disturbance activities resulting from the creation and development of the woodland plantations, including ground preparation works and land drains as well as extensive root networks, was carried out within the environs of all locations. The topsoil layer within all planted areas was noted to have been extensively disturbed by root systems and the frequent earth-cut drains extending between the regular tree rows. The underlying natural subsoil was noted within some exposed cut sections not obscured by vegetation and, in general, the topsoil cover appears to be generally shallow in depth within the plantations. There were no traces of potential archaeological features, unrecorded built structures, pre-forestry field boundaries or trackways noted during the visual inspections of accessible areas of the plantations. The areas of the Site outside the woods comprise untended, overgrown and poorly drained fields that were in use as marginal cattle grazing lands at the time of inspection. The fields boundaries within the Site comprise overgrown earthen banks with flanking drainage ditches and no traces of stone wall boundaries were noted.



The Oakfront Stream extends in a north-south direction through the area, and this will be crossed by a clear span bridge to facilitate an access track at one location (ITM 550640, 617752). The clear span bridge will accommodate the grid connection cable and internal collector cables within its deck. An inspection of the watercourse at this location was carried out from the adjacent bank, and it comprises a shallow stream, c.2m wide, within an eroded channel and the moderately flowing, clear water provided good visibility of the gravel bed (Appendix 14.2; Plate 14.10). There were no traces of any potential in-channel or bank features noted during this visual appraisal, e.g., bank revetments, weirs, stepping stones or farm tracks leading to the location. In addition, no features are indicated at the proposed crossing point or its environs on any of the consulted historical OS maps.

The accessible recorded archaeological sites within the study area were visited and these comprised Fulacht fia CO007-175----, Ringfort CO007-072001-, Enclosure CO007-072001-, Enclosure CO07-074----, Bridge CO007-144---, levelled Castle CO007-115----, Mound CO007-073---- and Redundant Record CO007-041---- (photographs provided in Appendix 14.2). The locations of the other known archaeological sites and designated architectural structures within the study area are located within inaccessible private properties. The assessment of these cultural heritage assets was informed by visual appraisals where visible from public roadways as well as information provided their published inventory entries and other information gathered during the desktop study, including reviews of modern aerial/satellite images of their locations. Apart from *fulacht fia* (CO007-175---) all inspected archaeological sites remain as described in the published inventory entries provided above. The location of *fulacht fia* (CO007-175----) was planted by woodland at some stage after it was recorded by the Archaeological Survey of Ireland and no surface traces of the site were identified during an inspection of its recorded location carried out as part of the current assessment (Appendix 14.2; Plate 14.13). While ground disturbance arising during the creation and development of the woodland plantation may have removed surface traces of this site the potential that subsurface remains survive at its location cannot be discounted.

There were no surface traces of potential unrecorded archaeological sites noted during systematic fieldwalking inspections of all accessible proposed construction areas, including turbines, hardstands, access roads, met mast, compound and substation. The locations of the two extant farmyards shown on the 25-inch OS map were inspected during the field surveys while no surface traces of a farmyard shown on the 6-inch edition map subsequently levelled during the second half of the 19th century were identified (see Cartographic Review above). The southern farmyard is accessed from a farm lane to the south and extant derelict remains of a farmhouse, walled yard and outbuildings survive in varying states of preservation (Appendix 14.2; Plate 14.18). The walls and roofs of the extant structures have numerous breaches and the ground surface within the yard and outbuildings has been extensively impacted by cattle trampling. The interior of the farmhouse could not be accessed but a visual appraisal indicated that it contains frequent inclusions of dumped agricultural debris and waste. The access route to the proposed met mast location to the west of the farmyard will utilise an existing farm lane that extends around the yard and will, therefore, avoid the location of the farmyard structures. The second extant late 19th century farmyard within the Site comprises the overgrown remains of a farmhouse with an outbuilding to the north. While sections of the walls and roofs of these two structures remain extant, both are in derelict condition and areas of the interiors of both have been colonised by trees and other vegetation (Appendix 14.2; Plate 14.17). The remains of these two buildings are located outside the footprint of the wind farm construction areas and are located 200m to the north of the nearest section of access track.



Table 14-11: Description of wind farm construction areas with references to consulted desktop sources

Project Element	Townland	Description	Nearest archaeological site	Historic OS Maps	Aerial/Satellite images
Turbine 1	Cooliney	Located within a thick woodland plantation in generally level terrain. Access to the location was restricted by undergrowth but inspection of environs indicated that the plantation has resulted in extensive ground disturbance. The access track to the location extends for c.170m through forestry from north and continues for c. 280m towards T3 to the south through a vacant, wet, marginal field intersected with open land drains. (Appendix 14.2; Plates 14.1, 14.7 and 14.8)	Ringfort (CO007-043001-) located 430m to northeast	Shown as vacant field on all OS maps	Shown as vacant pasture field until ground preparation works for tree plantation are visible on 2005 image. A number of linear land drains are visible in the field between T2 and T3 and indicate modern drainage works in area
Turbine 2	Fiddane	Hardstand location is within a level, marginal pasture field. The access track to the location extends for c. 250m through a number of marginal pasture fields to the south. (Appendix 14.2; Plate 14.2)	Enclosure (CO007-074----) located c. 460m to south	Shown as vacant fields on all OS maps	
Turbine 3	Coolcaum	Located entirely within an accessible area of a woodland plantation intersected with open land drains. A large machine-cut drainage ditch separates the woodland from the marginal pasture field to north. (Appendix 14.2; Plate 14.3)	Fulacht fia (CO007-135----) located 245m to east	Shown as vacant fields on all OS maps	Shown as vacant fields until ground preparation works for tree plantation are visible on 2005 image. Shown as woodland on later images.



Project Element	Townland	Description	Nearest archaeological site	Historic OS Maps	Aerial/Satellite images
Turbine 4	Annagh North	Hardstand straddles an accessible area of woodland at north and poorly drained marginal pasture at south. The access track to the location extends for a distance of c.550m through an overgrown area of wet marginal open land to south and has been sited to avoid a fulacht fia (CO007-175----) within the woodland further to the east of the turbine. A number of earth cut land drains extend through this overgrown area of wet marginal land (Appendix 14.2; Plates 14.4 and 14.9)	Fulacht fia (CO007-175----) located 170m to east	Shown as vacant fields on all OS maps	The reviewed images indicate that the woodland in the area was planted within marginal fields during the past decade
Turbine 5	Annagh North	Located within marginal pasture in an area of poorly drained level terrain intersected by low field boundary hedges with overgrown drains. The access track to the location extends from a wood plantation located c.80m to the northeast. (Appendix 14.2; Plate 14.5)	Ringfort (CO007-072001-) & Enclosure (CO007-072002) are both located 190m to south	Shown as vacant fields on all OS maps	Shown as vacant marginal pasture on all images
Turbine 6	Annagh North	Within a level area of thick woodland plantation in the southeast section of the wind farm site. The presence of thick growth within the plantation hindered access to the turbine location but an inspection of its environs indicated that the ground surface in the area has been disturbed by planting (Appendix 14.2; Plate 14.6)	Enclosure (CO007-074----) located 390m to north	Shown as vacant fields on all OS maps	Shown as marginal pasture intersected with land drains until creation of plantation in past decade



Project Element	Townland	Description	Nearest archaeological site	Historic OS Maps	Aerial/Satellite images
Substation	Annagh North	Within an accessible area of woodland planted in past decade. There was no surface trace of the fulacht fia (CO007-175-- --) located within the area of woodland to the west of its location.	Fulacht fia (CO007-175----) located 70m to west	Shown as vacant fields on all OS maps	Reviewed images indicate that the woodland in the area was planted within marginal fields during the past decade
Construction compound	Cooliney	Within area of good quality level pasture in the northern portion of the wind farm site. Northern section of main wind farm access road extends along the north-eastern margin of the compound area (Appendix 14.2; Plate 14.7)	Ringfort (CO007-042----) located 430m to east	Shown as vacant field on all OS maps	Shown as vacant improved pasture on all images
Met Mast	Annagh North	Located within a vacant area of a poorly drained, overgrown, marginal land	Ringfort (CO007-072001-) located 220m to northeast	Shown as vacant field on all OS maps	Shown as vacant marginal pasture on all images
Access Track from site entrance	Cooliney	This access track will enter the north end of the Site from the L1322 road and will flank the eastern boundaries of six improved pasture fields at it extends to woodland containing T01. The lands in this area are generally level and well-drained and there are existing gaps in the earthen bank field boundaries along the route. (Appendix 14.2; Plate 14.7)	Ringfort (CO007-042----) located 350m to east	Shown as vacant fields on all OS maps	Shown as vacant improved pasture on all images



14.3.4.2 Grid Connection Route and Turbine Delivery Route

These routes both extend eastwards from the northern entrance to the Site along a tarmac-covered local road (L1322) which is present on the 6-inch OS map. The relevant section of this road does not contain any masonry bridge structures and does not extend through any towns or villages. The adjoining farmlands are dominated by vacant pasture fields with dispersed 20th century detached houses flanking both sides of the road. The grid connection route diverts to the north along another local road at Ardnageehy crossroads in Rathnacally townland until it reaches the existing substation located c.580m to the north while the turbine delivery route continues eastwards along the L1322 to the N20 road.

As noted in Section 14.3.3.2, the section of the study area which extends for 100m from both sides of the roadways that form the grid connection and turbine delivery route work areas contains six recorded archaeological sites which are all located within private lands. There are no designated architectural heritage buildings or Architectural Conservation Areas located within this section of the study area.

The inspection of the relevant sections of the road revealed that extant remains of only one of the recorded archaeological sites within this section of the study area is visible from the roadside and this comprises the derelict ruins of a vernacular house (CO007-049001-) which is set back from the southern road margin. The interior of the structure has been extensively colonised by trees and the roof appears to be largely absent. The roadside façade is barely perceptible due to thick overgrowth and no visible traces of any associated features were visible along the road margin. A detached residential house has recently been constructed in the plot adjacent to its eastern side and this does not appear to have impacted on the structure which remains in a heavily overgrown area adjacent to the new driveway. The roadside to the south of the recorded location of a levelled ringfort (CO007-048----) in Rathnacally townland is formed by a well-maintained hedgerow and no surface traces of the ringfort were observed during a visual appraisal of the pasture field from the roadside. The locations of all other recorded archaeological sites within the study area were obscured by roadside field boundaries formed by earthen field banks, tree lines and hedgerows and no potential associated features were observed along the road margins.

A concrete encasement which formerly contained a water pump is located adjacent to the north side of the road margin in Rathnacally townland (ITM 552607, 619480). These are a common feature in the Irish rural landscape and while some intact examples can be designated as Protected Structures or included in NIAH inventories, the remains of the Rathnacally example is not listed in either. The feature is not shown on any of the consulted OS maps and may be 20th century in date but the potential that it was not deemed a recordable structure by the 19th century surveyors also exists. Given the absence of a water pump feature the concrete encasement is assessed as being a feature of negligible cultural heritage significance. The location of Cooliney Mill, as indicated on the 6-inch OS map, is now occupied by vacant grassland within the southern end of a field on the opposite (north) side of the road from the Site entrance and no visible traces of any structural remains were observable from the roadway. No works are proposed within this field and the location of the former mill site, which is not listed in the RMP, RPS or NIAH, is assessed as being an undesignated feature of low to negligible cultural heritage significance.

14.4 POTENTIAL IMPACTS

The following sections present assessments of potential impacts on identified cultural heritage assets within the environs of the various elements of the proposed development and these are then collated in table format (Tables 14-12 to 14-14).



The values assigned to the various assets are identified in these tables were determined based on the results of the desktop study and inspections of accessible sites and follow the guidelines outlined in Table 14-2. The majority of the recorded assets located within lands surrounding the Site are within inaccessible private properties and their current condition and indicative values, as well as potential sensitivities to indirect impacts of a visual nature, have been assessed based on their classifications, designations, inventory descriptions and reviews of historical maps and modern aerial/satellite images. A number of recorded cultural assets within private lands have been assigned a range of potential values where certainty cannot be assessed in the absence of site inspections. These values have been assigned based on the criteria outlined in Table 14-2 in combination with available contextual information sourced during the desktop study including details on their current state of preservation based on published archaeological inventory descriptions, details on historic mapping and reviews of modern aerial/satellite images of their locations. It should also be noted that all archaeological sites, including levelled examples, have the potential to possess sub-surface features, artefacts, human burials or other archaeological remains, which may be of High value, but this cannot be discerned without recourse to archaeological excavation and are attributes unlikely to be affected in the absence of direct impacts.

14.4.1 Do Nothing Scenario

A 'Do Nothing Scenario' will see to the continued preservation of recorded and potential cultural heritage features within the study area defined in Section 14.3.1.

14.4.2 Construction Phase

Wind Farm Construction Phase Direct Impacts

There are no recorded archaeological sites located on the footprint of any of the proposed construction areas within the Site and no potential unrecorded archaeological sites were identified within these areas during the desktop study and field inspections carried out as part of this assessment. The mitigation strategies presented in Section 14.5 include measures to ensure that all identified cultural heritage constraints within lands in the environs of proposed construction areas will be adequately signed and protected within appropriate buffer zones during the construction phase.

The nearest recorded archaeological site to proposed construction areas within the Site is a *fulacht fia* (CO007-175----) located c.75m to the west of the substation. The recorded location of this site was planted with woodland at some stage after it was recorded by the Archaeological Survey of Ireland and no surface remains were observed at its recorded location during the site surveys undertaken as part of this assessment. There are no wind farm construction phase works proposed within the Zones of Notification, as designated by the NMS, surrounding any of the recorded archaeological sites within the study area.

Given the above factors, no direct impacts on the known archaeological resource are predicted during the construction phase.

The creation and subsequent development of the woodland plantations that occupy the majority of the proposed turbine and hardstand locations in recent decades have resulted in extensive ground disturbance. A Heritage Council of Ireland study on the impacts of forestry on the archaeological resource concluded that the processes involved in the planting, maturing and rotation of planted lands have a high potential to completely remove or to severely degrade any archaeological sites and associated sub-surface deposits that may exist within the plantation (Johnson 1998). While there is a low potential for the survival of unrecorded, archaeological sites within the woodland construction areas this cannot be completely discounted. A number of other elements of the proposed wind farm (e.g., access tracks, site compound) will involve ground reduction works within marginal and semi-improved pasture fields.



While no surface traces of potential unrecorded archaeological sites were noted in these areas the potential exists for the presence of subsurface archaeological sites, features or artefacts within such green field lands. As the existence, nature and extent of any unrecorded sub-surface archaeological remains within the study area are unknown; the level of potential impacts is indeterminable but ground works during the construction phase will have the potential to result in permanent, direct, negative effects on any unrecorded archaeological sites that may exist within the footprint of the construction locations.

There were no designated architectural heritage structures, or potential curtilage features, located within the Site. There are two extant farmyards of late 19th century date within the Site and while the structures at both locations are in derelict condition, they do comprise features of local vernacular heritage significance with low cultural heritage value. No interventions to these farmyards will be carried out during the construction phase and no direct impacts on either example are predicted.

Wind Farm Construction Phase Indirect Impacts

There are no recorded archaeological sites or architectural heritage structures located adjacent to any proposed construction areas and no indirect negative impacts are predicted to arise during the construction phase.

Grid Route Connection Construction Phase Direct Impacts

There are no recorded archaeological sites or architectural heritage structures located on the footprint of the grid connection route and it does not extend into any historical villages or towns. The grid connection will entail a cable trench excavated into the existing roadway surface which will result in no predicted direct impacts on the known cultural heritage resource. While the potential for the survival of unrecorded subsurface archaeological remains beneath the constructed road surface is deemed to be low, the potential for direct impacts on any such remains cannot be entirely discounted.,

Grid Connection Construction Phase Indirect Impacts

The recorded archaeological sites within the environs of the public road that will form the grid connection route are entirely located within adjoining private properties. Given the absence of any recorded archaeological sites or architectural heritage structures directly adjacent to the cable trench within the public road, no indirect impacts are predicted to arise during the construction phase.

Turbine Delivery Route Construction Phase Direct Impacts

The delivery of the turbines to the proposed wind farm will not require the construction of any new sections of diversion roads or bridges. The delivery will require localised widening works, to mainly include vegetation trimming, within localised sections of the L1322 road margin which are within the wider environs of three recorded archaeological sites located within private properties on both sides of the road. (i.e., Ringfort CO007-048----, Vernacular House CO007-049001- and Church site CO007-122----). The proposed work locations to facilitate the delivery route within the environs of Ringfort CO007-048---- and Church CO007-122---- will not result in any direct impacts on their recorded locations. In addition, no interventions to the derelict ruins of the vernacular house CO007-049001- will be required. While the works will not result in predicted direct impacts on any of these recorded archaeological sites, any localised reduction of existing ground surfaces will have the potential to result in permanent, direct, negative effects on any unrecorded, sub-surface archaeological remains that may exist within the footprint of ground works.



A section of the concrete encasement around the former water pump in Rathnacally townland will be reduced by 0.5m during enabling works resulting in a not significant, direct, negative impact on an undesignated feature which is of low cultural heritage value.

There is one watercourse crossing along the grid connection route, which comprises a section of Rathnacally Stream crossed by a shallow concrete bridge with a 5.3m carriageway. It is proposed to install ducting beneath this stream using horizontal directional drilling (HDD) and this methodology will not result in any predicted impacts on any potential in-channel archaeological features or artefacts.

Turbine Delivery Route Construction Phase Indirect Impacts

The use of public roads to transport the turbines to the Site will not result in any predicted indirect impacts on the cultural heritage resource during the construction phase.

14.4.3 Operational Impacts

Wind Farm Operational Phase Direct Impacts

The operational phase of the proposed development will result in no predicted direct impacts on the known archaeological, architectural and cultural heritage resources. The successful implementation of the construction phase mitigation measures outlined in Section 14.5 will result in the preservation *in situ* by avoidance, or the preservation in record by archaeological excavation, of any unrecorded, sub-surface archaeological sites or features that may exist within proposed development areas. There will, therefore, be no predicted direct impacts on any such potential unrecorded archaeological sites during the operational phase.

Wind Farm Operational Phase Indirect Impacts

There are 23 recorded archaeological sites, including associated demesne lands of two country houses, located within 1km of the wind farm redline boundary. The majority of these archaeological sites are either completely or partially levelled and are all located within private lands which are not accessible to the public and have no discernible existing tourist or amenity attributes. None comprise monument types that have potential visual attributes associated with ritual practices such as alignments across the landscape towards astronomical events, e.g., stone circles, stone rows or megalithic tombs, that could be potentially impinged upon by wind turbines and there are no recorded examples of such prehistoric monuments within 10km of the proposed project. Based on these factors the significance of indirect negative impacts on the known archaeological sites within surrounding lands have been assessed to range from 'none' to 'slight' (see Table 14-13). The late 18th century country house known as Milltown Castle (CO007-036001/RPS 00021) in the area to the north of the study area is within private lands and was not accessible during the assessment. A review of aerial images indicates the presence of lines of tall trees and modern farm buildings surrounding the house which likely screen views towards the location of the wind farm to the south. It is also noted that an archaeological impact assessment of a proposed solar farm in lands to the southwest of this house included a field inspection that concluded that the tree lines around the house screened its location from that development⁷. The location of the 18th century Cooliney House (CO007-045001-/RPS 0020) in lands to the northeast of the Site was also inaccessible during the assessment but a review of aerial images indicates that a range of modern farm buildings have been constructed adjacent to its western side and likely screen views from its location towards the Site. A review of the Landscape and Visual assessment (Chapter 15; VP 8) revealed that the magnitude of visual impact from the environs of this location is assessed as low-negligible with a slight-imperceptible significance of impact.

⁷ <http://planning.corkcoco.ie/ePlan/AppFileRefDetails/175799/0>



In addition, there are no National Monuments in State Care located within the close environs of the Site and the nearest examples are Lis Carroll Castle (National Monument ref. 333) located c.7km to the southwest and Ardskeagh Church (National Monument ref. 314) located 6.7km to the east.

Lis Carroll Castle is located within the village of the same name with streets to the south and east and farmlands to the north and west. The castle, which is currently closed to the public, is entered through a gateway from a public street on the south side and no views towards the general location of the wind farm to the north were observed from this area during a site visit carried out as part of this assessment. Ardskeagh Church is located within a private farm and was not accessible during the assessment, but an inspection of aerial imagery revealed the presence of a number of modern farm buildings adjacent to its west side which likely screen views towards the general location of the wind farm. There are two other National Monuments in State Care within 10km of the Site and these are Kilbolane Castle (National Monument 490), located 8.5km to the northwest of the nearest turbine and Buttevant Abbey (National Monument 202) located 9km to the south of the nearest turbine. Kilbolane Castle is located within a private property and there is no public access to the monument. It is located on the north side of a public road which is flanked by a line of tall mature trees on the south side which screen views towards the location of the Site which is located 8.5km to the southeast. The assessment of visual impacts undertaken by the Landscape and Visual Impact Assessment consultants (Chapter 15) from the locations of a number of cultural heritage receptors within the wider landscape were also reviewed during the compilation of this chapter. The assessment concludes that the magnitude of visual impact from Buttevant town, which contains the site of Buttevant Abbey, is low-negligible with a slight-imperceptible significance of impact (Chapter 15; VP 13). The assessment of views from Lough Gur, which is located 27.4km to the northeast of the project and contains a notable concentration of archaeological monuments, concluded that the magnitude of visual impact is low-negligible and of imperceptible significance (Chapter 15; VP 19). The assessment of the magnitude of visual impact on Doneraile Demesne, which is located 13.4km to the southeast of the project, is assessed as negligible with an imperceptible significance (Chapter 15; VP 16). In conclusion, no significant visual impacts on cultural heritage receptors within the wider landscape were identified (Chapter 15; Section 15.8.6).

Grid Connection Operational Phase Direct/Indirect Impacts

The grid connection will comprise a buried cable within the existing road network and will result in no predicted direct or indirect impacts on the cultural heritage resource during the operational phase.

Turbine Delivery Route Operational Phase Direct/Indirect Impacts

No direct or indirect impacts relating to the turbine delivery route will arise during the operational phase as this element of the proposed development will not occur during this phase.

14.4.4 Decommissioning Phase

No direct impacts on known elements of the cultural heritage resource are predicted during the decommissioning phase as there are no recorded cultural heritage assets located within the footprint, or close environs, of the various elements of the wind farm that will be subject to decommissioning. The decommissioning phase will reverse the slight to non-significant indirect visual impacts on extant cultural heritage receptors located within surrounding lands (Table 14-13) as well as those within the wider landscape as identified in Chapter 15.



14.4.5 Cumulative Impacts

A review of the location of proposed replant lands in Emlagh, Co. Clare as well as a number of developments within the wider landscape around the Site was carried out in order to assess the potential for cumulative impacts on the cultural heritage resource.

Emlagh Replant Lands

A desktop review of the proposed replant landholding in Emlagh, Co. Clare revealed that there are no recorded archaeological sites or designated architectural heritage structures located within its boundary. The nearest archaeological site comprises a children's burial ground (CL056-062002-) located 50m outside the south end of the replant boundary. The Archaeological Survey of Ireland have not published an inventory for this burial site but a review of historic OS maps, as well as modern aerial images, demonstrate that it is bounded by a circular enclosure feature which is annotated as 'church (site of) and graveyard'. The distance between the replant lands and the archaeological site has been calculated from the north end of this enclosure feature. The historic OS maps show the lands within the replant boundary occupied by fields with a number of associated farm buildings which are not listed as Protected Structures or included in the NIAH. A comparison between the detail on cartographic sources and modern aerial imagery indicates that the layout of the fields was altered in the second half of the 19th century and remained unchanged during the 20th century. A number of 20th century farm buildings in the west end of the landholding are visible on aerial images. In summary, no known cultural heritage assets were noted within the Emlagh replant lands during the review.

Fiddane Solar Farm

This comprises a consented 67.8 hectare solar farm within pasture farmland bordering the north of the Site. A review of the online Cork County Council planning file (ref. 175799) for this development revealed that pre-development archaeological investigations revealed the presence of a number of previously unrecorded, sub-surface archaeological features, including burnt spreads, within its landholding⁸. The archaeological impact assessment report recommended that they be preserved in situ by a combination of non-intrusive panel footings and avoidance during the construction phase, which was to be subject to archaeological monitoring. The *An Bord Pleanála* grant of permission for the development included these recommended mitigation measures as planning conditions (ABP-306915-20).

Solar Farm

This comprises a consented 102.76 hectare solar farm and 3.4 km grid connection located 1km southeast of the Site. A review of the online Cork County Council planning file (ref. 204041) revealed that a geophysical survey carried out as part of an archaeological impact assessment of the landholding identified a number of areas of archaeological activity⁹. Preservation by avoidance through the use of buffer zones and non-intrusive panel footings and archaeological monitoring were recommended as mitigation measures and these measures are included as conditions in the grant of planning permission.

Boolard Wind Farm

This comprises a constructed 2 turbine wind farm (150.5m tip) and grid connection located 2.36km northwest of T4.

⁸ <http://planning.corkcoco.ie/ePlan/AppFileRefDetails/175799/0>

⁹ <http://planning.corkcoco.ie/ePlan/AppFileRefDetails/204041/0>



A review of the online planning files for this development revealed that it was subject to an advance archaeological impact assessment which concluded that no impacts to any known archaeological sites were predicted¹⁰. Archaeological monitoring of the construction phase of this development revealed nothing of archaeological significance¹¹.

Rathnacally Wind Farm

This comprises a constructed 2 turbine wind farm (150.5m tip) and grid connection located 2.27km northeast of T1. Archaeological monitoring (Licence 17E0429) of the construction phase of this development was carried out to comply with a planning condition and revealed ten previously unrecorded areas of sub-surface archaeological activity which included a number of prehistoric sites such as a burnt mound, foundations of a timber roundhouse, a ring-ditch, a short cist burial and a cremation pit as well as other pits, postholes and kilns. These sites were subsequently preserved in record by systematic archaeological excavation licensed by the National Monuments Service.

N/M20 Cork to Limerick Improvement Scheme

This scheme will be located 2-4km to the east of the Site. While a review of potential impacts on the cultural heritage resource by this scheme is currently indeterminable, it is noted that Transport Infrastructure Ireland schemes are subject to detailed cultural heritage assessments and mitigation measures. These include investigations such as geophysical surveys, test trenching, excavations and building surveys to ensure that any previously unrecorded assets are preserved by avoidance or by record.

Conclusions

Based on the review of the above developments, including considerations of publicly available information on their potential impacts and mitigation measures, it is concluded that the proposed project will not combine with them to result in predicted significant adverse cumulative impacts on the cultural heritage resource.

¹⁰ <http://planning.corkcoco.ie/ePlan/AppFileRefDetails/125997/0>

¹¹ <https://excavations.ie/report/2019/Cork/0030336/>



Table 14-12: Summary of construction phase impacts on cultural heritage sites within 1km of wind farm

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
C0007-033----	Ringfort (levelled)	960m north of T2 650m west of site entrance	Medium	None predicted	Neutral	n/a	n/a	None
C0007-036001-(RPS 00021)	Country House (Extant)	House is 1.26km north of the site entrance and south end of demesne lands is 650m to north of entrance The nearest turbine (T1) is located 2.1km to the south	Medium	None predicted	Neutral	n/a	n/a	None
C0007-041----	Redundant record	160m southwest of compound	Negligible	None predicted	Neutral	n/a	n/a	None
C0007-042----	Ringfort (levelled)	415m northeast of T1 350m east of access track	Medium	None predicted	Neutral	n/a	n/a	None
C0007-043001-	Ringfort (extant)	430m northeast of T1 380m east of access track	Medium /High	None predicted	Neutral	n/a	n/a	None
C0007-043002-	Moated site (levelled)	500m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-044----	Earthwork (levelled)	800m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-045001-(RPS 0020)	Country house	840m northeast of compound	Medium	None predicted	Neutral	n/a	n/a	None



Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
	(extant)	1,000m northeast of T1						
C0007-045002-	Graveyard (extant)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-045003-	Church (partially levelled)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-070----	Ring-barrow (partially levelled)	440m northwest of T4	Medium	None predicted	Neutral	n/a	n/a	None
C0007-071----	Ringfort (levelled)	450m north of T4	Medium	None predicted	Neutral	n/a	n/a	None
C0007-072001-	Ringfort (extant)	80m north of Met Mast access track 190m southwest of T5	Medium /High	None predicted	Neutral	n/a	n/a	None
C0007-072002-	Enclosure (partially levelled)	100m north of Met Mast access track 190m southwest of T5	Medium	None predicted	Neutral	n/a	n/a	None
C0007-073----	Mound (extant)	825m southwest of T6	Medium	None predicted	Neutral	n/a	n/a	None
C0007-074----	Enclosure (partially levelled)	360m southeast of T2 370m northeast of T5 80m east of access track	Medium	None predicted	Neutral	n/a	n/a	None



Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
C0007-075----	Fulacht fia (levelled)	260m northeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-076----	Mound (levelled)	380m east of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-115----	Castle – unclassified (levelled)	1,000m south of Met Mast	Medium	None predicted	Neutral	n/a	n/a	None
C0007-135----	Fulacht fia (extant)	250m east of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-137----	Castle – unclassified (levelled)	390m southeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-144----	Bridge (Extant)	1,000m south of Met Mast	Medium	None predicted	Neutral	n/a	n/a	None
C0007-175----	Fulacht fia (levelled)	70m west of substation 170m east of T4	Medium	None predicted	Neutral	n/a	n/a	None
None	North Farmyard (derelict)	200m north of access track	Low	None predicted	Neutral	n/a	n/a	None
None	South Farmyard (derelict)	Existing farm track outside yard wall will form access to met mast	Low	None predicted	Neutral	n/a	n/a	None



Table 14-13: Summary of operation phase impacts on cultural heritage sites within 1km of wind farm

Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
C0007-033----	Ringfort (levelled)	960m north of T2 650m west of site entrance	Medium	None predicted	Neutral	n/a	n/a	None
C0007-036001-(RPS 00021)	Country House (Extant)	House is 1.26km north of the site entrance and south end of demesne lands is 650m to north of entrance The nearest turbine (T1) is located 2.1km to the south	High	Indirect	Negative	Low	Long term (reversible)	Slight
C0007-041----	Redundant record	160m southwest of compound	Negligible	None predicted	Neutral	n/a	n/a	None
C0007-042----	Ringfort (levelled)	415m northeast of T1 350m east of access track	Medium	None predicted	Neutral	n/a	n/a	None
C0007-043001-	Ringfort (extant)	430m northeast of T1 380m east of access track	Medium /High	None predicted	Neutral	n/a	n/a	None
C0007-043002-	Moated site (levelled)	500m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-044----	Earthwork (levelled)	800m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-045001-	Country house	840m northeast of compound	Medium	Indirect	Negative	Low	Long term (reversible)	Slight



Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
	(extant)	1,000m northeast of T1						
C0007-045002-	Graveyard (extant)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-045003-	Church (partially levelled)	930m northeast of compound 1,120m northeast of T1	Medium	None predicted	Neutral	n/a	n/a	None
C0007-070----	Ring-barrow (partially levelled)	440m northwest of T4	Medium	None predicted	Neutral	n/a	n/a	None
C0007-071----	Ringfort (levelled)	450m north of T4	Medium	None predicted	Neutral	n/a	n/a	None
C0007-072001-	Ringfort (extant)	80m north of Met Mast access track 190m southwest of T5	Medium / High	Indirect	Negative	Low	Long term (reversible)	Slight
C0007-072002-	Enclosure (partially levelled)	100m north of Met Mast access track 190m southwest of T5	Medium	Indirect	Negative	Low	Long term (reversible)	Slight
C0007-073----	Mound (extant)	825m southwest of T6	Medium	Indirect	Negative	Low	Permanent	Slight
C0007-074----	Enclosure (partially levelled)	360m southeast of T2 370m northeast of T5 80m east of access track	Medium	Indirect	Negative	Low	Long term (reversible)	Slight



Monument No.	Class / Condition	Distance from nearest wind farm elements	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
C0007-075----	Fulacht fia (levelled)	260m northeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-076----	Mound (levelled)	380m east of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-135----	Fulacht fia (extant)	1,000m south of Met Mast	Medium	None predicted	Neutral	n/a	n/a	None
C0007-137----	Castle – unclassified (levelled)	250m east of T3	Medium	None predicted	Neutral	n/a	n/a	None
C0007-175----	Fulacht fia (levelled)	390m southeast of T3	Medium	None predicted	Neutral	n/a	n/a	None
None	North Farmyard (derelict)	200m north of access track	Low	Indirect	Negative	Negligible	Long term (reversible)	Not significant
None	South Farmyard (derelict)	Existing farm track outside yard wall will form access to met mast	Low	Indirect	Negative	Negligible	Long term (reversible)	Not significant



Table 14-14: Summary of construction phase impacts - grid connection and turbine delivery route work areas

Monument No.	Class / Condition	Distance from road	Indicative Value	Type of Impact	Quality	Magnitude	Duration	Significance of Impact
CO007-045002-	Graveyard (extant)	70m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-045003-	Church (partially levelled)	80m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-048----	Ringfort (levelled)	25m to north	Medium	None predicted	Neutral	n/a	n/a	None
CO007-049001-	Vernacular house (derelict)	10m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-049002-	Ringfort (extant)	65m to south	Medium	None predicted	Neutral	n/a	n/a	None
CO007-122----	Church (levelled)	20m to north	Medium	None predicted	Neutral	n/a	n/a	None
None	Water pump encasement	3m to north	Negligible	Direct	Negative	Medium	Permanent	Not significant
None	Levelled mill site	10m to north	Low	None predicted	Neutral	n/a	n/a	None



14.5 MITIGATION MEASURES

Wind Farm

The presence of extensive woodlands plantations, including tree roots, at the locations of the majority of turbines and associated hardstands will preclude advance archaeological site investigations such as geophysical survey and test trenching at their locations. A systematic advance programme of archaeological fieldwalking surveys will be undertaken within all construction areas within these woodlands following pre-construction tree felling to assess whether there are any surface traces of any potential unrecorded archaeological or architectural heritage sites exist within these areas. Archaeological monitoring of ground excavation works during the construction phase will then be carried out within all areas of the Site under licence by the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage. In the event that any unrecorded, sub-surface archaeological sites or features are identified during these site investigations they will be recorded and cordoned off while the NMS are consulted to determine further appropriate mitigation measures, which may include preservation by avoidance or preservation by record through systematic archaeological excavations.

The locations of all recorded archaeological sites within the environs of construction areas will be cordoned off and the outer edges of their designated Zones of Notification will be clearly signed as ‘No Entry: Archaeological Areas’ for the duration of the construction phase. These onsite constraints comprise Ringfort CO007-072001-, Enclosures CO007-072002- and CO007-074---- and Fulacht Fia CO007-175----. The locations of the two derelict, late 19th century farmyards within the environs of the Site will also be clearly marked as no entry areas. The locations of these constraints are identified in the project CEMP contained in Appendix 3.1 and will also be identified during the site inductions provided to all onsite work crews during the construction phase. Their locations will be subject to inspections by the appointed archaeologist at regular intervals during monitoring of the construction phase to ensure that the protective measures are being successfully implemented.

Grid Connection Route and Turbine Delivery Route Work Areas

The programme of archaeological supervision of the construction phase of the Development will also include monitoring ground excavation works and vegetation clearance within the section of the L1322 road in the environs of known archaeological sites located in adjacent fields (i.e., Ringfort CO007-048----, Vernacular House CO007-049001- and Church site CO007-122----). Any required localised ground works within greenfield areas to facilitate the grid connection and turbine delivery will also be subject to archaeological monitoring (e.g., joint bays, site entrance upgrades). An archaeological watching brief of cable trench excavation works in other areas of roadways will be maintained and the extent of this supervision will be agreed in advance with the National Monuments Service as part of the licence application process.

Monitoring of mitigation measures

There are a number of obligatory processes to be undertaken as part of archaeological licence applications to the NMS and these will allow for monitoring of the successful implementation of the archaeological mitigation measures. Method statements detailing the proposed strategy for all site investigations will be submitted for approval to the National Monuments Service as part of the licence application in advance of the construction phase. These will clearly outline the extent of all ground works and outline the onsite and consultation processes to be enacted in the event that any unrecorded archaeological sites or features are identified. A report will be compiled on all site investigations which will clearly present the results in written, drawn and photographic formats and copies will be submitted to the National Monuments Service, the Planning Authority and the National Museum of Ireland.



14.6 RESIDUAL IMPACTS

The mitigation measures presented in Section 14.5 will provide for either the avoidance of the unrecorded archaeological resource or the proper and adequate recording of this resource by systematic archaeological excavation. While the operation of the proposed wind farm will result in a number of indirect, slight, negative impacts on a number of cultural heritage receptors within the wider landscape these will be reversible during the decommissioning phase. No residual impacts on the architectural heritage and undesignated cultural heritage resources are predicted to arise following decommissioning of the wind farm. No residual impacts on the cultural heritage resource are predicted to arise from the grid connection route or turbine delivery route.

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ANNAGH WIND FARM EIAR

VOLUME 2 - MAIN EIAR

CHAPTER 15 – LANDSCAPE AND VISUAL IMPACT ASSESSMENT

Prepared for: EMPOWER



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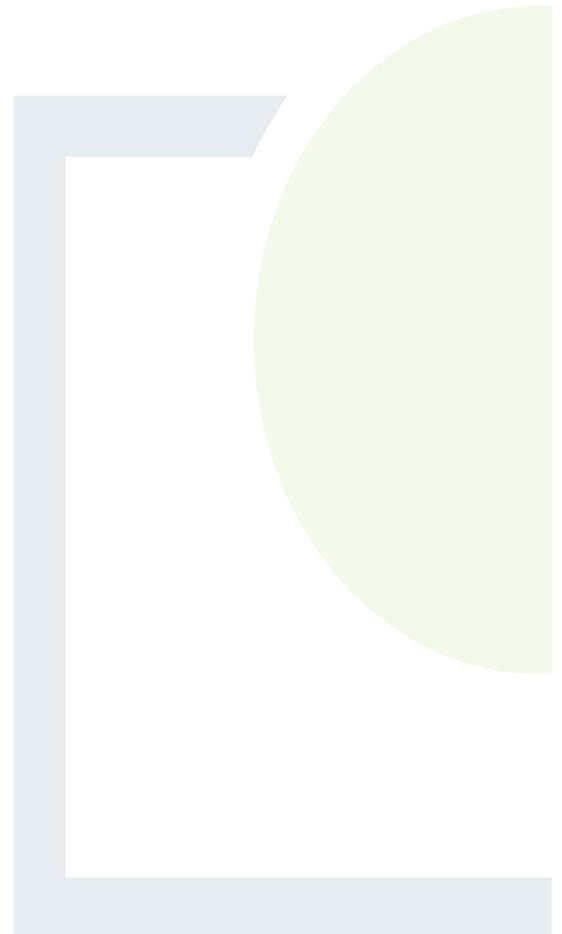


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15 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

15.1 Introduction

This chapter describes the landscape context of the proposed Annagh Wind Farm and assesses the likely landscape and visual impacts of the scheme on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) relates to changes in the physical landscape brought about by the proposed development, which may alter its character, and how this is experienced. This requires a detailed analysis of the individual elements and characteristics of a landscape that go together to make up the overall landscape character of that area. By understanding the aspects that contribute to landscape character, it is possible to make judgements in relation to its quality (integrity) and to identify key sensitivities. This, in turn, provides a measure of the ability of the landscape in question to accommodate the type and scale of change associated with the proposed development without causing unacceptable adverse changes to its character.

Visual Impact Assessment (VIA) relates to assessing effects on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial or intermittent) or; Visual Intrusion (interruption of a view without blocking).

Cumulative landscape and visual impact assessment is concerned with additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

This LVIA uses methodology as prescribed in the following guidance documents:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (Draft 2017) and the accompanying Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (Draft 2015).
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (GLVIA)– Third Addition (2013).
- Scottish Natural Heritage (SNH) Guidance Note: Cumulative Effect of Wind Farms (2012).
- Department of the Environment, Heritage and Local Government Wind Energy Development Guidelines (2006).
- Scottish Natural Heritage (SNH) Visual representation of wind farms: Best Practice Guidelines (version 2.2 - 2017).

15.1.1 [Statement of Authority](#)

This Landscape and Visual Assessment (LVIA) report was prepared by Senior Landscape Architects Richard Barker (MLA MILI) and Jamie Ball (BALA MILI) of Macro Works Ltd. Macro Works Ltd, is a specialist LVIA company with over 20 years of experience in the appraisal of effects from a variety of energy, infrastructure and commercial developments.



Relevant experience includes LVIA work on over 140 on-shore wind farm proposals throughout Ireland, including six Strategic Infrastructure Development (SID) wind farms. Macro Works and its senior staff members are affiliated with the Irish Landscape Institute.

15.1.2 Description of the Proposed Development

A detailed description of the proposed project assessed in the EIAR is contained in Chapter 3.

The proposed project will primarily consist of a wind farm of 6 no. wind turbine generators (WTG's), 1 no. permanent meteorological mast (PMM), and 1 no. substation compound along with ancillary civil and electrical infrastructure. The total Maximum Export Capacity (MEC) of the wind farm is up to 37.2 MW. The exact MEC will be dependent on the output power of the models available at procurement stage.

The proposed turbine is the Vestas V150. This turbine has a rating of 6.2 MW. The proposed turbines will have the following specifications:

- Three bladed, horizontal axis type turbine;
- Height of 175m from the top of the foundation to blade tip height;
- Rotor diameter of 150m;
- Hub height of 100m.

The associated grid connection route (GCR) will consist entirely of underground 38kV cable and will connect the on-site substation to the existing Charleville 110kV Substation within the townland of Rathnacally. The GCR will be approx. 5.9km in length including 3.4km to be constructed primarily within the existing road corridor and 2.5km of underground cables to be installed within private lands within the wind farm site. The proposed GCR arrangement is illustrated in Figure 3-4. The GCR includes one stream crossing within the wind farm site and one stream crossing on the L1322 local road, as indicated in Figure 3-4.

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). It is proposed that turbine deliveries shall approach the site from the North via Foynes Port, the N69, the N18, the M20, the N20 and L1322. Temporary accommodating works will be required at selected locations along the TDR to facilitate the delivery of large components to the site. These works are described in detail in Section 3.5.6.

The construction of the project in its entirety is expected to take between 12 - 18 months. Further details including a construction programme used as a basis of assessments in this EIAR is included in Section 3.6.

15.1.3 Summary of the Proposed Project Assessed in the EIAR

In summary the proposed project will consist of the following:

- Erection of 6 no. wind turbines with a blade tip height of 175m, rotor diameter of 150m and a hub height of 100m;
- Construction of turbine foundations and crane pad hardstanding areas;
- Construction of new site tracks and associated drainage infrastructure;



- Upgrading of existing tracks and associated drainage infrastructure where necessary including upgrade of entrance onto Local Road L1322.
- All associated drainage and sediment control including the installation of new watercourse or drain crossings and the re-use or upgrading of existing internal watercourse and drain crossings;
- Construction of 1 no. permanent onsite 38kV electrical substation to ESNB specifications including:
 - Control Building with welfare facilities;
 - Electrical infrastructure;
 - Parking;
 - Wastewater holding tank;
 - Rainwater harvesting;
 - Security fencing;
 - All associated infrastructure, services and site works.
- Temporary accommodation works associated with the Turbine Delivery Route to facilitate the delivery of turbine components;
- 1 no. Temporary construction site compound and associated ancillary infrastructure including parking;
- Tree felling and associated replanting to facilitate construction and operation of the proposed development;
- Installation of underground medium voltage (20/33kV) and communication cabling between the proposed turbines and the proposed on-site substation and associated ancillary works;
- Erection of 1 no. permanent meteorological mast with a height of 100m above ground level and associated access track;
- Installation of medium voltage (up to 38kV) underground cabling between the proposed on-site substation and the existing Charleville substation and associated ancillary works. The proposed grid connection cable works will include 2 no. watercourse crossings and the installation of 9 no. pre-cast joint bays;
- All associated site development works;
- A 10 year planning permission and 35 year operational life from the date of commissioning of the entire wind farm.

The proposed project assessed in this EIAR is comprised of the following key elements:

- The wind farm site **OR** 'the site';
- The grid connection route **OR** 'GCR';
- The turbine delivery route **OR** the 'TDR';
- Replant Lands at Emlagh, County Clare (assessed for potential cumulative impacts).



15.1.4 Definition of the Study Area

Both the current 2006 Wind Energy Development Guidelines and the revised 2019 Guidelines that are both published by the Department of the Environment, Heritage and Local Government specify different radii for examining the zone of theoretical visibility of proposed wind farm projects (ZTV).

The extent of this search area is influenced by turbine height, as follows:

- 15 km radius for blade tips up to 100m;
- 20 km radius for blade tips greater than 100m and;
- 25 km radius where landscapes of national and international importance exist.

In the case of this project, the blade tips are 175m high and, thus, the minimum ZTV radius recommended is 20 km from the outermost turbines of the scheme. However, one of Ireland's most important and well-visited/publically accessible archaeological sites, Lough Gur, is a site of international renown that is located approx. 26km northeast of the nearest proposed turbine. Consequently, as per the 2006 guidance, out of an abundance of caution it is recommended to include that important receptor within this LVIA, even though it falls outside of the principle study area.

Notwithstanding the full 20km extent of the LVIA study area, there will be a particular focus on receptors and effects within the central study area, where there is higher potential for significant impacts to occur. When referenced within this assessment, the 'central study area' is the landscape within approx. 5km of the site.

15.2 Methodology

Production of this Landscape and Visual Impact Assessment involved baseline work in the form of desktop studies and fieldwork comprising professional evaluation by qualified and experienced Landscape Architects, as detailed in the preceding Statement of Authority. This entailed the following:

15.2.1 Desktop Survey

- Establishing an appropriate Study Area from which to study the landscape and visual impacts of the proposed wind farm;
- Review of a Zone of Theoretical Visibility (ZTV) map, which indicates areas from which the project is potentially visible in relation to terrain within the Study Area;
- Review of relevant County Development Plans, particularly with regard to sensitive landscape and scenic view/route designations;
- Selection of potential Viewshed Reference Points (VRPs) from key visual receptors to be investigated during fieldwork for actual visibility and sensitivity;



15.2.2 Fieldwork

- Recording of a description of the landscape elements and characteristics within the Study Area.
- Selection of a refined set of VRP's for assessment. This includes the capture of reference images and grid reference coordinates for each VRP location for the visualisation specialist to prepare photomontages.

15.2.3 Appraisal

- Consideration of the receiving landscape with regard to overall landscape character as well as the salient features of the study area including landform, drainage, vegetation, land use and landscape designations.
- Consideration of the visual environment including receptor locations such as centres of population and houses; transport routes; public amenities, facilities and heritage features and designated and recognised views of scenic value.
- Consideration of design guidance and planning policies.
- Consideration of potentially significant effects and the mitigation measures that could be employed to reduce such effects.
- Assessment of the significance of residual landscape impacts.
- Assessment of the significance of residual visual impacts aided by photomontages prepared at all of the selected VRP locations.
- Assessment of cumulative landscape and visual effects in combination with other relevant surrounding developments that are existing, permitted or proposed.

15.2.4 Assessment Criteria for Landscape Impacts

The classification system used by Macro Works to determine the significance of landscape and visual impacts is based on the IEMA Guidelines for Landscape and Visual Impact Assessment (2013). When assessing the potential impacts on the landscape resulting from a wind farm development, the following criteria are considered:

- Landscape character, value and sensitivity;
- Magnitude of likely impacts;
- Significance of landscape effects

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new features without unacceptable detrimental effects to its essential characteristics.



Landscape Value and Sensitivity is classified using the following criteria outlined in Table 15.1 below:

Table 15-1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the proposal site boundary that may have an effect on the landscape character of the area. Table 15.2 refers:

Table 15-2: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute



Magnitude of Impact	Description
	to an overall change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 15.3:

Table 15-3: Landscape Impact Significance Matrix

Magnitude	Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
Very High	Profound	Profound-substantial	Substantial	Moderate	Slight
High	Profound-substantial	Substantial	Substantial - moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial - moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

* Note: Judgements deemed 'substantial' and above are considered to be 'significant impacts' in EIA terms.

15.2.5 Assessment Criteria for Visual Impacts

As with the landscape impact, the visual impact of the proposed wind farm will be assessed as a function of receptor sensitivity versus magnitude. In this instance, the sensitivity of visual receptors, weighed against the magnitude of visual effects.



15.2.5.1 Visual Sensitivity

Unlike landscape sensitivity, visual sensitivity has an anthropocentric basis. Visual sensitivity is a two-sided analysis of receptor susceptibility (people or groups of people) versus the value of the view on offer at a particular location.

To assess the susceptibility of viewers and the amenity value of views, the assessors use a range of criteria and provide a four point weighting scale to indicate how strongly the viewer/view is associated with each of the criterion. Susceptibility criteria is extracted directly from the aforementioned Guidelines for Landscape and Visual Assessment (2013), whilst the value criteria relate to various aspects of a view that might typically be related to high amenity including, but not limited to, scenic designations. These are set out below:

- **Susceptibility of receptor group to changes in view.** This is one of the most important criteria to consider in determining overall visual sensitivity because it is the single category dealing with viewer susceptibility. In accordance with the IEMA Guidelines for Landscape and Visual Assessment (3rd edition 2013) visual receptors most susceptible to changes in views and visual amenity are:
 - *Residents at home;*
 - *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views;*
 - *Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
 - *Communities where views contribute to the landscape setting enjoyed by residents in the area; and*
 - *Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened.*

Visual receptors that are less susceptible to changes in views and visual amenity include;

- *People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and*
- *People at their place of work whose attention may be focused on their work or activity, not their surroundings and where the setting is not important to the quality of working life.*
- **Recognised scenic value of the view** (County Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Development Plans, at least, a public consultation process is required;
- **Views from within highly sensitive landscape areas.** Again, highly sensitive landscape designations are usually part of a county's Landscape Character Assessment, which is then incorporated with the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
- **Intensity of use, popularity.** Whilst not reflective of the amenity value of a view, this criterion relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at county or regional scale;



- **Connection with the landscape.** This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e. commuters hurriedly driving on busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;
- **Provision of elevated panoramic views.** This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas.
- **Sense of remoteness and/or tranquillity.** Remote and tranquil viewing locations are more likely to heighten the amenity value of a view and have a lower intensity of development in comparison to dynamic viewing locations such as a busy street scene, for example;
- **Degree of perceived naturalness.** Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by obvious human interventions;
- **Presence of striking or noteworthy features.** A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory headland, lough or castle;
- **Historical, cultural or spiritual value.** Such attributes may be evident or sensed at certain viewing locations that attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;
- **Rarity or uniqueness of the view.** This might include the noteworthy representativeness of a certain landscape type and considers whether other similar views might be afforded in the local or the national context;
- **Integrity of the landscape character in view.** This criterion considers the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;
- **Sense of place.** This criterion considers whether there is special sense of wholeness and harmony at the viewing location; and
- **Sense of awe.** This criterion considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations where highly susceptible receptors or receptor groups are present and which are deemed to satisfy many of the view value criteria above are likely to be judged to have a high visual sensitivity and vice versa.

15.2.5.2 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors: the visual presence of the proposal and its effect on visual amenity.

Visual presence is a somewhat quantitative measure relating to how noticeable or visually dominant the proposal is within a particular view. This is based on a number of aspects beyond simply scale in relation to distance. Some of these include the extent of the view as well as its complexity and the degree of existing contextual movement experienced such as might occur where turbines are viewed as part of / beyond a busy street scene. The backdrop against which the project is presented and its relationship with other focal points or prominent features within the view is also considered. Visual presence is essentially a measure of the relative visual dominance of the proposal within the available vista and is expressed as such i.e. minimal, sub-dominant, co-dominant, dominant, highly dominant.



For wind energy developments, a strong visual presence is not necessarily synonymous with adverse impact. Instead, the 2012 Fáilte Ireland survey entitled ‘Visitor Attitudes On The Environment – Wind Farms’ found that *“Compared with other types of development in the Irish landscape, wind farms elicited a positive response when compared to telecommunication masts and steel electricity pylons”....* and that *“most (tourists) felt that their presence did not detract from the quality of their sightseeing, with the largest proportion (45%) saying that the presence of the wind farm had a positive impact on their enjoyment of sightseeing...”*.

The purpose here is not to suggest that turbines are either inherently liked or disliked, but rather to highlight that the assessment of visual impact magnitude for wind turbines is more complex than just the degree to which turbines occupy a view. Furthermore, a clear and comprehensive view of a wind farm might be preferable in many instances to a partial, cluttered view of turbine components that are not so noticeable within a view. On the basis of these reasons, the visual amenity aspect of assessing impact magnitude is qualitative and considers such factors as the spatial arrangement of turbines both within the scheme and in relation to surrounding terrain and land cover. It also examines whether the project contributes positively to the existing qualities of the vista or results in distracting visual effects and disharmony.

It should be noted that as a result of this two-sided analysis, a high order visual presence can be moderated by a low level of effect on visual amenity and vice versa. Given that wind turbines do not represent significant bulk, visual impacts result almost entirely from visual ‘intrusion’ rather than visual ‘obstruction’ (i.e. the blocking of a view). The magnitude of visual impacts is classified in the following table:

Table 15-4: Magnitude of Visual Impact

Criteria	Description
Very High	The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene
High	The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene
Medium	The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene



15.2.6 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix included for Landscape Impact Significance at Table 15.3 above.

15.3 Existing Environment

15.3.1 Landscape Baseline

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape brought about by the proposal will be assessed. This also includes reference to any relevant landscape character appraisals and the current landscape policy context (both are generally contained within County Development Plans).

A description of the landscape context of the proposed wind farm site and wider study area is provided below under the headings of 'landform and drainage' and 'vegetation and land use.' However, 'centres of population', 'transport routes' and 'tourism, recreation and heritage features' form part of the visual baseline, which is dealt with in Section 15.4 below.



Figure 15-1: Aerial photography showing the Landscape context of the site and its immediate surrounds

15.3.1.1 Landform and Drainage

Landform

At a broad brush stroke level, terrain within the study area is lowland and gently undulating, mostly keeping between 80m AOD and 150m AOD. The most apparent landform within the study area is that of the Ballyhoura Mountains, which runs east-west over a course of up to approx. 12km. The Ballyhoura foothills are 5-6km east of the site, with their rounded-profile summits cresting 7-8km distance from the site. The range peak at Seefin Mountain, at 528m AOD, is approx. 9km east of the site. Other peaks include Black Rock (516m AOD), Carron Mountain (440m AOD) and Knockea (approx. 400m AOD). In the western fringes of the study area are the foothills of the Mullaghareirk Mountains, which remain mostly less than 300m AOD (within the study area). In the far north, there is Knockfeerina (286m AOD) and Corronoher (273m AOD) hills. Approx. 9-10km west of the site, land lifts over 200m before soon tapering down to 100-150m AOD. However, these elevations are not reflective of the gentle, lowland landform that dominates the area.

Within the central study area, land also tends to be undulating but of a broadly gentle, non-dramatic profile, ranging between 80m-170m AOD.



Within the site, terrain varies from below 90m AOD in its most southern corner, to over 130m AOD in its north-western corner. However, these represent two extremes of the site (i.e. aligning public roads to the north and south) that do not reflect the centre of where the proposed turbines are to be located. In the centre of site, terrain chiefly undulates between 95m-100m AOD and in its western half can take the form of a damp and/or water-clogged 'sump' in terrain, between marginally higher ground to the north and south.



Figure 15-2: The western half of the site can take the form of a damp and/or water-clogged 'sump' in terrain, between marginally higher ground to the north and south.



Figure 15-3: Low-lying landform of the central study area, when viewed from the Ballyhoura Mountains

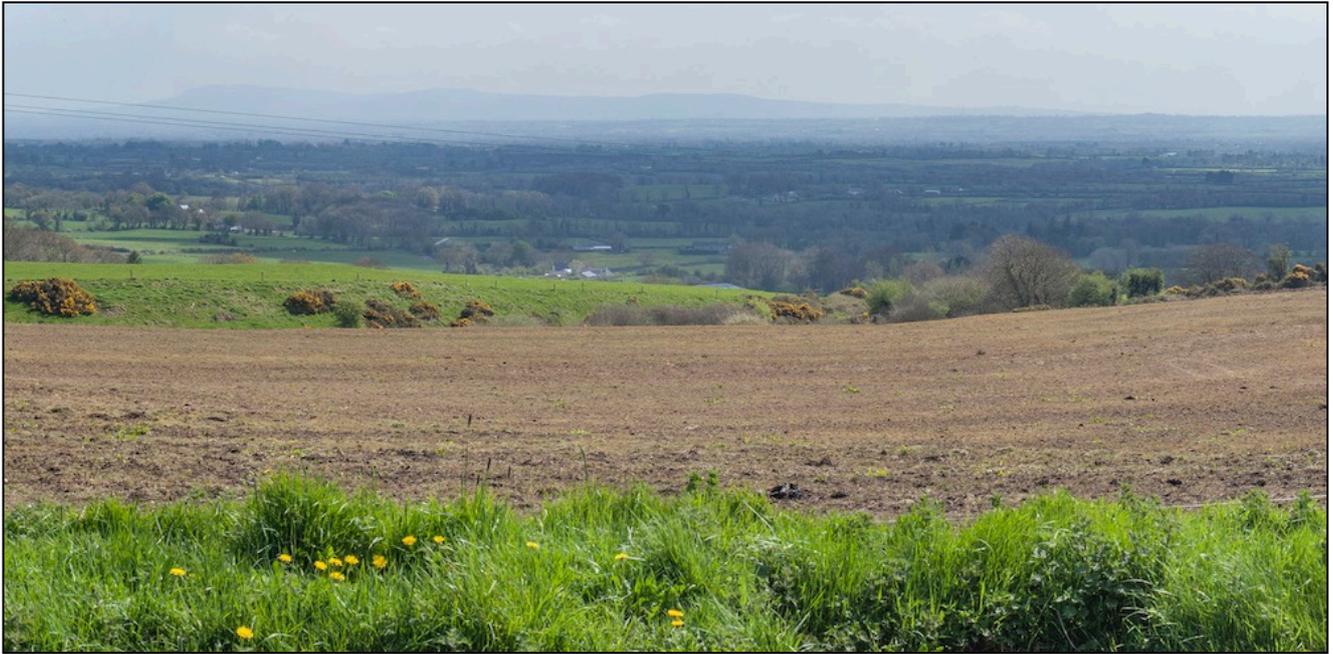


Figure 15-4: Low-lying landform of the study area, with the Ballyhoura Mountains silhouetted in the distance, when viewed from Corronoher Hill, approx. 16km northwest of the site.

Drainage

There are multiple rivers and streams across the study area. The Blackwater runs west-east in the very south of the study area, with multiple tributaries to the north. In the southeast quadrant, the rivers Awbeg and Ogden are prominent, with the River Allow flowing north-south in the south-western quadrant. In the north-western quadrant, the rivers Deel, Bealanablava and Mullaheera are found, with the rivers Maigue and Morningstar more apparent in the north-eastern quadrant.

In the central study area, the Awbeg River is most apparent, which tends to meander north-south, loosely mirroring the N20, in the direction of Buttevant, where it soon heads eastwards. In the west of the central study area is the River Deel, with Shruhaneballiv Stream in the north, near Charleville.

Within the site, there are a number of small, canalised streams that are frequently found in less well-drained and/or boggy terrains. These angular drainage canals eventually feed into the Awbeg River.

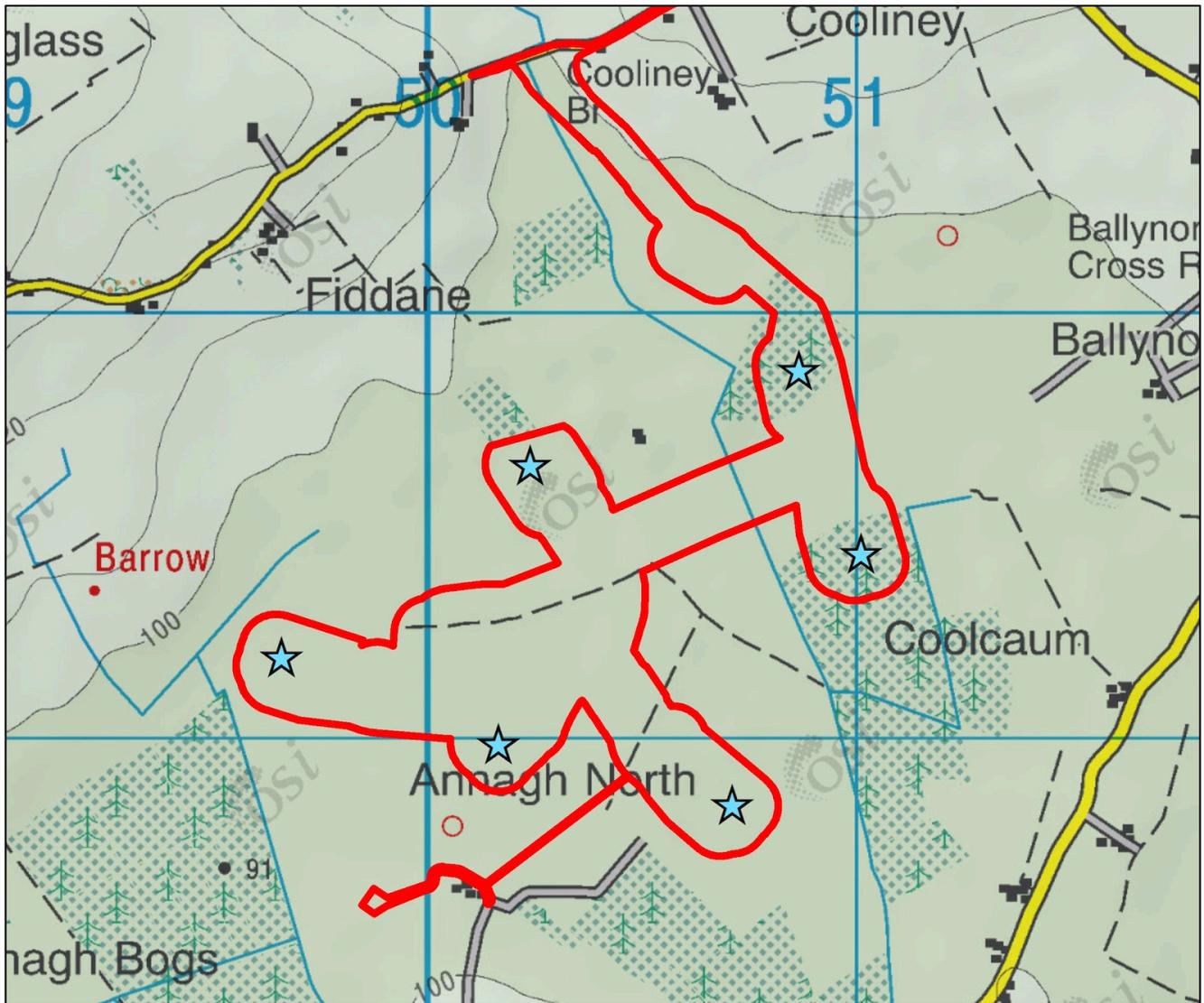


Figure 15-5: A number of small, canalised streams and/or drainage canals are angled across the site

15.3.1.2 Vegetation and Land Use

The vast majority of land use within the ever-evolving, highly anthropocentric study area is that of agricultural farmland, bound by a network of mixed hedgerow vegetation, and with very few fallow or under-utilised land. Being within the Golden Vale (i.e. the best land in Ireland for dairy farming), pasture is more prevalent than tillage. Fields tend to medium-sized, with smaller fields over approx. 250m-200m and larger fields on the flatter basins. However, pockets of commercial forestry can also be found scattered through the study area, particularly on upland or marginal terrain.

The largest anomaly to the prevalent land use in the study area occurs across the Ballyhouras, with a tendency for the southern slopes to be largely afforested with conifers, and with the northern side often under extensive heathland and blanket bog. However, the northern foothills of this hill range are also cloaked in commercial forestry. Concurrently, the Ballyhoura Mountain Bike Park is the largest trail network of its kind in Ireland, with loop trails ranging from 6-50km length. Wind turbines are highly visible across this range, as well as elsewhere in the wider study area.



A relatively modest rural population exists across most sections of the study area. Towns such as Mallow, Buttevant, Doneraile, Kanturk, Liscarroll, Charleville, Kilmallock and Bruree account for the most notable areas of urban land cover, whilst other anthropogenic landscape features include the linear transport corridors of the N20, N73 and the Dublin-Cork Intercity rail line. Several active and former quarries are also located throughout the wider study area.

Within the notably utilitarian, much-modified central study area, the land use and vegetation pattern is broadly similar. Pasture, followed by tillage and commercial forestry, are the most apparent, while less noticeable are transport corridors in the east (i.e. N20 and aforementioned rail line), some active and former quarries, villages such as Churchtown and a single golf course. Wind turbines are also present, but mostly in separate smaller developments of 1 or 2 turbines each. Charleville is marginally outside the central study area, although its south-western periphery enters to within 5km of the site.

As for the site itself, much of it is contained in conifer forest plantations as well as marginal pasture and boggy, weed- and rush-infested land. A tall telecommunications antenna is present, as are numerous farm tracks and a dilapidated farmhouse and farmyard.



Figure 15-6: Marginal pasture and boggy, rush- and weed-infested land and a large telecommunications antenna are present within the site, as well commercial forestry and improved pasture in places. Note the presence of two wind turbines to the right/east of the frame; turbines that are within the central study area but outside the site.

15.3.2 Landscape Policy Context and Designations

15.3.2.1 *Department of Environment, Heritage and Local Government Wind Energy Development Guidelines 2006*

The 2006 Wind Energy Development Guidelines provide guidance on wind farm siting and design criteria for a number of different landscape types. The main wind farm site and central study area is considered to be located within a landscape that is consistent with the 'Transitional Marginal Landscapes' landscape type.



However, there are also some aspects of the ‘Hilly and Flat Farmland’ landscape type. In such instances, the Guidelines recommend consideration of the advice for each landscape type. Siting and design recommendations for these landscape types include the following:

It is noted that the Draft Revised Wind Energy Development Guidelines 2019 maintain the same landscape types and siting and design recommendations as the 2006 Guidelines.

Transitional Marginal Landscapes:

Location – *“As wind energy developments, for reasons of commercial viability, will typically be located on ridges and peaks, a clear visual separation will be achieved from the complexity of lower ground.”*

“wind energy developments might also be located at lower levels in extensive areas of this landscape type, where they will be perceived against a relatively complex backdrop. In these situations it is important to minimise visual confusion such as the crossing by blade sets of skylines, buildings, utility lines and varied landcover.”

Spatial extent - *“Wind energy developments in these landscapes should be relatively small in terms of spatial extent. It is important that they do not dominate but achieve a balance with their surrounds, especially considering that small fields and houses are prevalent.”*

“4(a)Wind energy development with regular spacing and linear layout – may not be appropriate due to the undulation of the land from as well as limited field pattern.”

“4(b)Wind energy development with irregular spacing and random layout -is more appropriate given the relative undulation of the setting.”

“4(c)Large wind energy development straddling two landscape character types within the same visual unit can create visual ambivalence and, thus, negative tension between the two character types involved.”

Spacing - *“All options are possible, depending on the actual landscape characteristics. However, irregular spacing is likely to be most appropriate.”*

Layout - *“The likely location of wind energy developments on ridges suggests a linear or staggered linear layout whereas on broader hilltops they could be linear or clustered.”*

Height - *“...where the upper ground is relatively open and visually extensive, taller turbines may be more appropriate.”*

“...the profile can be even or uneven, depending on the profile and visual complexity of the terrain involved. The more rugged and undulating, the greater the acceptability of an uneven profile provided it does not result in significant visual confusion and conflict.”

Cumulative - *“This would have to be evaluated on a case-by-case basis, but great caution should be exercised. The spatial enclosure often found in transitional marginal landscapes is likely to preclude the possibility of seeing another wind energy development. However, should two or more wind energy developments be visible within a confined setting a critically adverse effect might result, depending on turbine height and wind energy development extent and proximity.”*



In instances where two or more landscape types are potentially applicable, the Guidelines recommend consideration of the advice for each landscape type rather than just the one that is considered to be most applicable. The 2006 Guidance specifically states (p40):

“It is, however, common that a wind energy development is located in one landscape character type but is visible from another, for example, where the site comprises an unenclosed moorland ridge standing above a broad flat farmland. In such an instance, the entire visual unit should be taken into consideration ...”.

In combination with the recommendations for ‘*Transitional Marginal Landscapes*’, the siting and design recommendations for the ‘*Hilly and Flat Farmland*’ landscape types have also been considered when designing the turbine layout for the proposed Annagh Wind Farm as a result of the varied nature of the landscape within the central and wider study area. In general, the proposed development is relatively consistent with the guidance notes for both landscape types, but it is especially consistent with the guidance for the landscape type ‘*Transitional Marginal Landscapes*’ in which the proposed project is situated. A key consideration in this instance was the locational guidance which states “*wind energy developments may be located at lower levels in extensive areas of this landscape type, where they will be perceived against a relatively complex backdrop.*”

Siting in Relation to Individual Properties (‘Setback’)

Section 6.18 of the Draft Revised Wind Energy Development Guidelines (December 2019) refers to appropriate setback distances for visual amenity purposes. The guidelines outline a mandatory minimum setback distance of “500 meters” or the distance of “4 times the tip height” of the proposed turbines “between the nearest point of the curtilage of any residential property”. This is set out in SPPR2 which is included below:

SPPR 2: With the exception of applications where reduced setback requirements have been agreed with relevant owner(s) as outlined at 6.18.2 below, planning authorities and An Bord Pleanála (where relevant), shall, in undertaking their development planning and development management functions, ensure that a setback distance for visual amenity purposes of 4 times the tip height of the relevant wind turbine shall apply between each wind turbine and the nearest point of the curtilage of any residential property in the vicinity of the proposed development, subject to a mandatory minimum setback of 500 metres from that residential property. Some discretion applies to planning authorities when agreeing separation distances for small scale wind energy developments generating energy primarily for onsite usage. The planning authority or An Bord Pleanála (where relevant), shall not apply a setback distance that exceeds these requirements for visual amenity purposes.

A setback distance of 700m is required for this project. All but one residence in the community falls outside this distance, which is:

- P51 A373 (690m SE of T3) – involved landowner

Consequently, this complies with the setback distance outlined in both the current 2006 Guidelines and the Draft Revised Guidelines (2019).



15.3.2.2 Cork County Development Plan 2014 - 2020

The current Cork County Development Plan (CDP) (2014) includes Chapter 13 'Green Infrastructure and Environment', within which sub-section 13.5 relates to landscape. A number of general objectives relating to landscape are noted within this chapter and are included below:

GI 6-1: Landscape

- a) *"Protect the visual and scenic amenities of County Cork's built and natural environment.*
- b) *Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while maintaining respect for the environment and heritage generally in line with the principle of sustainability.*
- c) *Ensure that new developments meets high standards of siting and design.*
- d) *Protect skylines and ridgelines from development.*
- e) *Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments."*

GI 6-2: Draft Landscape Strategy

"Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required."

GI 6-3: Draft Landscape Strategy and Local Area Plans

"Have regard to the Cork County Draft Landscape Strategy (2007) in the preparation of Local Area Plans and other plans." The value of the landscape in county Cork "is defined as the environmental or cultural benefits, including services and functions, which are derived from various landscape attributes. Value is evaluated using criteria ranging from Very High to Low".

A Landscape Character Assessment was undertaken as part of the Draft Cork Landscape Strategy (2007). This has been incorporated within the Cork County Development Plan (2014-2020) and divides the county into 16 No. Landscape Character Types (LCTs). The proposed development, as well as the entire central study area, is situated in the Landscape Character Type LCT5 "Fertile Plain with Moorland Ridge" (see Figure 15.7, below). LCT5 is classified as having a 'Very High' landscape sensitivity; a 'Very High' Landscape Value; and a 'County' Landscape Importance.

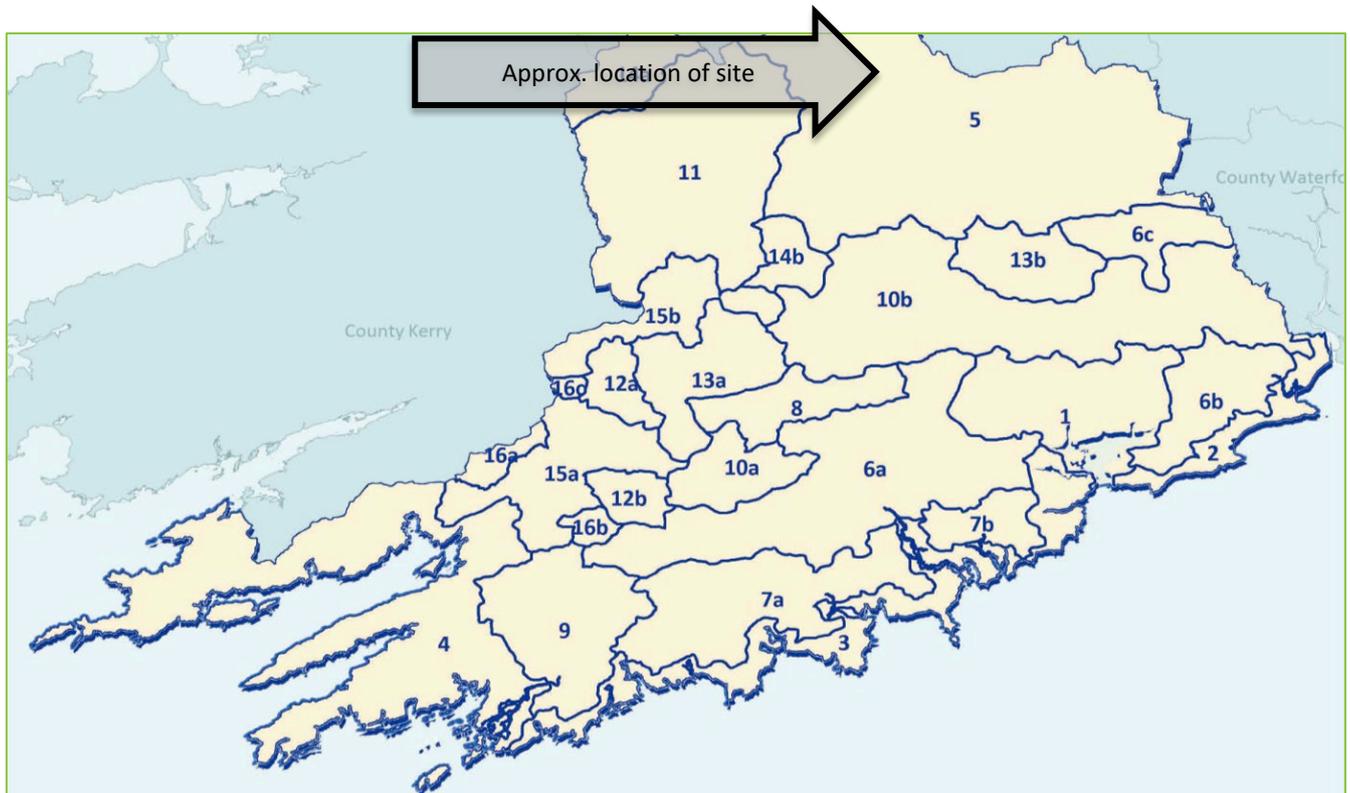


Figure 15-7: Excerpt from Cork County Development Plan (2014). Appendix E, Map 2 showing approximate location of proposed development in relation to Landscape Character Types.

According to the aforementioned landscape strategy, LCT5 is assigned as having the following:

Landscape Description:

“This landscape is generally referred to as the “Golden Vale” and occupies a substantial proportion of northeast Cork. This is a low lying landscape, which comprises an extensive area of predominantly flat or gently undulating topography along the River Blackwater, and which is contained in its periphery by low ridges.

... These physical conditions create a fertile and verdant landscape well suited to intensive farming. It is this activity and the planar landform, which give the landscape its characteristic rectilinear mosaic of large sized fields. This mosaic is articulated by the field boundaries comprising mostly mature broadleaf hedgerows but also scrub species such as gorse.

... The landscape is also characterised by many old demesnes comprising, for example, high stone walls, broadleaf avenues and open parkland. Several large settlements are found within the area, including Mallow, Charleville, Mitchelstown and Fermoy.

... Because of its flatness the landscape might be described as ‘calm’. While this even and vast extent can best be perceived from an elevated location, views are otherwise curtailed by the prevalent tall hedgerows when viewed on the plain.”



Aside from LCT 5, the only other Landscape Character Type found within the wider study area is LCT11 ‘Broad Marginal Middleground Valleys.’ This is located more than 8km from the site and solely occupies the south-western quadrant of the study area. This LCT is described as having a ‘High Landscape value,’ a ‘High Landscape Sensitivity’ and a ‘Local Landscape Importance.’ According to the aforementioned landscape strategy, LCT11 is assigned as having the following:

“This landscape is characterised by its relative evenness of terrain across the broad shallow valley of the River Blackwater, fed by several tributaries draining the higher ground to the north and south. At higher altitudes, the ground rises relatively steeply to meet a more mountainous landscape, while lower down the ground spreads out into gently sloping fertile land. Land is generally of marginal agricultural quality, typically of small to medium size fields bounded by mixed broadleaf hedgerows. Dairy farming is the main land use, while buildings comprising farmsteads, and individual houses are dispersed throughout the landscape.”

However, it is worth noting that as this LCT is outside the central study area, it has little capacity to affect or influence the landscape character associated with the site or its environs.

Landscape Character Area:

LCT5 contains three landscape character areas. The site is located within Landscape Character Area 69 (see Figure 15.8, below). Landscape Character Area 69 is described as:

“Dromina/Charleville (Fertile Planar and Gently Undulating Mosaic farmland and Moorland Ridge). While lands remain predominately fertile, there is more evidence of scrub on the plain than the Golden Vale. The main settlement is Charleville and the scattered villages in the vicinity, gravitate towards it.”

In regard to Cork County designated scenic routes, two such routes are located within the study area, both of which remain at all points more than 14km from the site of the proposed development. These are:

- S13 “Kilfinnan-Shanballymore Road,” located more than 14km, at its nearest point, east/southeast of the site;
- S14 “Road between Mallow and Roskeen Bridge,” located approx. 18km, at its nearest point, south of the site.

In addition, it should be noted that the site is not in or near a ‘High Value Landscape’ (HVL). The nearest HVL is located more than 3km east of the site (see Figure 15. 9, below).

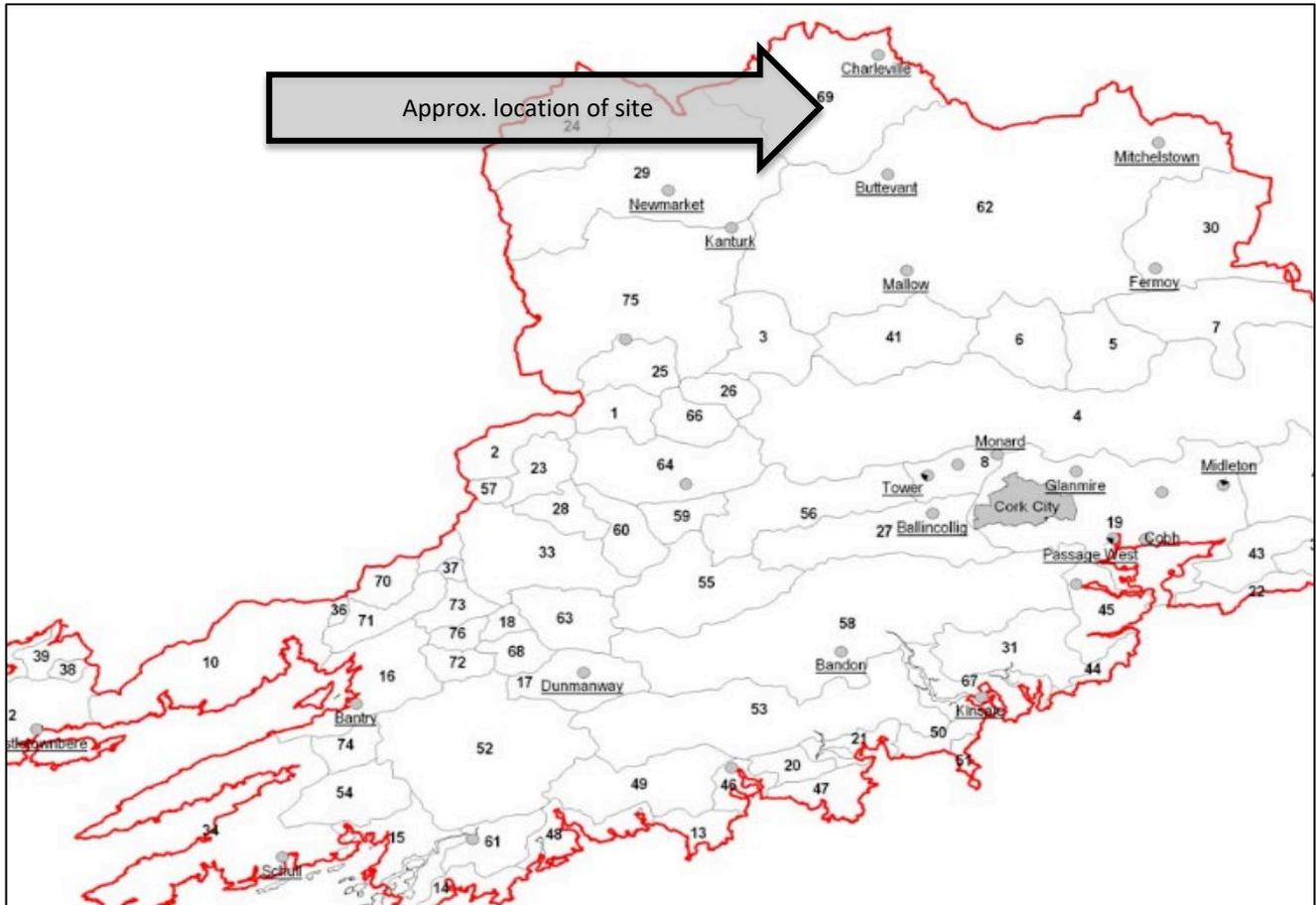


Figure 15-8: Excerpt from County Cork Draft Landscape Strategy 2007. Map 1 showing approximate location of proposed site in relation to Landscape Character Areas

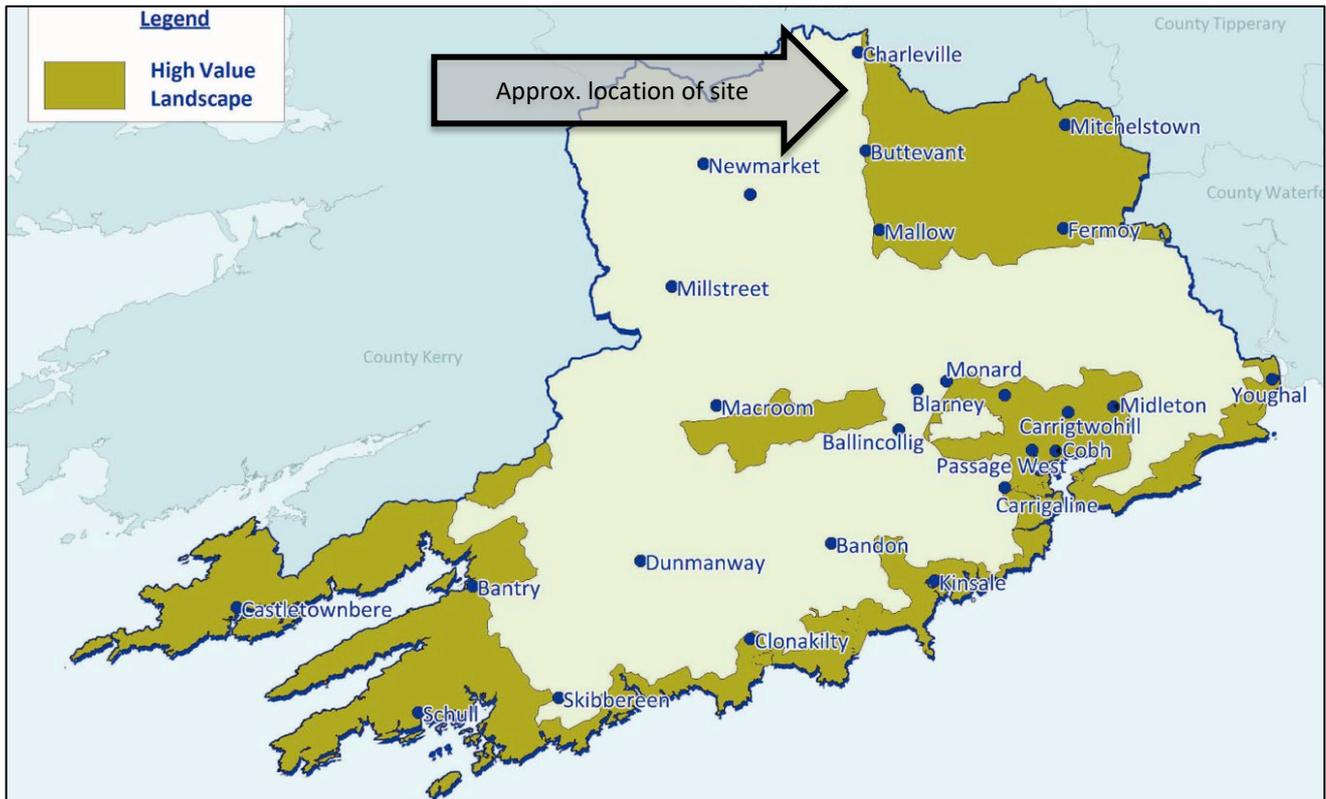


Figure 15-9: Excerpt from Cork County Development Plan (2014). Chapter 13, Figure 13.2 showing approximate location of proposed site in relation to high value landscapes.

15.3.2.3 Limerick County Development Plan 2010-2016

Whilst the proposed development is wholly contained within County Cork, much of the northern half of the study area falls within County Limerick, which comes within 6-6.5km northeast of the site. It is therefore important to consider landscape designations in the current Limerick County Development Plan. As Limerick County does not enter the central study area, it is principally that of scenic designations that are of relevance to the proposed development.

There’s two Co. Limerick designated scenic routes in study area. Both of these are located more than 13km east of the site, with the Ballyhoura Mountains largely between these routes and the site. These two are the:

- Castleoliver Scenic Drive (FID 8), located between approx. 14-19km east of the site;
- Kilfinane Scenic Drive (FID 11), located between approx. 18-20km east of the site.

15.3.2.4 Cork County Development Plan 2014 – Wind Energy Policy

Section 9.3 of the Cork County Development Plan 2014 covers onshore wind energy within County Cork. A number of objectives relating to the proposed development are outlined therein:

County Development Plan Objective ED 3-1: National Wind Energy Guidelines - Development of on-shore wind shall be designed and developed in line with the ‘Planning Guidelines for Wind Farm Development 2006’ issued by DoELG and any updates of these guidelines.



County Development Plan Objective ED 3-2: Wind Energy Projects - On-shore wind energy projects should focus on areas considered ‘Acceptable in Principle’ and Areas ‘Open to Consideration’ and generally avoid “Normally Discouraged” areas in this Plan.

County Development Plan Objective ED 3-3: Wind Energy Generation - Support a plan led approach to wind energy development in County Cork and identify areas for wind energy development. The aim in identifying these areas is to ensure that there are no significant environmental constraints, which could be foreseen to arise in advance of the planning process.

Figure 9.2 of the Cork County Development Plan 2014 shows a map with policy considerations for wind energy projects (see Figure 15.10, below) and identifies areas likely to be most suitable for wind energy developments. Although the site is not situated within one of the areas identified as ‘likely to be most suitable’, is it situated in an area designated as “Important Landscape (Medium).”

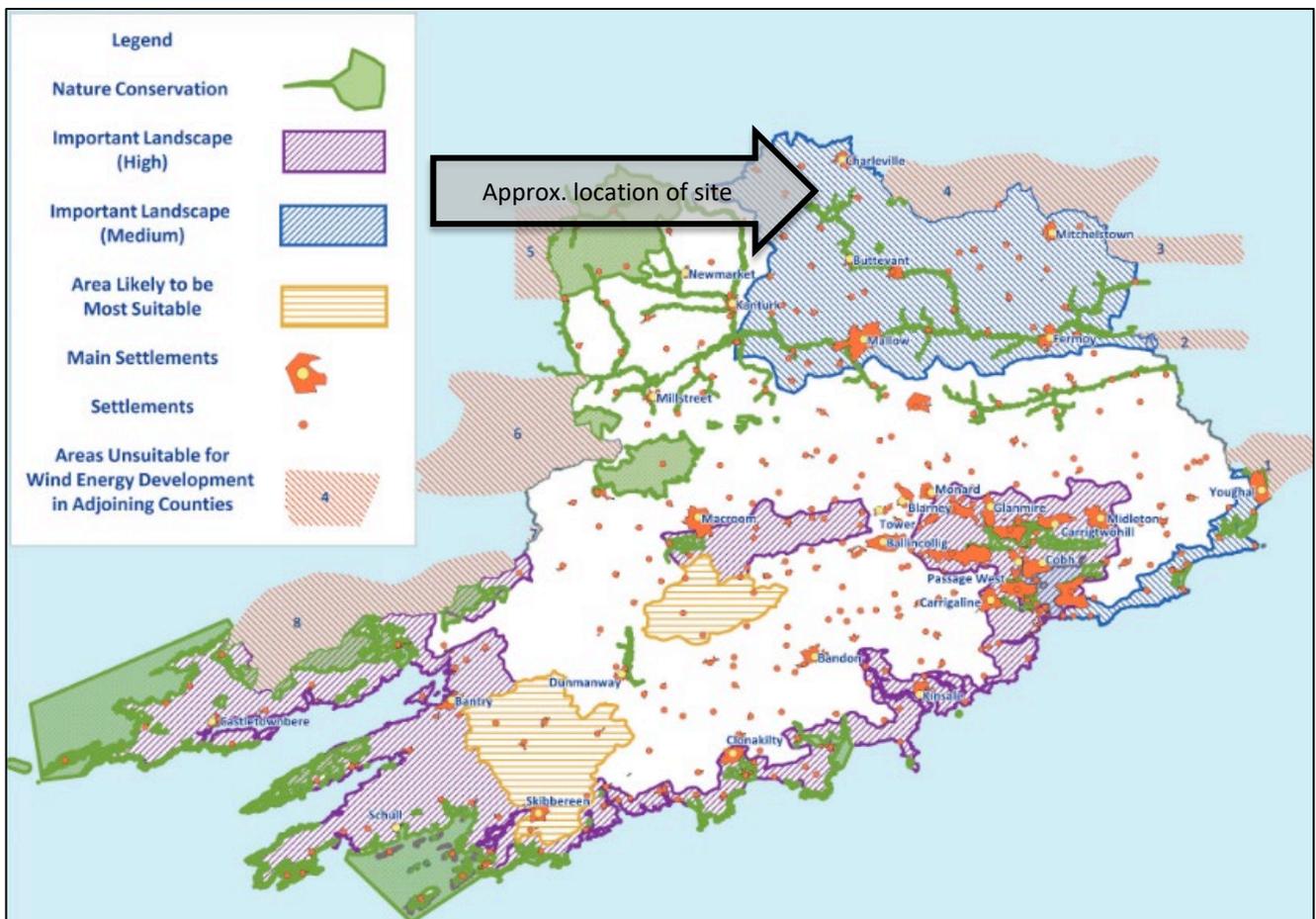


Figure 15-10: Excerpt from Cork County Development Plan (2014), Chapter 9, Figure 9.2 showing approximate location of proposed site in relation policy considerations for wind energy projects.

Figure 9.3 of the county development plan identifies areas of the county where wind energy developments are ‘Accepted in Principle’, ‘Open to consideration’ and ‘Normally discouraged.’ The location of the proposed turbines is entirely situated in an area designated as ‘Open to Consideration’.



These areas are:

“Locations that may have potential for wind farm developments but there are also some environmental issues to be considered. This area has variable wind speeds and some access to the grid. Urban areas, metropolitan/town green belts, and Natural Heritage Areas (NHA’s) within this area are not generally considered suitable for wind farm developments”.

Objectives outlined within the Cork County Development Plan relating to areas identified as ‘open to consideration’ are included below:

County Development Plan Objective ED 3-5: Open to Consideration

“Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:

- *Residential amenity particularly in respect of noise, shadow flicker and visual impact;*
- *Urban areas and Metropolitan/Town Green Belts;*
- *Natura 2000 Sites (SPA and SAC), Natural Heritage Areas (NHA’s) or adjoining areas affecting their integrity. Architectural and archaeological heritage;*
- *Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.”*

However, it is important to note that a section in the southwest corner of the site is within a ‘normally discouraged’ wind energy designation (see Figure 15.11, below). This is located more than 500m southwest from the proposed location of the nearest turbine (i.e. T4) and relates to the Blackwater River Special Area of Conservation (SAC). As the site is situated in the same visual context as this designation, it therefore has the potential to influence the character of this area. Objectives outlined within the Cork County Development Plan relating to areas identified as ‘normally discouraged’ are included below:

County Development Plan Objective ED 3-6: Normally Discouraged

“Commercial wind energy developments will be discouraged in these areas which are considered to be sensitive to adverse impacts associated with this form of development (either individually or in combination with other developments). Only in exceptional circumstances where it is clear that adverse impacts do not arise will proposals be considered.”

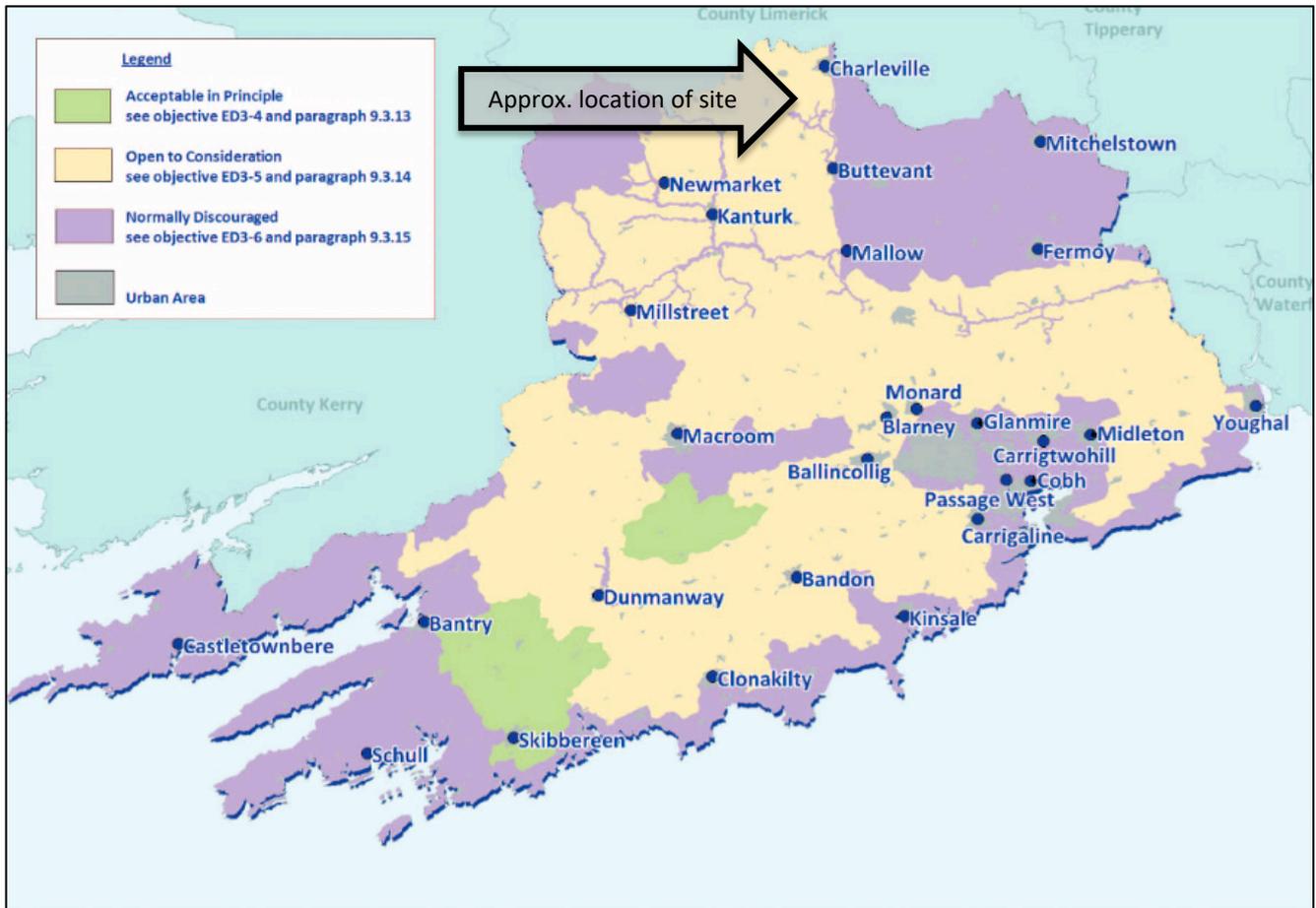


Figure 15-11: Excerpt from Cork County Development Plan (2014), Chapter 9, Figure 9.3, showing approximate location of proposed development in relation Cork’s Wind Energy Strategy.

15.3.2.5 Ecological Designations

Ecological designations such as Special Areas of Conservation (SAC’s), Special Protection Areas (SPA’s) and Natural Heritage Areas (NHA’s) are relevant to the landscape and visual assessment as they can identify areas that are likely to exhibit naturalistic character and low levels of built development. They also highlight areas to which landscape conservation values are attached and they are often associated with outdoor amenity facilities where people go to enjoy the landscape setting.

In this instance, the ecological designations within the central study area entail:

- Blackwater River SAC (FID 129) – this enters the most south-western section of the site, but remains more than 600m from the location of the nearest proposed turbine (i.e. T4)

Thus, there are no Special Protection Areas (SPA’s), Natural Heritage Areas (NHA’s) nor proposed Natural Heritage Areas within the central study area.



15.4 Visual Baseline

Only those parts of the study area that potentially afford views of the proposed EIA Development are of interest to this part of the assessment. Therefore, the first part of the visual baseline is establishing a 'Zone of Theoretical Visibility' and subsequently, identifying important visual receptors from which to base the visual impact assessment.

15.4.1 Zone of Theoretical Visibility (ZTV)

A computer generated Zone of Theoretical Visibility (ZTV) map has been prepared to illustrate where the proposed turbines are potentially visible from. The ZTV map is based solely on terrain data (bare ground visibility), and ignores features such as trees, hedges or buildings, which may screen views. Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the proposed development will definitely not be visible, due to terrain screening within the 20km study area. The ZTV below (Figure 15.12) is based on the tip height of the proposed turbines.

The following initial, key points are illustrated by the 'bare-ground' ZTV map (see Figure 15.12, below), while a more in-depth analysis of the ZTV map's likely implications will be provided in Section 15.4.2, below:

- As an overview, approx. half of the study area will experience theoretical visibility of the proposed development. No views of the proposed development will be available from much of the southwest quadrant; the far north; the far south, and those sections of the eastern study area screened by the Ballyhoura Mountains.
- Where theoretical visibility of the proposed development does exist, in the overwhelming majority of instances it pertains to 5-6 turbines potentially visible (i.e. the highest category).
- The most dense and regular areas where theoretical visibility of 5-6 turbines does exist is within 3-5km of the site
- In terms of settlements in the study area, no views of the proposed development will be available from Broadford, Drumcolliher, Milford, Newmarket, Kanturk, the majority of Doneraile and the overwhelming majority of Mallow.
- Of the two aforementioned designated County Cork scenic routes and two aforementioned designated County Limerick scenic routes within the study area, none have the potential to experience views of the proposed development.

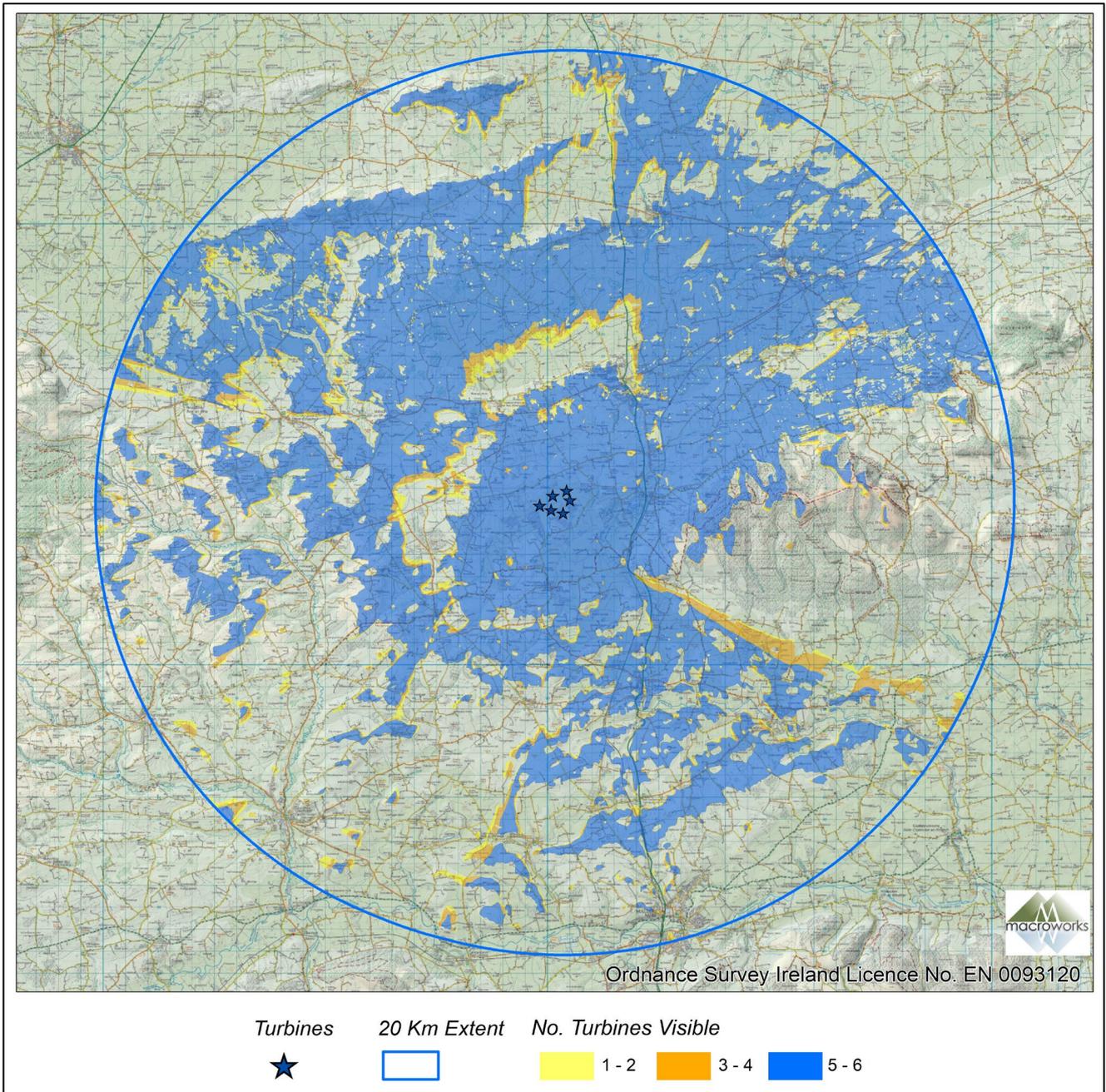


Figure 15-12: ZTV Map (Tip Height) for Annagh Wind Farm (See Appendix 15.2 for full scale annotated ZTV maps)

15.4.2 Visual Receptors

15.4.2.1 Centres of Population and Houses

The centres of populations within 5km of the site and in ZTV are Churchtown (approx. 600 residents) that is approx. 3km south of site, and the small village of Dromina (approx. 275 residents) that is approx. 4km northwest of the site. Between 5-10km from the site, the centres of population that are in ZTV entail Charleville (approx. 4000 population), Buttevant (approx. 1000 population) and Lisscarrol (approx. 250 population).



Beyond 10km from the site, those towns and villages within the study area that are also within ZTV entail Kilmeedy, Ballyagran, Bruree, Athlacca, Kilmallock and Kilfinane. However, it should be noted that beyond 10km distance from the proposed development, the potential for visual impacts in the mid and/or higher order tend to become highly unlikely.

15.4.2.2 *Transport Routes*

Within the central study area, the two most notable transport routes are the N20 and the Cork-Limerick Junction rail line, both of which come no closer than approx. 4km east of site and remain almost entirely within ZTV. The only other major route within 5km of the site is the R515 and the R578 that are located more than 3km to the northwest and north of the site, and are mostly within ZTV. The central study area is bound by a network of local roads, where two such local roads come within 800m (to the north and to the southeast) of the location of the nearest proposed turbine.

It should be noted that for transport routes beyond 5km distance from the proposed development, the potential for visual impacts above mid-order tend to become unlikely. While there are numerous regional roads, the National roads entail the N20, less than half of which is in ZTV (outside the central study area), and in the far south and southeast, the N72 and N73, the overwhelming majority of which are not in ZTV.

15.4.2.3 *Tourism, Recreational and Heritage Features*

Within 10km of the site, there are numerous such features. These include:

- Within 2.5km south of site is the Ballyhoura Way (National Waymarked Trail), which is mostly within ZTV;
- Two small cemeteries are located within 3km of the location of the nearest proposed turbine. These are Cooline Cemetery (1.1km northeast) and one at Killabraher South townland (2.9km west);
- Within 3.5km north of the site is Charleville Golf Club, which is partially in ZTV, with numerous mature thickets of trees separating the greenways (i.e. therefore curtailing many longer distant views);
- Within 4km east of the site is Kilmallock Cycle Hub Route 1, which is almost exclusively within ZTV;
- Within 7km east of the site is Ballyhoura Hills, including Coillte recreational tracks: Ballyhoura - Streamhill Loop (Blue) & Ballyhoura - Garanne Loop (White), which are partially within ZTV (i.e. only those sections of the trails on the western or northern slopes). The Ballyhoura Mountains are a well-used resource for the wider community, particularly for walking/trekking and mountain biking. In addition, it is nationally renowned for hosting the premier Mountain biking trails in the country, which attracts visitors from afar.
- The early medieval walled market town of Buttevant, approx. 8km southeast of the site, is in ZTV and is rich in castles, towers and abbeys;
- For sporting pitches (e.g. GAA clubs, soccer clubs, rugby clubs etc.) located in villages/towns within 10km of the site, refer to section 15.4.2.1.

It should be noted that for such heritage, tourism or recreational features beyond 10km distance from the proposed development, the potential for visual impacts in the higher order tend to become less likely.



These will include sporting pitches (e.g. GAA clubs, soccer clubs, rugby clubs etc.) in those towns and villages within the study area that are also within ZTV (i.e. Kilmeedy, Ballyagran, Bruree, Athlacca, Kilmallock and Kilfinane). Outside 10km distance, a very small degree of the aforementioned Coillte recreational tracks across the Ballyhouras will be in ZTV, although the Kilmallock Cycle hub Route in the northeast quadrant will be mostly in ZTV. In the southeast quadrant, Doneraile Park will be partially in ZTV, although the stately Doneraile Court, within the Park, will not be in ZTV.

Although it is contained outside of the principle 20km radius study area, Lough Gur is incorporated into the assessment in this instance due to its value as a site of international archaeological and cultural renown, located in southern Co. Limerick. The Lough Gur complex is centred on a shallow, horseshoe shape at the base of Knockadoon Hill, with a lakeside visitor centre and car park. However, the largest stone circle in Ireland, and accompanying dolmen and the remains of Stone Age houses, is located to the north of the lake. Closer to the lake there is also a (Castle) Tower House and the ruins of a Norman Castle (Black Castle). The lake and the surrounding area is known to be one of Ireland's most important archaeological sites, with humans having lived here continuously since Neolithic times (i.e. the last 5000-6000 years). A number of less well-known and less distinctive or rare heritage features are also located throughout the study area ranging, from demesne landscapes, church and graveyard remnants, castles and holy wells.

In the far south of the study area (and almost exclusively outside ZTV), the Blackwater River is associated with recreational amenity within the wider study area and is commonly used for water-based amenities such as rowing and fishing. Mallow racecourse is also situated in the far south of the study area and hosts numerous race meetings throughout the year, but it, too, is outside ZTV.

15.4.3 Views of recognised scenic value

Views of recognised scenic value are primarily indicated within County Development Plans in the context of scenic views/routes designations, but they might also be indicated on websites, touring maps, guide books, or road side rest stops that represent the area. All of the scenic routes and views that fell inside the ZTV pattern were investigated during fieldwork to determine whether actual views of the proposed wind farm might be afforded. If visibility may occur, a viewpoint has been selected for use in the visual impact appraisal later in this chapter.

As covered in Section 15.3.2.2, two Cork County designated scenic routes are located within the study area, both of which remain at all points more than 14km from the site of the proposed development. These are:

- S13 "Kilfinnan-Shanballymore Road," located more than 14km, at its nearest point, east/southeast of the site;
- S14 "Road between Mallow and Roskeen Bridge," located approx. 18km, at its nearest point, south of the site.

As covered in Section 15.3.2.3, two Limerick County designated scenic routes are located within the study area, both of which remain at all points more than 13km from the site. These are:

- Castleoliver Scenic Drive (FID 8), located between approx. 14-19km east of the site;
- Kilfinane Scenic Drive (FID 11), located between approx. 18-20km east of the site.



However, as covered in Section 15.4.1, of these four designated scenic routes in the study area, all are outside ZTV and therefore none have the potential to experience views of the proposed development. Thus, all views of recognised scenic value in the study area are not in fact potential visual receptors.

15.4.4 Identification of Viewshed Reference Points as a basis for Assessment

The results of the ZTV analysis provide a basis for the selection of Viewshed Reference Points (VRP's), which are the locations used to study the landscape and visual impact of the proposed wind farm in detail. It is not warranted to include each and every location that provides a view of this development as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the project. Instead, a variety of receptor locations were selected that are likely to provide views of the proposed wind farm from different distances, different angles and different contexts.

The visual impact of a proposed development is assessed using up to 6 categories of receptor type as listed below:

- Key Views (from features of national or international importance);
- Designated Scenic Routes and Views;
- Local Community views;
- Centres of Population;
- Major Routes; and
- Amenity and heritage features;

Where a VRP might have been initially selected for more than one reason it will be assessed according to the primary criterion for which it was chosen. The characteristics of each receptor type vary as does the way in which the view is experienced. These are described below.

Key Views

These VRPs are at features or locations that are significant at the national or even international level, typically in terms of heritage, recreation or tourism. They are locations that attract a significant number of viewers who are likely to be in a reflective or recreational frame of mind, possibly increasing their appreciation of the landscape around them. The location of this receptor type is usually quite specific.

Designated Scenic Routes and Designated Views

Due to their identification in the County Development Plan this type of VRP location represents a general policy consensus on locations of high scenic value within the Study Area. These are commonly elevated, long distance, panoramic views and may or may not be mapped from precise locations. They are more likely to be experienced by static viewers who seek out or stop to take in such vistas.

Local Community Views

This type of VRP represents those people who live and/or work in the locality of the proposed EIA Development, usually within a 5 km radius of the site. Although the VRPs are generally located on local level roads, they also represent similar views that may be available from adjacent houses. The precise location of this VRP type is not critical; however, clear elevated views are preferred, particularly when closely associated with a cluster of houses and representing their primary views. Coverage of a range of viewing angles using several VRPs is necessary in order to sample the spectrum of views that would be available from surrounding dwellings.



Centres of Population

VRPs are selected at centres of population primarily due to the number of viewers that are likely to experience that view. The relevance of the settlement is based on the significance of its size in terms of the Study Area or its proximity to the site. The VRP may be selected from any location within the public domain that provides a clear view either within the settlement or in close proximity to it.

Major Routes

These include national and regional level roads and rail lines and are relevant VRP locations due to the number of viewers potentially impacted by the proposed development. The precise location of this category of VRP is not critical and might be chosen anywhere along the route that provides clear views towards the proposal site, but with a preference towards close and/or elevated views. Major routes typically provide views experienced whilst in motion and these may be fleeting and intermittent depending on screening by intervening vegetation or buildings.

Amenity and Heritage Features

These views are often one and the same given that heritage locations can be important tourist and visitor destinations and amenity areas or walking routes are commonly designed to incorporate heritage features. Such locations or routes tend to be sensitive to development within the landscape as viewers are likely to be in a receptive frame of mind with respect to the landscape around them. The sensitivity of this type of visual receptor is strongly related to the number of visitors they might attract and, in the case of heritage features, whether these are discerning experts or lay tourists. Sensitivity is also heavily influenced by the experience of the viewer at a heritage site as distinct from simply the view of it. This is a complex phenomenon that is likely to be different for every site. Experiential considerations might relate to the sequential approach to a castle from the car park or the view from a hilltop monument reached after a demanding climb. It might also relate to the influence of contemporary features within a key view and whether these detract from a sense of past times. It must also be noted that the sensitivity rating attributed to a heritage feature for the purposes of a landscape and visual assessment is not synonymous with its importance to the Archaeological or Architectural Heritage record.

The Viewshed Reference Points selected in this instance are set out in 5 and Figure 15.13, below.

Table 15-5: Selected Viewshed Reference Points (VRP's)

VRP No.	Location	Distance to nearest turbine	Direction of view
VP1	The Pastures housing development, Charleville	5.4km (T1)	SW
VP2	Dooley's Crossroads, Newtown Ballyhay	3.8km (T3)	W
VP3	Ballyhoura Way at Ballyhoura Hills	8.0km (T3)	W
VP4	N20 at Shinanagh Bridge	3.3km (T6)	NW
VP5	Ballyhoura Way north of Churchtown	2.6km (T6)	N
VP6	Residences on local road southeast of site	946m (T6)	N
VP7	L1322 at Coolcaum townland	746m (T3)	SW/W/NW
VP8	Cooline Cemetery, Cooliney townland	1.1km (T1)	SW
VP9	Local residences at Fiddane townland	846m (T2)	S/SW
VP10	Local residences at Cloonkeen townland	1.1km (T4)	SW



VRP No.	Location	Distance to nearest turbine	Direction of view
VP11	Cemetery at Killabrahher South townland	2.9km (T4)	E
VP12	Dromina GAA club, Dromina	4.7km (T4)	E/SE
VP13	Housing development, Buttevant	8.2km (T6)	NW
VP14	R578 at Knockilly townland	13.5km (T4)	NE
VP15	N20 at Baltydaniel West townland	14.4 km (T6)	NW
VP16	Doneraile Estate, Doneraile	13.4km (T6)	NW
VP17	N20 at Ballyfookeen townland, Co. Limerick	12.8km (T1)	S/SE
VP18	Elevated road at Gortroe Townland	15.3km (T2)	SE
VP19	Lough Gur	27.4km (T1)	SW

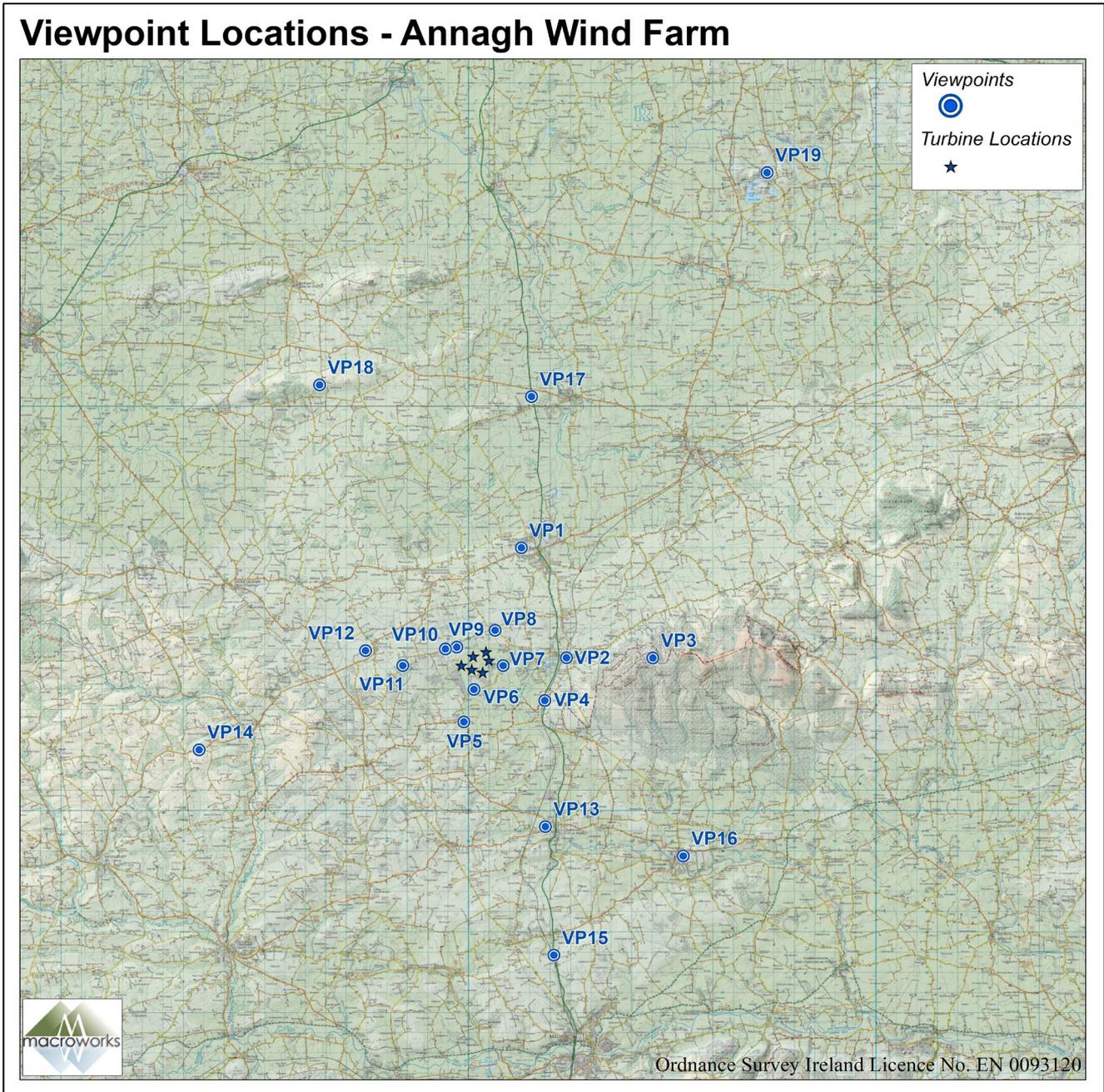


Figure 15-13: Map of Viewpoint Locations

15.5 Potential Impacts

Based on the assessment criteria employed herein, potential significant impacts are considered most likely to occur in instances where highly sensitive landscape and visual receptors coincide with high order landscape and visual effects (see descriptions Table 15.1, Table 15.2 and Table 15.4).



From Macro Works previous experience of this type of proposed development in a rural setting, it is considered that potentially significant landscape and visual impacts have the potential to occur in the following ways:

Landscape Impacts

- a) Irreversible physical effects on sensitive landscape features;
- b) Disruption of existing land use patterns;
- c) Incongruous change to areas of sensitive landscape character.

Visual Impacts

- a) A combination of visual and spatial dominance as seen from highly sensitive receptor locations. This is most likely to occur within 1-3km of the proposed development.
- b) Visual clutter and ambiguity, if seen from highly sensitive receptor locations. This can occur at any distance, but tends to occur beyond 2-3km, when turbines can become stacked in perspective and a more two dimensional layout is perceived.
- c) A combination of both of the above effects.

In terms of the most sensitive landscape receptors, from baseline studies and early stage assessment specific to the proposed project, within the central study area this is considered to be the River Blackwater Special Area of Conservation (SAC), which enters the most south-western section of the site, but remains more than 600m from the location of the nearest proposed turbine (i.e. T4). Whilst a degree of landscape sensitivity is also associated with some of the more local landscape features, these are not considered to be highly sensitive landscape receptors. However, in terms of planning policy context (as raised in Section 15.3.2.2), according to the Landscape Character Assessment undertaken as part of the Draft Cork Landscape Strategy (2007), the proposed development, as well as the entire central study area, is situated in the Landscape Character Type LCT5 "Fertile Plain with Moorland Ridge." LCT5 is classified as having a 'Very High' landscape sensitivity; a 'Very High' Landscape Value; and a 'County' Landscape Importance.

Typically, the most sensitive visual receptors tend to be the designated scenic routes (identified in the Cork and Limerick County Development Plans) and/or key views. In the case of designated scenic routes, these are sensitive receptor locations on the basis that they represent a notable degree of scenic and recreational amenity. However, as previously established, all such designated scenic routes in the study area have no potential for views of the proposed development. In the case of key views, there are no known such views in the study area.

15.6 Mitigation Measures

Given the highly visible nature of commercial wind energy developments it is not generally feasible to screen them from view using on-site measures, as would be the primary form of mitigation for many other types of development. Instead, landscape and visual mitigation for wind farms must be incorporated into the early stage site selection and design phases. In this instance, the two main forms of landscape and visual mitigation employed were:

- Mitigation by avoidance and design
- Buffering of Residential Receptors



15.6.1 Mitigation by Avoidance and Design

Macro Works have been involved in the proposed project since early 2020, when early-stage constraints studies took place. One of the main mitigation measures brought forward from these early-stage studies was that the layout would avoid the aforementioned River Blackwater Special Area of Conservation (SAC), which enters the most south-western section of the site: the identification of this constraint resulted in a more than 600m distance being established between it and the location of the nearest proposed turbine.

In the second half of 2020, Macro Works were involved in the design optimisation analysis of the initial turbine layout for the proposed development. For the purposes of this analysis, fieldwork was undertaken and a range of key representative viewpoints (VPs) from surrounding receptor locations were selected and photography was captured. Fourteen VP locations were selected to represent a variety of key receptors viewing distances and viewing angles. Wireframe overlay montages from all 19 of the VPs were produced to analyse the layout and identify degrees of planning risk and potential for design improvement. This analysis began with an objective review of visibility at each VP location, followed by a summary of likely planning risk and recommendations. Consequently, as a result of this analysis, the proposed layout was refined and improved to reduce potential and/or likely visual impacts associated with the proposed development.

15.6.2 Buffering of Residential Receptors

For the proposed Annagh Wind Farm, a setback distance of 700m is required. All but one residence in the community falls outside this distance. This is:

- P51 A373 (690m SE of T3) – involved landowner

Consequently, this complies with the setback distance outlined in both the current 2006 Guidelines and the Draft Revised Guidelines (2019).

Variation in residential buffer distances within the nearest kilometre has a much more noticeable effect on perceived turbine scale than when it occurs in the context of more distant views. This is due to the law of perspective; that is, doubling the distance to an object halves its perceived height. The reduction factor is even more pronounced when considered in the context of the ‘swept area’ of turbine blades and not just their tip height. This exponential ‘scale in relation to distance’ scenario is illustrated in Figure 15.14 below.

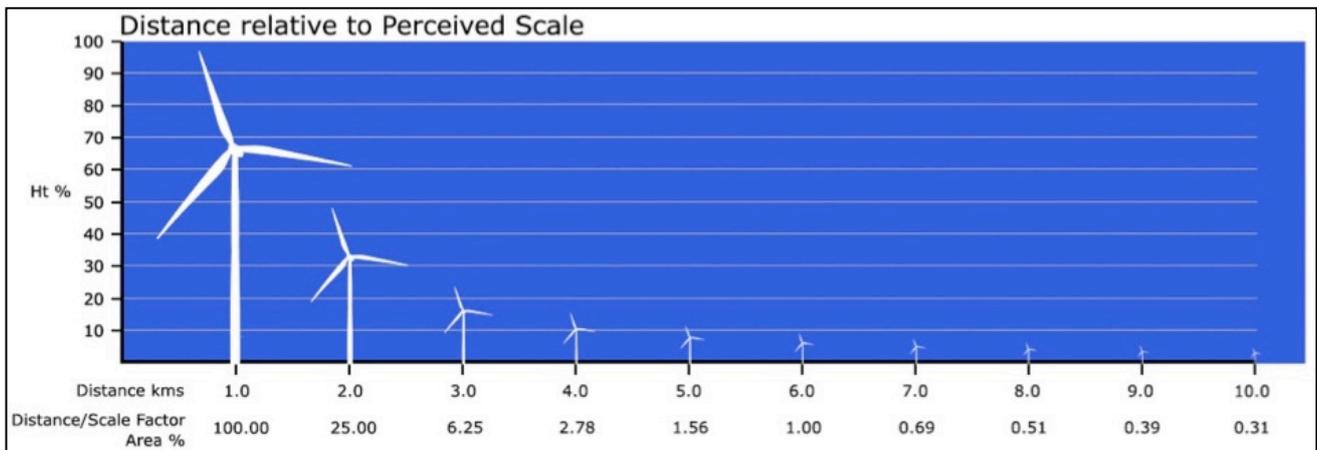


Figure 15-14; Turbine ‘scale in relation to distance’ relationship



15.7 Residual Landscape Effects

15.7.1 Landscape Character, Value and Sensitivity

Effects on landscape character will be considered at both the localised scale of the site and its immediately surrounding landscape as well as the broader scale of the Study Area. The following summarises and deduces those observations made in Section 15.3.

Central Study Area (< c. 5km from nearest turbines)

Within the central study area, land tends to be undulating, but of a broadly gentle, non-dramatic profile, ranging between 80m-170m AOD. However, within the centre of the site, where the proposed turbines are to be located, terrain chiefly undulates between 95m-100m AOD. In terms of land use, the central study area is utilitarian, ever evolving and highly anthropocentric; a locale where intensive farming practises prevail. Pasture, followed by tillage and commercial forestry, are the most apparent land uses; less noticeable are, quarries, two villages, a single golf course and existing wind turbines. As for the site itself, much of it is under conifer forest plantations, aside from marginal pasture and boggy, weed- and rush-infested land. A tall telecommunications antenna is present, as are numerous farm tracks and a dilapidated farmhouse and farmyard.

In terms of planning policy context, the proposed development, as well as the entire central study area, is situated in a Landscape Character Type that is classified as having a 'Very High' landscape sensitivity; a 'Very High' Landscape Value; and a 'County' Landscape Importance. However, it should be noted that the site is not in or near a 'High Value Landscape' (HVL), which is located more than 3km east of the site.

While the aforementioned River Blackwater Special Area of Conservation (SAC) enters the most south-western section of the site, overall, the central study area is one in which productive, utilitarian qualities are notably more apparent than naturalistic, conservation and/or aesthetic values. The latter point is supported by the fact that all designated scenic routes remain more than 13km from the site. It is an intensively managed working rural landscape where intensive agriculture, modified landscape and existing wind energy developments, among other land uses, inform its landscape character. In addition, there is a highly limited degree of recreational value present in the central study area.

On balance of the above factors, the site and central study area are considered to have a **Medium** landscape sensitivity.

Wider Study Area (c. 5-20km)

Overall, terrain within the wider study area is lowland and gently undulating, with the most apparent landform being that of the Ballyhoura Mountains, which begin 5-6km east of the site. However, all landform rests below 600m AOD within the study area, with the vast majority being less than 150m AOD. There are multiple rivers and streams, with the Blackwater being chief among them, followed by rivers Awbeg, Ogden, Allow, Deel, Bealanablaya, Mullaheera, Maigue and Morningstar. While present, and unlike some areas of the county or province, rivers and/or watercourses do not tend to characterise its sense of place.

The vast majority of land use within this ever evolving, highly anthropocentric study area is that of agricultural farmland, bound by a network of mixed hedgerow vegetation. Being within the Golden Vale, pasture is more prevalent than tillage, with field sizes tending towards medium. In that light, the presence of the Ballyhouras in the east represent somewhat of an upland, uncultivated anomaly to the wider context, while also raising the presence of recreational and aesthetic values.



Reflective of such a broadly lowland, fertile, accessible and productive study area, there is a plethora of towns and villages relatively evenly scattered about it, along with attendant/supporting transport routes, including regional and national roads, as well as an inter-city rail line.

In terms of planning policy context, the proposed development and the vast majority of the study area is situated in a Landscape Character Type that is classified as having a 'Very High' landscape sensitivity; a 'Very High' Landscape Value; and a 'County' Landscape Importance. In the south-western quadrant of the study area is a Landscape Character Type that has a 'High Landscape value,' a 'High Landscape Sensitivity' and a 'Local Landscape Importance.' In terms of scenic or aesthetic values of the area, there is a relatively low degree of scenic designations present (i.e. four scenic routes between Counties Limerick and Cork, both of which remain more than 13km from the site).

Overall, it is considered that the wider study area is principally that of a productive rural landscape that comprises of some highly anthropogenic features, such as busy national primary and secondary routes, the national railway line corridor and a presence of existing wind energy developments. Nonetheless, there is a pastoral aesthetic and a degree of rural tranquillity throughout the study area, which also includes some highly sensitive landscape features such as the Blackwater River SAC.

For the reasons outlined above, the wider study area is generally considered to be of a **Medium** landscape sensitivity, but with occasional landscape features and areas of higher and lower sensitivity.

15.7.2 Magnitude of Landscape Impacts

The physical landscape as well as the character of the proposed development and its central study area (<5km) is affected by the proposed wind turbines as well as ancillary development such as access and circulation roads, areas of hard standing for the turbines, grid connection and the proposed substation compound. By contrast, for the wider landscape of the study area, landscape impacts relate exclusively to the influence of the proposed turbines on landscape character. The aspects of the proposed development that are likely to have an impact on the physical landscape and landscape character are described in Chapter 3 (Description of Proposed Development) with construction processes described in the Construction and Environmental Management Plan (CEMP) included in Appendix 3.1.

15.7.2.1 *Construction Stage Effects on the Physical Landscape*

It is considered that the proposed wind farm development will have a modest physical impact on the landscape within the site as none of the proposed development features have a large 'footprint' and land disturbance/vegetation clearing will be relatively limited. The topography and land cover of the proposed site will remain largely unaltered with construction being limited to elements such as proposed tracks, areas of hard standing for the turbines, the on-site substation compound, temporary site construction compound and proposed met mast. Excavations will tie into existing ground levels and will be the minimum required for efficient working. Any temporary excavations or stockpiles of material will be re-graded to marry into existing site levels and reseeded appropriately in conjunction with advice from the project ecologist.

The proposed project also includes approx. 4.5km of new internal access tracks that will be required to be constructed and approx. 0.38km of upgraded agricultural tracks will be required as part of the project. The finalised internal track layout has been designed to avoid environmental constraints, and every effort has been made to minimise the length of proposed tracks by utilising and upgrading existing tracks.



Furthermore, the track layout has been designed to follow the natural contours of the land wherever possible, reducing potential for areas of excessive 'cut and fill'.

There will be an intensity of construction stage activity associated with the access tracks and turbine hardstands consisting of the movement of heavy machinery and materials, but this will be temporary/short term in duration and transient in location. The construction stage effects on landscape character from these familiar and dispersed surface activities will be minor.

There will be one 38kV on-site substation compound constructed to collect the generated power from the proposed development before distributing it to the existing Charleville 110kV Substation. The proposed 38kV on-site substation compound will measure 48.8m x 23m, with its control building measuring 21.8m(L) by 7.3m(W) and 6m(H). The most notable construction stage landscape impacts resulting from the proposed on-site substation relate to the construction of concrete foundations to facilitate that substation building. Overall, these construction stage effects are relatively minor and compare to the construction of an industrial farm shed.

All internal site cabling will be underground, following site access tracks without the need for trenching through open ground. Indeed, the land cover of the site will only be interrupted as necessary to build the structures of the proposed wind farm and to provide access. Impacts from land disturbance and vegetation loss at the site are considered to be modest in the context of this landscape setting. Some forest felling will be necessary to accommodate the construction of some turbines, hardstands, crane pads, access tracks and the proposed onsite substation. All forestry that is removed (i.e. 12.6ha) will be subject to forest replanting provisions, which will be provided on a site at Emlagh, Moyasta, Co. Clare.

One permanent meteorological (Met) masts will be erected on site and will comprise of 100m high lattice steel masts with a shallow concrete foundation. The most notable construction stage effects here relate to the minor amount of ground excavation required to facilitate the shallow foundations for the steel mast structure. Be that as it may, this proposed met mast will replace an existing tall met mast on site.

The grid connection cabling will be approx. 5.9km in length, including 3.4km to be constructed primarily within the existing road corridor and 2.5km of underground cables to be installed within private lands within the wind farm site, and will include for directional drilling at one location to cross existing watercourses. No overhead lines are required for this connection. Connection works will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables. This will require delivery of plant and construction materials, followed by ground excavation laying of cables and subsequent reinstatement of trenches, and will result in minor and very localised construction stage landscape effects.

Site activity will be at its greatest during the construction phase due to the operation of machinery on site and movement of heavy vehicles to and from site. This phase will have a more significant impact on the character of the site than the operational phase, but it is a 'short-term' impact that will cease as soon as the proposed development is constructed and becomes operational (approximately 12-18 months from the commencement of construction).

There will be some long term/permanent construction stage effects on the physical landscape in the form of turbine foundations and hardstands, access tracks and a substation, but only the on-site substation is likely to remain in perpetuity as part of the national grid network. It is likely that, with the exception of some residually useful access tracks, all other development features will be removed from the project site and it will be reinstated to agricultural or forestry use upon decommissioning. Thus, the construction stage landscape effects of the proposed development are largely reversible.



There will be some construction stage effects on landscape character generated by the intensity of construction activities (workers and heavy machinery), as well as areas of bare-ground and stockpiling of materials as identified in the Construction and Environmental Management Plan (CEMP) in Appendix 3.1. Such effects will be temporary/short term in duration and are, therefore, not considered to be significant.

15.7.2.2 Operational and Decommissioning Stage Effects on Landscape Character

For most commercial wind energy developments, the greatest potential for landscape impacts to occur is as a result of the change in character of the immediate area due to the introduction of tall structures with moving components. Thus, wind turbines that may not have been a characteristic feature of the area become a new defining element of that landscape character. In this instance, wind turbines are a characteristic feature of the central and wider study area, most notably to the northeast and northwest of the site. Two existing wind farms (Rathnacaly and Boolard) are within the central study area, each consisting of two turbines, located within 2.5km of the site. Further wind farms are found in the wider study area, most patently the Ballyhoura Mountains. In that location, less than 10km from the site, the existing Buttevant (Knockatalig) and Castlepook Wind Farms are highly evident across the surrounding lowlands, hosting 20 turbines between them. The effect, therefore, is one of intensification and extension of an established land use in this landscape and not the introduction of a new and unfamiliar feature.

In terms of scale and function, the proposed wind farm is well assimilated within the context of the central study area. This is due to the nature of the landform, landscape elements and land use patterns. These attributes prevent the height and extent of the proposed wind farm causing the type of scale conflict that can occur in other landscape areas. The central study area has a notable utilitarian, much-modified character and although the proposed development represents a stronger human presence and level of built development than currently exists on the site, it will not detract significantly from its productive rural character, which wind turbines are already a key component of.

It is important to note that in terms of duration, this development proposal represents a long term, but not permanent impact on the landscape and is reversible. The lifespan of the project is 35 years, after which time it will be dismantled and the landscape reinstated to prevailing conditions. Within 2-3 years of decommissioning, it is likely that there will be little evidence a wind farm ever existed on the site, albeit the proposed on-site substation will remain in perpetuity as part of the national grid infrastructure, in addition to some residually useful access tracks.

The decommissioning phase will have similar temporary impacts as the construction phase with the movement of large turbine components away from the site. This may potentially result in the minor loss of roadside and trackside vegetation that has grown during the operation phase of the project, but this can be reinstated upon completion of decommissioning. Areas of hard standing that are of no further use will be reinstated and reseeded to blend with the prevailing surrounding land cover of the time. It is expected that the decommissioning phase would be completed within a period of approximately 6 months.

In summary, there will be physical impacts on the land cover of the site as a result of the proposed development during the operational phase, but these will be relatively minor in the context of this productive rural landscape that comprises of existing wind energy developments. The scale of the proposed development will be well assimilated within its landscape context without undue conflicts of scale with underlying landform and land use patterns. For these reasons the residual magnitude of the landscape impact is deemed to be **Medium-low** within the Central Study Area. Beyond 5km from the site, the residual magnitude of landscape impact is deemed to reduce to **Low** and **Negligible** at increasing distances as the wind farm becomes a proportionately smaller component of the overall landscape fabric.



15.7.3 Significance of Landscape Effects

The significance of landscape impacts is a function of landscape sensitivity weighed against the magnitude of the landscape impact. This is derived from the significance matrix (Table 15.3) used in combination with professional judgement. Based on the assessment described in Sections 15.7.2, the significance of residual landscape impact is considered to be **Moderate-slight** throughout the Central Study Area.

For the wider study area (beyond 5km from the site), residual landscape impact significance is not considered to exceed **Slight** and will reduce to Imperceptible at increasing distances as the project becomes a progressively smaller component of the wider landscape fabric even in the context of higher sensitivity landscape units / features.

15.8 Residual Visual Effects

Table 15.6 below summarises the full textual assessment of visual effects for each Viewshed Reference Point (VRP) contained in Appendix 15.1. Whilst the ‘receptor sensitivity analysis table’ and full textual assessment for each VRP is normally contained within the landscape and visual chapter, in this instance, given the number of VRPs, it is considered more prudent to place this material in a separate appendix and focus herein on the significance of the findings. The left hand side of the table incorporates statistical data associated with the distance to the proposed turbines, whilst the right hand side contains professional judgements in respect of the view. It is important to note that the professional judgements are based on the effects experienced in relation to the view and are not directly influenced by the statistical data.

Table 15-6: Summary of Visual Effects at Viewshed Reference Points (VRPs)

VRP No.	Distance to nearest turbine	Visual receptor Sensitivity (see Appendix 15.1)	Visual Impact Magnitude	Significance of Visual impact
VP1	5.4km	Medium-low	Low	Slight
VP2	3.8km	Medium-low	Low	Slight
VP3	8.0km	Medium	Low	Slight
VP4	3.3km	Medium-low	Low	Slight
VP5	2.6km	Medium-low	Low	Slight
VP6	946m	Medium-low	Medium	Moderate-slight
VP7	746m	Medium-low	High-medium	Moderate
VP8	1.1km	Medium	Low-negligible	Slight-imperceptible
VP9	846m	Medium-low	Medium	Moderate
VP10	1.1km	Medium-low	High-medium	Moderate
VP11	2.9km	Medium	Medium-low	Moderate-slight
VP12	4.7km	Medium-low	Negligible	Imperceptible
VP13	8.2km	Medium	Low-negligible	Slight-imperceptible



VRP No.	Distance to nearest turbine	Visual receptor Sensitivity (see Appendix 15.1)	Visual Impact Magnitude	Significance of Visual impact
VP14	13.5km	Medium-low	Negligible	Imperceptible
VP15	14.4km	Medium-low	Negligible	Imperceptible
VP16	13.4km	Medium	Negligible	Imperceptible
VP17	12.8km	Medium-low	Negligible	Imperceptible
VP18	15.3km	Medium	Low-negligible	Slight-imperceptible
VP19	27.4km	High-medium	Low-negligible	Imperceptible

15.8.1 Impacts on Key Views

There are no known Key Views (as set out in Section 15.4.4) located within the study area.

Thus, it is not considered that any significant visual impact can occur in respect of Key Views.

15.8.2 Impacts on Designated Views

As covered in Section 15.3.2.2 and 15.4.3, of the four designated scenic routes in the study area, all are outside ZTV and therefore none have the potential to experience views of the proposed development.

As a result, it is not considered that any significant visual impact will occur in respect of designated views.

15.8.3 Impacts on Local Community views

Local Community views are considered to be those experienced by those people who live, work and move around the area within approximately 5km of the site. These are generally the people that are most likely to have their visual amenity affected by a wind energy proposal due to proximity to the turbines, a greater potential to view turbines in various directions, or having turbines as a familiar feature of their daily views.

Ten views were chosen to represent the local community: VP2, V4, VP5, VP6, VP7, VP8, VP9, VP10, VP11 & VP12. The sensitivity of these views range from 'Medium-low' to 'Medium' with those of a 'Medium' sensitivity also attributed to amenity and heritage features (i.e. two historic graveyards in the central study area). Of the 10 views, the highest significance of visual impact is 'Moderate' at VP7, VP9 and VP10. Rather than visual receptor sensitivity, this is principally due to a combination of the proximity to the site (i.e. no more than 1.1km) and lack of intervening vegetation and/or screening resulting in a magnitude of either 'Medium' (in one instance) or 'High-medium' (in two instances). However, in all three instances, the context of these views were either from a standard roadside field entrance (where otherwise roadside vegetation screened likely views of the proposed development), or an extended field entrance clearance; in either case, for road users, such views tend to be relatively fleeting and at an oblique angle to the road. However, for the remaining seven local community views, the significance of visual impact ranged from 'Imperceptible' (e.g. VP12) to no higher than 'Moderate-slight' (i.e. VP6 and VP11).



Overall, whilst the turbines appear as tall and prominent features in some of these views, they do not present with any notable sense of overbearing, nor will they appear out of place in this broad upland context where wind energy development is already a well-established land use.

Consequently, it is not considered significant visual impacts will occur in respect of local community views.

15.8.4 Impacts on Centres of Population

Four viewpoints were chosen to represent centres of population within the central and wider study area (i.e. VP1, VP12, VP13 and VP16).

Within the central study area, there are two centres of population, being the villages of Dromina and Churchtown. For Dromina (i.e. VP12), it is worth noting that from the majority of the village, no views of the proposed development are even theoretically visible (see Section 15.4.1). VP12 was selected to the southwest of the village centre, in the most westerly and elevated position within those GAA grounds, to allow for the maximum potential of views. From here - over 4.5km from the nearest proposed turbine - the blade tips of two turbines will be discernible, though very unlikely to be noticed, resulting in an 'Imperceptible' impact upon the inherent visual amenity. For Churchtown, however, views of the proposed development are likely to be screened entirely from within the village, owing to its more built-up nature. Early stage wireframe photomontages, captured from two locations within the village, were generated, which established such a lack of likely visibility. Accordingly, the closest alternative location to the village was chosen (i.e. VP5), which is more likely to have views of the proposed development. However, in that regard, VP5 is not representative of views from this centre of population, as it is located approx. 900m north of Churchtown.

Beyond the central study area, the nearest and largest centre of population is Charleville, represented by VP1. In that view, only the blades of two of the six proposed turbines are likely to be visible partially rotating above the distant rooflines, while the four existing turbines in the central study area will be far more apparent. Thus, the significance of visual impact was deemed to be 'slight.' Over 8km from the nearest proposed turbine, the viewpoint at Buttevant (i.e. VP13) was deemed to have a 'Slight-imperceptible' visual impact significance. Located approx. 13km from the nearest proposed turbine, no views of the proposed development are theoretically possible from the majority of Doneraile. However, some locations within Doneraile Park (VP16) were theoretically attainable, but owing to intervening trees, was deemed to have an 'Imperceptible' visual impact significance. Lastly, as set out in Section 15.4.1, no views of the proposed development will be available from Broadford, Drumcolliher, Milford, Newmarket, Kanturk and the overwhelming majority of Mallow (i.e. 19-20km from the site).

As a result of the reasons outlined above, it is not considered that any significant visual impact will occur in respect of Centres of Population.

15.8.5 Impacts on Major Routes

Four viewpoints were chosen to represent major routes in the study area: VP4, VP14, VP15 & VP17. However, only one of these, VP4, is within the central study area or, for that matter, within 12km of the nearest proposed turbine.

Even with VP4, it is set within a marginally elevated section of the N20, where it crosses over the Dublin-Cork rail line, which allows for considerably more elevated views in the broader directions of the site than is otherwise attainable from this busy National road.



At over 3km distance, three of the proposed turbines will be noticeable, while the blade sets of a fourth will be discernible. However, the proposal is not likely to have a salient impact upon the visual amenity of the scene, and is deemed to have a 'Slight' significance of visual impact. Set more than 12km from the nearest proposed turbines, in the case of VP14, VP15 and VP17, the significance of visual impact was deemed to be 'Imperceptible.'

As a result of the reasons outlined above, it is not considered that any significant visual impact will occur in respect of major route receptors.

15.8.6 Impacts on Heritage and Amenity Features

Nine viewpoints were chosen to represent heritage and amenity features within the study area and beyond, ranging from a distance of 1.8km to 27.4km from the nearest proposed turbine.

Five of these viewpoints are within the central study area, with two of these receptors (VP4 and VP5) representing the Ballyhoura Way (National Waymarked Trail); two representing small, historic graveyards in proximity to the site (i.e. VP8 and VP11) and a further viewpoint (VP2) representing the Kilmallock Cycle Hub Route 1. The visual impact significance was deemed to be no higher than 'Slight' at four of these viewpoints, while at VP11 it was deemed to be 'Moderate-slight'. This was owing to a 'Medium' visual sensitivity at VP11, along with a 'Medium-low' magnitude of visual impact arising from the proposal presenting at a modest but noticeable scale, offering clear and full visibility of the proposed turbines.

The remaining four viewpoints were located 8km or more from the nearest proposed turbines. The highest likely visual impact of these (VP3) was from the elevated realm of the Ballyhoura Mountains, resulting in the proposal being fully visible, albeit at a distance of 8km. VP12 (from Dromina GGA club) and VP16 (from Doneraile Park) were deemed to have an 'Imperceptible' visual impact significance. Lastly, VP19 was from Lough Gur complex of international archaeological and cultural renowned. While located more than 7km outside the study area, it was included in the Visual Impact Assessment out of an abundance of caution, in accordance with LVIA Guidelines. However, it is worth noting that the elevated location of this viewpoint - only attained at the end of a pathway - is the only section of the complex that is accessible to the public, and which experiences potential visibility of the proposed development. Be that as it may, the proposed development was deemed to have an 'Imperceptible' visual impact significance from this location.

As a result of the reasons outlined above, it is not considered that any significant visual impact will occur in respect of heritage & amenity receptors.

15.8.7 Summary of Visual Impacts

Overall, it is not considered that the proposed project will result in significant visual impacts.

15.9 Do Nothing Scenario

In a Do-Nothing scenario, the existing land use and land cover is expected to remain broadly as is: aside from the marginal pasture and boggy scrub, the conifer plantations that cloak the majority of the site would continue to be managed through rotations of commercial conifer planting and harvesting.



15.10 Cumulative Impacts

15.10.1 Scottish Natural Heritage Guidelines (2012)

The Scottish Natural Heritage (SNH) Guidance relating to ‘Assessing the Cumulative Effects of Onshore Wind Farms (2012) identify that cumulative impacts on visual amenity consist of combined visibility and sequential effects. The same categories have also been subsequently adopted in the Landscape Institute’s 2013 revision of the Landscape and Visual Impact Assessment Guidelines. The principal focus of wind energy cumulative impact assessment guidance relates to other wind farms - as opposed to other forms of development. This will also be the main focus herein, albeit with a subsequent consideration of cumulative impacts with other forms of notable development (existing or permitted), particularly within the Central Study Area.

“Combined visibility occurs where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be in combination (where several wind farms are within the observer’s arc of vision at the same time) or in succession (where the observer has to turn to see the various wind farms).

“Sequential effects occur when the observer has to move to another viewpoint to see different developments. The occurrence of sequential effects may range from frequently sequential (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to occasionally sequential (long time lapses between appearances, because the observer is moving very slowly and / or there are large distances between the viewpoints.)”

Cumulative impacts of wind farms tend to be adverse, rather than positive, as they relate to the addition of moving manmade structures into a landscape and viewing context that already contains such development. Based on guidance contained within the SNH Guidelines relating to the Cumulative Effects of Wind Farms (2005) and the DoEHLG Wind Energy Guidelines (2006), cumulative impacts can be experienced in a variety of ways. In terms of landscape character, additional wind energy developments might contribute to an increasing sense of proliferation. A new wind farm might also contribute to a sense of being surrounded by turbines with little relief from the view of them.

In terms of visual amenity, there is a range of ways in which an additional wind farm might generate visual conflict and disharmony in relation to other wind energy developments. Some of the most common include visual tension caused by disparate extent, scale or layout of neighbouring developments. A sense of visual ambivalence might also be caused by adjacent developments traversing different landscape types. Turbines from a proposed development that are seen stacked in perspective against the turbines of nearer or further developments tend to cause visual clutter and confusion. Such effects are exacerbated when, for example, the more distant turbines are larger than the nearer ones and the sense of distance is distorted.

Table 15.7 below provides Macro Works’ criteria for assessing the magnitude of cumulative impacts, which are in accordance with the SNH Guidelines (2012).



Table 15-7: Magnitude of Cumulative Impacts

Magnitude of Impact	Description
Very High	<ul style="list-style-type: none"> • The proposed wind farm will strongly contribute to wind energy development being the defining element of the surrounding landscape. • It will strongly contribute to a sense of wind farm proliferation and being surrounded by wind energy development. • Strongly adverse visual effects will be generated by the proposed turbines in relation to other turbines.
High	<ul style="list-style-type: none"> • The proposed wind farm will contribute significantly to wind energy development being a defining element of the surrounding landscape. • It will significantly contribute to a sense of wind farm proliferation and being surrounded by wind energy development. • Significant adverse visual effects will be generated by the proposed turbines in relation to other turbines.
Medium	<ul style="list-style-type: none"> • The proposed wind farm will contribute to wind energy development being a characteristic element of the surrounding landscape. • It will contribute to a sense of wind farm accumulation and dissemination within the surrounding landscape. • Adverse visual effects might be generated by the proposed turbines in relation to other turbines.
Low	<ul style="list-style-type: none"> • The proposed wind farm will be one of only a few wind farms in the surrounding area and will be viewed in isolation from most receptors. • It might contribute to wind farm development becoming a familiar feature within the surrounding landscape. • The design characteristics of the proposed wind farm accord with other schemes within the surrounding landscape and adverse visual effects are not likely to occur in relation to these.
Negligible	<ul style="list-style-type: none"> • The proposed wind farm will most often be viewed in isolation or occasionally in conjunction with other distant wind energy developments. • Wind energy development will remain an uncommon landscape feature in the surrounding landscape. • No adverse visual effects will be generated by the proposed turbines in relation to other turbines.

15.10.2 Department of Environment, Heritage and Local Government (DoEHLG) ‘Wind Energy Development Guidelines’ (2006)

The aforementioned DoEHLG guidelines provide direction on wind farm siting and design criteria for a number of different landscape types. The main wind farm site and central study area is considered to be located within a landscape that is consistent with the ‘*Transitional Marginal Landscapes*’ type. However, there are also some aspects of the ‘*Hilly and Flat Farmland*’ landscape type.



The associated guidance that is applicable, with respect to cumulative effects in ‘*Transitional Marginal Landscapes*’ type is:

“This would have to be evaluated on a case-by-case basis, but great caution should be exercised. The spatial enclosure often found in transitional marginal landscapes is likely to preclude the possibility of seeing another wind energy development. However, should two or more wind energy developments be visible within a confined setting a critically adverse effect might result, depending on turbine height and wind energy development extent and proximity.”

However, it is worth noting that the setting of the proposed development is not within a “confined setting,” or anything resembling such. The associated guidance is applicable, with respect to cumulative effects in ‘*Hilly and Flat Farmland*’ landscape type is:

“It is important that wind energy development is never perceived to visually dominate. However, given that these landscapes comprise hedgerows and often hills, and that views across the landscape will likely be intermittent and partially obscured, visibility of two or more wind energy developments is usually acceptable.”

General guidance in relation to cumulative effects is provided in Chapter 6 of the Guidelines – ‘*Aesthetic Considerations in Siting and Design*’. The most relevant aspect of guidance in this instance is contained in the fourth bullet point, which states:

“It is preferable to avoid locating turbines where they can be seen one behind another, when viewed from highly sensitive key viewpoints (for example, viewing points along walking or scenic routes, or from designated views and prospects), as this results in visual stacking and, thus, confusion. This may not be critical, however, where the wind energy development to the rear is in the distant background.”

It should be noted that the Draft Revised Wind Energy Development Guidelines 2019 maintain the above guidance on siting and design.



15.10.3 Cumulative Zone of Theoretical Visibility

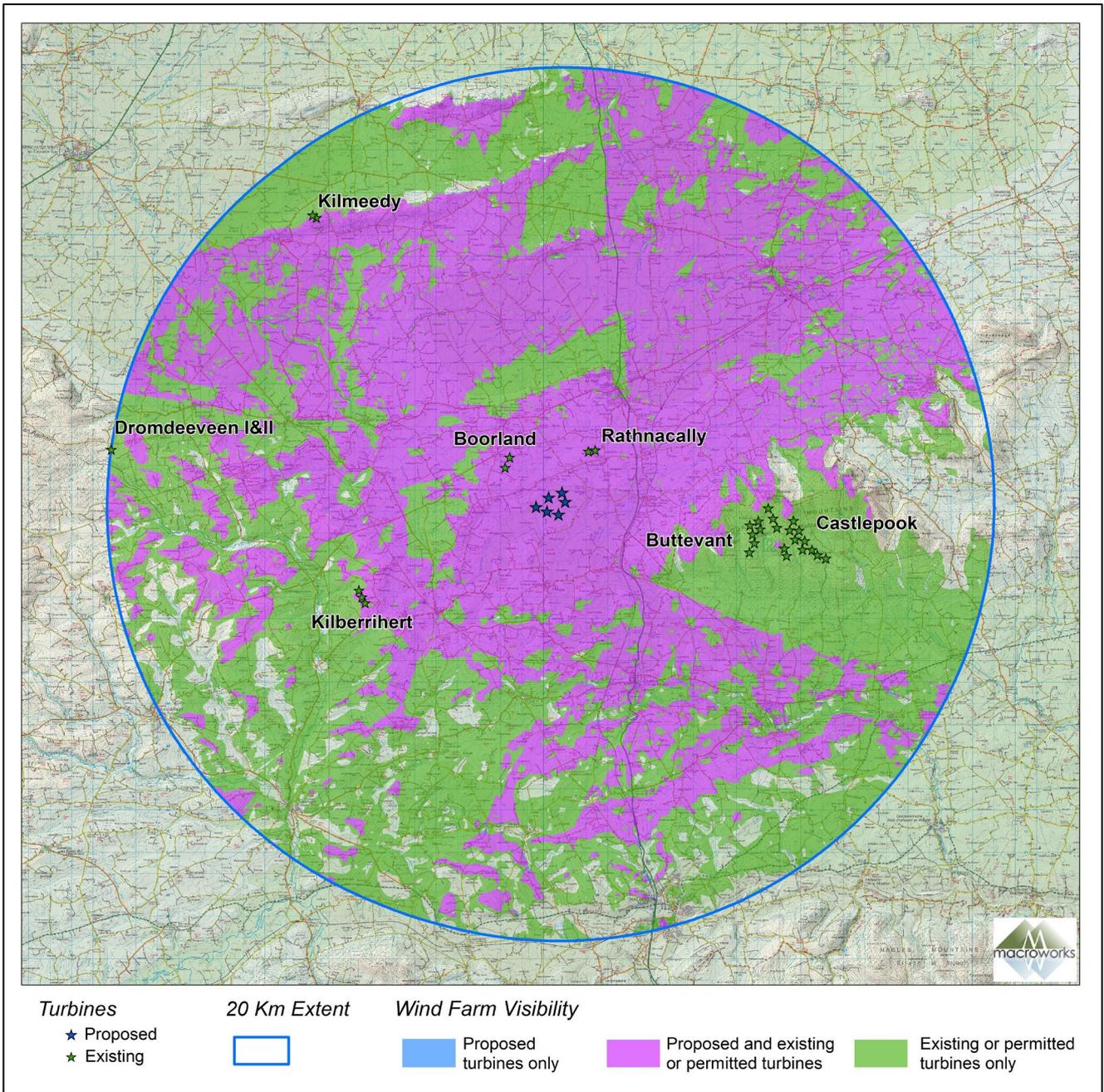


Figure 15-15: ZTV indicating the cumulative theoretical visibility of the proposed Annagh Wind Farm in combination with all other wind farms in the study area.

A cumulative Zone of Theoretical Visibility (ZTV) map has been prepared for the wind energy developments contained within the study area and is included in Appendix 15.2



However, a small-scale version of this map can be seen above, at Figure 15.15.

The cumulative ZTV map indicates the following key points:

- There is a moderate proportion (i.e. 47.4%) of theoretical intervisibility between the proposed wind farm and cumulative wind farms in the study area. This will result in the majority of the study area experiencing no cumulative visibility.
- A modest proportion (i.e. 42%) of the study area will experience theoretical visibility of existing turbines only.
- No part of the study area will have visibility of the proposed Annagh turbines only.
- Approx. 10% of the study area will not have any view of the proposed wind farm or that of any existing wind farms within the study area.

Please note that as the cumulative ZTV map does not account for vegetation screening, it vastly overestimates the potential for intervisibility between these developments, particularly at distances of more than 10-12km from the proposed wind farm.

15.10.4 Nature of Cumulative Impact

As part of this application, a comprehensive planning search for large projects in the wider proximity to the site has been completed, and is included in appendix 1.2 of this EIAR.

In terms of non-wind energy developments, these include two consented solar farms and the proposed M20 Limerick to Cork Motorway, the sites of which are more than 2km from the site. However, these consented and proposed developments are very different in nature, context, scale and location to that of this proposed wind energy development. Accordingly, cumulative effects in respect of non-wind energy developments are not deemed to be significant.

In terms of wind energy developments, there are seven operational wind farms and no known permitted or proposed wind farms contained within the study area. These are set out in Table 15.8 below.

Table 15-8: Cumulative Wind Farms within the study area

Wind Farm Name	Number of turbines	Distance and Direction from nearest proposed turbine	Status
Rathnacally Wind Farm	2	c. 2.3km to the northeast	Operational
Boolard Wind Farm	2	c. 2.5km to the northwest	Operational
Buttevant Wind Farm	6	c. 8.7km to the southeast	Operational
Kilberriherth Wind Farm	3	c. 9.1km to the southwest	Operational
Castlepook Wind Farm	14	c. 9.4km to the southeast	Operational
Kilmeedy Wind Farm	2	c. 17.0km to the northwest	Operational
Dromdeeveen Wind Farm	1	c. 20km to the west	Operational



The appraisal of cumulative impacts with other wind energy developments is based on the cumulative ZTV maps included in Appendix 15.1 and wireframes provided in Volume 4 of this EIAR. Given the absence of other tall structures within the study area, it is considered that there is no potential for in combination effects with other types of development.

The nature of cumulative visibility within the study area is analysed in Table 15.9 below, using the same viewpoints that are used for the main visual impact assessment:

Table 15-9: Nature of cumulative visibility

VRP Ref.	Number of other wind farms in view	Nearer or further than the Proposed Development	Combined View (within a single viewing arc - 90°)	Succession View (within a series of viewing arcs from the same location)	Sequential View (view of different developments moving along a linear receptor)
VP1	2	Nearer and further	Yes	-	-
VP2	0	-	-	-	Yes
VP3	2	Nearer and further	Yes	-	Yes
VP4	1	Further	Yes	-	Yes
VP5	1	Further	Yes	-	-
VP6	0	-	-	-	-
VP7	1	Further	Yes	-	Yes
VP8	0	-	-	-	-
VP9	1	Further	Yes	-	-
V10	1	Further	Yes	-	-
VP11	3	Nearer and further	Yes	Yes	Yes
VP12	1	Nearer	Yes	-	-
VP13	1	Further	Yes	-	-
VP14	0	-	-	-	-
VP15	0	-	-	-	-
VP16	1	Nearer	-	-	-
VP17	0	-	-	-	-
VP18	3	Nearer and further	Yes	Yes	-
VP19	2	Similar	Yes	-	-

15.10.5 Cumulative Impact Summary

To begin with, as noted in Section 15.10.3, the majority of the study area will experience no cumulative visibility, while approx. 10% of the study area will not have any view of the proposed wind farm or that of any existing wind farms within the study area. Bearing this in mind, using the largely quantitative cumulative analysis outlined above in Section 15.10.4, a summary assessment of the nature of cumulative effects is provided hereunder.



Approx. one third (i.e. 6 of 19) of the viewpoints will have no other cumulative wind farms visible within the same viewing context as the proposed wind farm. Of the 19 viewpoints where there *will be* other cumulative wind farms visible within the same viewing context, 8 viewpoints are likely to experience visibility of just one of the existing windfarms in the study area; three viewpoints are likely to experience visibility of two existing windfarms in the study area and two viewpoints are likely to experience visibility of three existing windfarms. It is worth noting that although there are seven operational wind farms in the study area, no more than three of those are likely to be concurrently visible from any of the 19 selected viewpoints. As an overview, cumulative visibility tends to adhere to two broader categories, although there remains variance from such generalised categories as follows.

The first category tends to be views from within 15km to the southeast, south or southwest of the proposed development, where views of the existing Boolard and/or Rathnacally Wind Farms are experienced in conjunction with the proposed development. As previously stated, both of these existing wind farms are within 2.5km of the nearest proposed turbines, and both possess two turbines each. In instances where cumulative visibility is likely to arise, these turbines appear as a background feature to the proposed turbines, where stacking or visual disharmony or clutter is effectively negligible. Where such cumulative views occur from outside the central study area, it also has the broader visual effect of consolidating wind energy development into one extended lowland realm within the study area.

The second category relates to broader views from the west, northwest, north or northeast of the proposed development. In these instances, views of the more immediate, existing Boolard and/or Rathnacally Wind Farms can be experienced in conjunction with the proposed development, as well as considerably more distant, harder-to-discern ridgeline silhouettes of the Buttevant (Knockatalig) Wind farm, more than 8km from the proposed development.

Section 6.5 of the Wind Energy Development Guidelines 2006 highlight the potential aesthetic issue of turbines from different schemes becoming stacked in perspective, when viewed from “*highly sensitive key viewpoints.*” However, this does not occur in the case of the proposed development. In addition, atmospheric perspective (i.e. fading of distant objects) also serves to differentiate between the turbines of each development, reducing the likelihood of confusing or cluttered cumulative views of the aforementioned schemes. It is considered that the number of cumulative schemes within the study area is moderate (i.e. seven), with the existing/constructed wind farms containing a moderate number of turbines (i.e. 30 turbines between the seven aforementioned existing/constructed wind farms). Crucially, two-thirds of these (i.e. 20 out of 30 turbines) occur in the distinct geographic anomaly (within the context of the study area) of the Ballyhoura Mountains, which contain a very separate sense of place, landscape fabric and character than that of the wider study area. In that regard, the potential clutter or confusion between such existing upland turbines with those of existing or proposed lowland turbines – set over 8km apart – is highly unlikely to occur.

Overall, the proposed development represents a modest increase in the total number of turbines in the study area (i.e. an increase from 30 to 36 turbines), but not a more disparate dissemination of those turbines within this landscape. However, it is an area where wind energy development is a characteristic and complementary feature of the productive, progressive rural landscape, but without becoming a dominant land use.

Lastly, as referenced in Section 15.7.2.1, forest felling will be necessary to accommodate the construction of the proposed turbines, hardstands, crane pads, access tracks and the onsite substation. All forestry that is removed (i.e. 12.6 ha) will be subject to forest replanting provisions, which will be provided on a site at Emlagh, Moyasta, Co. Clare. Owing to these replacement lands being outside the study area, there will be no potential for cumulative impacts to arise from the proposed forestry Harvest Management Plan.



However, the potential for cumulative impacts to arise from the proposed replant lands at Emlagh, in combination with any existing, consented or proposed projects in the wider vicinity of those lands needs also to be here addressed. In terms of planning policy context, it should be noted that the replant lands at Emlagh are not within a designated heritage landscape and not within 4km of a designated scenic route. Rather, these lands are within a designated ‘Settled Landscape’ (i.e. “areas where people live and work”) that is also within ‘Landscape Character Type’ 10 ‘Flat Estuarine Farmland and Islands.’ According to Section 13.3.2.1 of the Clare County Development Plan 2017-2023, such Settled Landscapes “...make up the majority of the County” and “contain the resources of land, soil, minerals and water that are used to sustain the economy,” and where forestry is one of the envisaged land uses. In addition, there are multiple semi-mature and mature commercial forestry blocks located within 1km of the Emlagh site, including lands aligning its northern border. Lastly, there are no known existing, consented or proposed developments in the broader vicinity of the site that have the potential for significant cumulative impacts to arise from the proposed forestry Harvest Management Plan.

For the reasons outlined above, the magnitude of cumulative effects in respect of other wind farms is deemed to be **Medium-low**. Thus, significant cumulative impacts are not considered to occur.

15.11 Conclusion

This Landscape and Visual Impact Assessment has separately considered landscape effects, visual effects and cumulative effects in the context of relevant planning policy and a comprehensive baseline study of the 20km radius study area. The assessment is also based on the most relevant, best practice guidance documents for landscape and visual impact assessment of onshore wind farms in Ireland. Based on the findings of this assessment, the proposed Annagh wind farm will result in noticeable landscape and visual change, particularly within its immediate context. However, even these localised effects are not considered to be significant and will reduce rapidly with increased viewing distances and broader landscape context.

Overall, it is considered that the proposed wind farm will not give rise to any significant landscape or visual impacts.



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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED ANNAGH WIND FARM, CO. CORK

VOLUME 2 – MAIN EIAR

CHAPTER 16 – TELECOMMUNICATIONS & AVIATION

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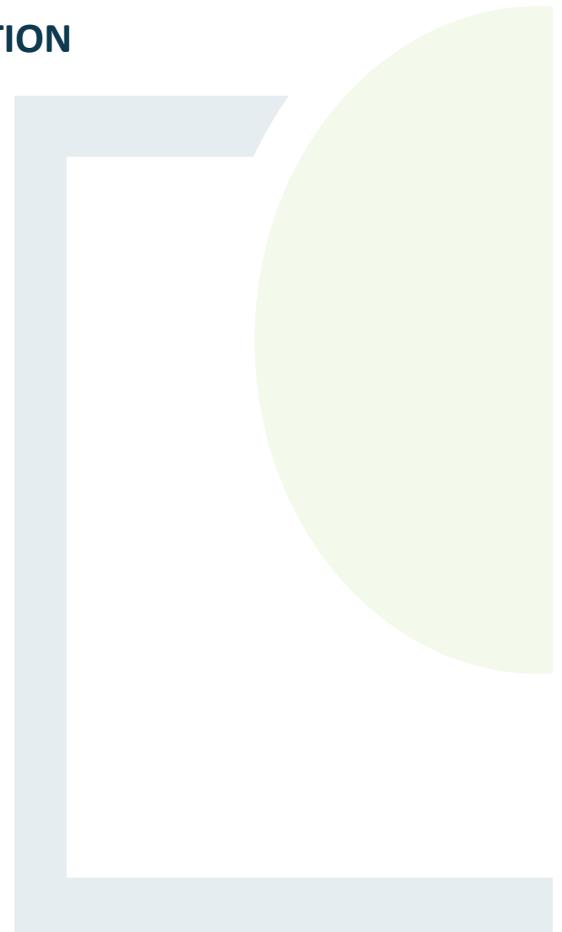


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16. TELECOMMUNICATIONS AND AVIATION

16.1 Introduction

This chapter has been prepared to examine the potential impacts from the proposed Annagh Wind Farm project, located in north County Cork, on local telecommunications services and aviation. The potential effects of the proposed project are considered without mitigation, mitigation is then proposed where required and the residual effects post mitigation are described. Potential cumulative impacts with other projects are also assessed.

16.1.1 Project Description

A detailed description of the project assessed in this EIAR is provided in Chapter 3 and is comprised of the following key elements:

- The wind farm site (**referred to in this EIAR as ‘the Site’**);
- The grid connection route (**referred to in this EIAR as the ‘GCR’**);
- The turbine delivery route (**referred to in this EIAR as the ‘TDR’**);

The Site includes the wind turbines, internal access tracks, hard standings, permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compound, drainage infrastructure and all associated works related to the construction of the wind farm. The Site includes lands in the townlands of Annagh North, Fiddane, Cooliney, Coolcaum. The GCR passes through the townlands of Cooliney, Rathnacally, Farranshonikeen, Ardnageehy and Clashganniv. The TDR passes through the townlands of Cooliney, Rathnacally, Farranshonikeen, Ardnageehy, Clashganniv, Ballyhay before it enters the national primary road network at the N20 to the port of Foynes in County Limerick. Replanting lands have been identified in the townlands of Emlagh, near Moyasta, County Clare. The replant lands have been assessed for potential cumulative impact throughout the EIAR.

16.1.2 Study Area

The study area associated with this assessment focuses on the proposed wind farm site, “The Site”, as described above and in Chapter 3. The location of the wind farm site is illustrated in Figure 3-1 of this EIAR.

16.2 Methodology

This section of the assessment describes the methodology used in assessing the potential impact from the wind farm project on telecommunications and aviation. As part of the EIAR scoping and consultation exercise relevant telecommunication operators and aviation authorities were consulted.



Scoping was carried out in line with draft EPA Guidelines¹ and the ‘*Best Practice Guidelines for the Irish Wind Energy Industry 2012*’² which provides a recommended list of telecommunications and aviation stakeholders for consultation.

The following assessment methodology was applied in this assessment:

- Wide ranging consultation with all known telecommunications operators (TO’s) that could potentially be affected by the proposed wind farm.
- Consultation with the Irish Aviation Authority
- Comprehensive data gathering exercise to establish all known telecommunications links in the area
- Preparation of constraint mapping using data collected from the TO’s, to identify separation distance of the project from existing telecommunications links and masts and if necessary, identify mitigation measures.
- 3D network modelling on radio planning software where potential impact to links are identified.
- Identification of aerodromes and airports in proximity to the project.
- Review of turbine delivery route (TDR) and grid connection route (GCR) in the context of overhead power and telecommunication lines.

16.2.1 Background and Potential Effects

16.2.1.1 *Electromagnetic Interference*

In the context of wind farm development, electromagnetic interference is the impact of a wind farm on existing telecommunication services resulting in an unacceptable negative impact. The rotating blades of a wind turbine can occasionally cause interference to electro-magnetically-propagated signals. Such interference could, in theory, affect all forms of electromagnetic communications including:

- Satellite communications
- RADAR
- Cellular radio communications
- Aircraft instrument landing systems
- Air traffic control
- Terrestrial telecommunication links
- Television broadcasts

Impacts on aviation are considered in Section 16.4 of this Chapter.

For the purposes of the telecommunications impact assessment, point-to-point and point-to-multipoint signals are considered, both are used extensively throughout Ireland.

¹ EPA, (2017) ‘Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’

² IWEA. (2012). Best Practice Guidelines for the Irish Wind Energy Industry.



Point to point (or line of sight) is a wireless telecommunications transmission link between two nodes located at specified fixed points.

The term telecommunications link relates to the wireless transmission of data via radio frequencies between two fixed points. Telecommunications towers are generally used to transmit and receive signals over large distances. Radio frequency bands above 1 GHz are referred to as microwave radio links and are commonly used by telecommunications operators. These 'links' are used mainly by mobile phone operators, broadcasters and utilities or emergency service providers, to provide transmission networks that are flexible and cost effective.

Point to multipoint refers to the situation where a central node transmits to, and receives from, a number of independent locations. This includes television and radio broadcasting and reception, mobile phones (to the mobile phone mast) and land mobile systems. It is possible that houses in the immediate vicinity of turbines could require some remedial measures in relation to television reception.

Section 5.10 of the DoEHLG Planning Guidelines on Wind Energy Developments (2006) [the guidelines] states that:

“wind turbines, like all electrical equipment, produce electromagnetic radiation, and this can interfere with broadcast communications. The interference with broadcast communication can be overcome by the installation of deflectors or repeaters. Planning authorities should advise the developer to contact the individual broadcasters, both national and local, and inform them of the proposals. A list of the licensed operators is available on the ComReg website at www.comreg.ie. Mobile phone operators should also be advised of the proposed development.”

Section 7.15 of these guidelines state:

“Conditions regarding measures to be taken to minimise interference with the transmission of radio and television signals, air and sea transport communications and other transmissions systems in the area may be necessary. Where electromagnetic interference is difficult to predict, conditions may require the developer to consult with the service provider concerned and undertake remedial works to rectify any interference caused.”

On that basis, consultation was carried out with all known telecommunications operators (TOs) that could potentially be affected by the proposed wind farm.

The telecommunications network is constantly evolving and the potential impact of the proposed Annagh Wind Farm on local telecommunications signals is difficult to accurately predict for the following reasons:

- The network topology is likely to change significantly over time as a result of technological advances including migration towards 4G and the impending 5G networks
- Network operators are beginning to share services and consolidate the existing network which is likely to lead to an increase in the number of redundant and decommissioned services

16.2.1.2 Broadcast Communications

Wind turbines as with any other large structure, have the potential to interfere with broadcast signals by acting as a physical barrier or causing a degree of interference to microwave links.



The most significant effect at a domestic level relates to a possible flicker effect caused by the moving rotor, affecting, for example, radio signals. The most significant potential effect occurs where the wind farm is directly in line with the transmitter radio path.

16.2.1.3 Domestic Receivers

Depending on local topography, a domestic receiver may receive broadcast signals from more than one location. The strength of the signals varies with distance from the transmitter, and the receiver's antenna is generally always directed towards the most local, and usually strongest, broadcasting station.

There are two types of potential electromagnetic interference to domestic receivers, depending on the location of the receiver in relation to a wind farm. 'Shadowed' houses are located directly behind a wind farm, relative to the location from where the signal is being received. In this case, the main signal passes through the wind farm and the rotating blades can create a degree of signal scattering. In the case of viewers located beside the wind farm (relative to the broadcast signal direction), the effects are likely to be due to periodic reflections from the blade, giving rise to a delayed signal.

In both cases, i.e. shadowed houses located behind the wind farm and those located to the side of it, the effects of electromagnetic interference may depend to some degree on the wind direction, since the plane of rotation of the rotor will affect both the line-of-sight blockage to viewers located behind the wind farm and the degree of reflection to receivers located to the side.

16.2.1.4 Other Signal Types

Wind turbines have the potential to affect other signal types used for communication and navigational systems, for example tower-to-tower microwave communication links, and airborne and ground radar systems. Interference with radar systems occurs when wind turbines are located close to an airport or directly in line with the instrument landing approach. The nearest such operational airport to the main wind farm site is Shannon Airport, approximately 43km north west of the proposed wind farm.

Potential effects on broadcast communications are generally easily dealt with by detailed micro-siting of turbines in order to avoid alignment with signal paths or by the use of repeater relay link, (i.e. reflective and or refractive panels)

16.2.1.5 Relevant Guidance

A review of relevant planning and policy documents was undertaken to identify relevant objectives relating to telecommunication, broadcasting and aviation. The following documents have been reviewed:

- 'Wind Energy Development Planning Guidelines' (WEG2006), published by the Department of the Environment, Heritage and Local Government (2006).
- 'Best Practice Guidelines for the Irish Wind Energy Industry', published by the Irish Wind Energy Association (2012).
- Cork County Development Plan (2014) & Draft County Development Plan (2021)
- 'Tall structures and their impact on broadcast and other wireless services', published by Ofcom, a regulatory body independent from UK Government (2009).



- ‘RF Measurement Assessment of Potential Wind Farm Interference to Fixed Links and Scanning Telemetry Devices’, published by ERA on behalf of Ofcom (2009).

16.3 Scoping and Consultation

In accordance with the WEG 2006 as part of the EIAR scoping and consultation exercise, FT contacted the relevant national and regional broadcasters, fixed and mobile phone operators, Irish Aviation Authority, Airport Authorities and other relevant consultees. Consultation was undertaken to provide information on the proposed project to all relevant telecommunications service providers to discuss concerns and the potential for benefits of the proposed wind farm. A Scoping Report was sent as part of this consultation. The service providers were provided with the locations and dimensions of the proposed turbines and asked to advise whether any impact could occur to their networks. An example of the correspondence issued by Fehily Timoney (FT) to consultees is provided in Appendix 16.1.

Consulted stakeholders include authorities with associated telecommunication infrastructure, wireless broadcasters, cellular network providers, broadband suppliers and wireless internet service providers (WISP).

The responses received from the telecommunications, broadcasters and aviation consultees are summarised in Table 16.1 following:

Table 16-1: Telecommunications and Aviation Scoping Consultees

Telecommunications Operator	Response Date	Impact Identified by Consultee	Further Comments
Irish Aviation Authority	02/10/2020	No impact	Recommended to contact Cork and Shannon Airport Authorities
Cork Airport Authority	16/10/2020	N/A	Acknowledged Receipt by Email, no further response
Shannon Airport Authority	26/11/2020	No impact	Recommended to contact IAA to see if full aeronautical assessment is required
Irish Broadband/Imagine	28/09/2020	No impact	No potential for interference
Digiweb	25/09/2020	N/A	Acknowledged Receipt by Autoreply Email, no further response
Ripplecom	25/09/2020	No impact	No potential for interference
Munster Broadband	25/09/2020	N/A	Acknowledged Receipt by Email, no further response
Magnet Networks	25/09/2020	N/A	Acknowledged Receipt by Autoreply Email, no further response
BT Communications Ireland Ltd	27/10/2020	No impact	No potential for interference. Contact BT before breaking ground on day of site setup
Dublin Airport Authority	06/11/2020	No impact	No potential for interference at Cork Airport. Recommend to contact IAA-ANSP regarding flight procedures and Communication Navigation Systems



Telecommunications Operator	Response Date	Impact Identified by Consultee	Further Comments
Commission for Communications Regulation	23/09/2020	N/A	Returned with addresses of relevant telecoms providers
Nova Telecom	14/05/2021	Potential Impact	Potential for 35% coverage loss in the area of the site.
Netshare (Vodafone)		No response	No response
Three	29/09/2020	No impact	No potential for interference
2RN (RTE Transmission Network)		No response	No response
Virgin Media Ireland		No response	No response
Eir	30/09/2020	No impact	No potential for interference
Pure Telecom		No response	No response
ESB Telecoms	25/09/2020	No response	Alternate email address given. No response
TETRA Ireland Ltd.		No response	No response
TowerCom Ltd.		No response	No response
Enet Telecommunications Nwtwork Ltd.		No response	No response
ITS Irish Networks Services		No response	No response
Ivertec Ltd.		No response	No response
RTE/Saorview		No response	No response
RTE		No response	No response
Cork County Council		No response	No response
Viatel		No response	No response

Five of the Telecommunications Operators provided a material response. The responses received following consultations with the relevant bodies and the issues that they raised (if any), are summarised in section 16.3.1.1.

16.3.1.1 Detailed Scoping Responses

All correspondence received from telecoms operators (TOs) is included in Appendix 5.1 of Volume 3 of this EIAR, and is summarised below.

Eir

In correspondence dated 30/09/2020 a representative of Eir stated “The proposed windfarm does not pose any risk to the Eir mobile network, it’s over 2.5km away from any site or transmission link.”



Imagine

In correspondence dated 28/09/2020 a representative of Imagine Group stated, “The locations in the .kml file will not pose any issues for Imagines’ network.”

BT

In correspondence dated 29/09/2020 a representative of BT stated “Thank you for your enquiry regarding our network. There is no BT Ireland network at this location according to our records. This information is believed to be correct. There may also be items of BT Ireland network of which no record is held.

It is recommended that on the day of the site setup you contact the BT Ireland Network Management Centre (NMC)(014326555) before you break the ground surface.”

Three

In correspondence dated 29/09/2020 a representative of Three stated “I have reviewed the turbine locations of the proposed Annagh Windfarm development and 3Ireland have no MW links that will be affected.”

NovaTel

In correspondence dated 29/09/2020 a representative of NovaTel stated the following:

“I have had a cursory look and I do feel that there will be some impact to our publicly available telecommunications services.

There are a number of base stations nearby, operating fixed wireless broadband and telephony services for both residential and business customers.

(screenshot included)

Our coverage extends 360 degrees @ 30km range given the proposed wind farm is less than 4km away for one of our sites and 5km for our other site.

I have completed GIS analysis of our coverage areas and estimate that approximately 35% of the coverage will be lost.”

As a result of this potential impact to NovaTel’s service, an EMI Impact Assessment was commissioned. Ai Bridges undertook the study. The report can be found in Appendix 16.2.

16.4 Likely Significant Effects

16.4.1 Do- Nothing Scenario

If the proposed project were not to proceed, there would be no change to the existing telecommunications, broadcasting and aviation operations in the area.



16.4.2 Construction Phase

16.4.2.1 *Telecommunications and Broadcasting*

The potential for electromagnetic interference from wind turbines occurs only during the operational phase of the project. There are no electromagnetic interference impacts associated with the construction phase of the proposed project on telecommunications and broadcasting in the area.

As the proposed grid connection will be constructed underground in the public roadway, there are no construction related impacts for electromagnetic interference and broadcasting interests in the area.

As identified in Chapter 13 Traffic and Transportation, Appendix 13.1, the delivery of large turbine components has the potential to impact on existing overhead telecommunications lines for a short period of time if services are disconnected to facilitate the turbine delivery. Overhead utilities and obstructions will need to be removed at any locations where a blade may require to be raised on a scissor lift, where overhead lines hang low, or where poles holding telecommunications lines are required to be temporarily removed. The removal of overhead utilities will result in temporary disconnections. Such works will be carried out by the utility providers in advance of turbine delivery to site.

Temporary disconnections of overhead lines will be required on several occasions to facilitate the delivery of turbine blades and will be carried out during the delivery of the components. Advance disconnection works will be required before the first turbine deliveries. The schedule of turbine component deliveries will be determined by the turbine supplier however it is reasonable to assume that several convoys will be required to deliver all of the turbine components to site over the course of the turbine installation works which is expected to take place over the course of 1 month. It is reasonable to assume a worst-case scenario where temporary disconnections will be required during off peak times, on up to seven different occasions over the course of one month to facilitate convoys, with a duration of several hours between disconnection and re-connection of services on each occasion. This is expected to have a brief to temporary localised negative impact on telecommunications provision during turbine delivery.

In some cases, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of telecoms lines/poles, lampposts, signage and local road widening. Any accommodation works within the public road corridor will be carried out in advance of the turbine deliveries in agreement with the local authority and subject to a road opening license.

The proposed grid connection will be constructed underground primarily along public roads. Such works could impact on underground telecommunication and broadband services. However, in advance of the construction phase, records of such services will be obtained from the relevant service providers. Cable detection tools, a ground penetrating radar and slit trenches will be used, as appropriate, to verify the exact locations of existing services. The final locations of the proposed cable routes in the public roads and in the verge along the public road will be within the area indicated and assessed in this EIAR and will minimise conflicts with other services. A minimum separation distance of 300mm will be maintained with existing services. New cable ducts will be laid below existing services wherever possible.

16.4.2.2 *Aviation*

There is potential for aviation impacts during the late construction phase of a wind farm project and prior to the commissioning of the proposed project as the wind turbines are constructed and placed in situ. The turbines could be considered to be an obstacle to low flying craft.



IAA recommended to contact both Cork and Shannon Airport Authorities. A response was received from Dublin Airport Authority (daa) regarding Cork Airport. In their response they stated:

“The proposal has been reviewed by our Aerodrome Standards Manager. There are no anticipated impacts on Cork Airport however, we would recommend that in addition to your consultation with the IAA, you should ensure that IAA-ANSP have been consulted regarding flight procedures and Communication Navigation Systems.”

A response was received from Shannon Airport stating that their assessment indicates that the proposed development should not affect the aerodrome OLS. Shannon Airport recommended that consultation with the IAA should take place to determine if a full aeronautical assessment is required.

The closest airport to the proposed wind farm is Shannon Airport, c. 43km north west. Rathcoole Aerodrome is located c. 29km south west. Cork Airport is located c. 52 km south of the Annagh Wind Farm Site. Noting the presence of existing/consented nearby turbines to the proposed wind farm and the distances to existing airports, it is considered therefore that there will be no significant effect on aviation from the proposed project during the construction phase.

As the proposed grid connection will be constructed underground within the public roadway, there are no construction related impacts on aviation interests associated with the GCR.

16.4.3 Operational Phase

16.4.3.1 *Telecommunications and Broadcasting*

Consultation regarding the potential for electromagnetic interference from the proposed project was carried out with the relevant national and regional broadcasters, fixed line and mobile telephone operators and other operators. No existing telecommunications infrastructure was found by the project team during a desk based survey within proximity of the proposed wind farm. According to the Comreg siteviewer³, the nearest telecommunication mast is located at Dawn Meats Charleville, approximately 3km northeast of the proposed turbines. There is another mast located at the N20, approximately 3.5km east of the proposed turbines.

Consultation with relevant operators revealed a potential impact to NovaTel’s infrastructure as detailed in Section 16.3.1.1. A detailed EMI Impact Assessment Analysis was carried out on the wireless internet service network operated by Nova Networks in the vicinity of the wind farm as detailed in Appendix 16.2 of Volume 3 of this EIAR.

From the findings of the appended report, it can be concluded that there will be no interference impacts from the proposed Annagh Wind Farm development on the Novatel licenced and unlicensed transmission backhaul radio networks and that no mitigation measures are required. Detailed technical analysis was carried out to include interference service predictions. Based on the findings it can be concluded that there will be no impacts on the Nova Telecoms \ Nova Broadband wireless internet service network.

The remaining findings of the consultation and desk based study confirms there will be no significant electromagnetic interference effect caused by the proposed project.

³ Comreg Siteviewer. <https://siteviewer.comreg.ie/#explore>



As set out in the construction impacts sections, with appropriate construction methodologies it is not expected that the proposed grid connection will have any operational related impacts on telecommunications and broadcasting interests in the area.

There is not expected to be any temporary impact to overhead lines during the operational phase of the proposed development. In the unlikely event that a turbine requires repair or replacement, a brief to temporary impact to overhead lines will occur during the delivery of turbine components.

16.4.3.2 Aviation

The potential for aviation impacts during the operational phase of the project are similar to those as set out in the construction impact section. Noting IAA's response to the scoping request, the response received from Shannon Airport and Dublin Airport Authority, the presence of existing adjacent turbines to the proposed wind farm and the distances to existing airports, it is considered therefore that there will be no significant effect on aviation from the proposed project during the operational phase.

As the proposed grid connection will be operating underground within the public roadway, there are no operational related impacts on aviation interests as a result of the operation of the GCR.

16.4.4 Decommissioning Phase

16.4.4.1 Telecommunications and Broadcasting

As stated in Section 16.3.3.1 above, the potential for electromagnetic interference from wind turbines occurs only during the operational phase of the project. There are no electromagnetic interference impacts associated with the construction or decommissioning phases of the proposed project, and therefore no mitigation required.

The proposed grid connection will be left in situ underground within the public roadway. There are no decommissioning related impacts on telecommunications and broadcasting interests in the area.

If overhead lines have to be temporarily disconnected at the time of decommissioning, the impacts will be no greater than those assessed at construction stage.

16.4.4.2 Aviation

During the decommissioning phase, the turbines will be dismantled and removed from the site, thereby removing all potential obstacles to aviation interests. There will be no significant effects on aviation.

The proposed grid connection will be left in situ underground within the public roadway. There are no decommissioning related impacts on aviation associated with the GCR.



16.5 Mitigation Measures

16.5.1 Telecommunications and Broadcasting

The proposed grid connection will be left in situ underground within the public roadway and will not cause any interference to telecommunications or broadcasting. As a result, there are no mitigation measures proposed for the GCR. In advance of the main grid connection works the precise alignment of the cable route within the corridor will be defined. This will include slit trenching which will ensure the avoidance of existing services in the road.

Overhead telecommunication lines will be temporarily disconnected and then reconnected following turbine delivery to the site. No mitigation measures are required.

16.5.1.1 *Aviation*

No mitigation measures are required.

In line with the scoping response from IAA, an aeronautical obstacle warning light scheme will be agreed with the authority.

The proposed grid connection will be left in situ underground within the public roadway and will not impact on aviation.

16.6 Cumulative Effects

All known existing and proposed projects within the study area that could potentially generate a cumulative impact with the project during construction, operation and decommissioning were identified and examined as part of this assessment. The full list of projects are contained in Appendix 1.2 of Volume 3 of this EIAR. There will be no cumulative impacts relating to the proposed project and surrounding projects in relation to telecommunications or aviation.

During the development of any large project that holds the potential to effect telecoms or aviation, the Developer is responsible for engaging with all relevant Telecoms Operators and Aviation Authorities to ensure that the proposals will not interfere with television or radio signals by acting as a physical barrier. In the event of any potential impact, the Developer for each individual project is responsible for ensuring that the necessary mitigation measures are in place. Therefore, as each project is designed and built to avoid impacts arising, a cumulative impact is unlikely to arise.

Replant lands at Emlagh, County Clare have been assessed cumulatively with respect to telecommunications and aviation. According to Comreg Siteviewer⁴, there is no telecommunication infrastructure in proximity to the replant lands site. The closest mast is located approx. 5.5km west at Kilkee. The most proximate airport to the Emlagh site is Shannon, located approx. 42km east of the replant lands site. Due to lack of proximity, the afforestation of the Emlagh site is not expected to have any cumulative effects on telecommunications and aviation with the proposed Annagh Wind Farm Project.

⁴ Comreg Siteviewer. <https://siteviewer.comreg.ie/#explore>



16.7 Residual Effects

16.7.1 Telecommunications and Broadcasting

Following implementation of mitigation as set out above, no residual effects are expected.

16.7.2 Aviation

No residual effects are expected.

From: Annagh Windfarm <annaghwindfarm@ftco.ie>

Sent: Friday 25 September 2020 13:07

To: [insert operator address]

Subject: Annagh Wind Farm Telecoms Assessment

Greetings,

EMPower intend to apply for planning permission for a wind farm development near Charleville in north County Cork consisting of 6 no. wind turbines. The project is named the Annagh Wind Farm. The Commission for Communications Regulation have recommended that we contact you in relation to potential interferences to telecommunications service as a result of the proposed wind farm. The proposed project is located approximately 6km south west of Charleville. I have attached a KMZ file which includes the locations of the 6 no. proposed turbine (this can be opened in the google earth app) and I have attached a list of the ITM coordinates of the turbines below, as well as grid references.

Please consider the location of this project with respect to your company's infrastructure. If any potential issues arise, or if there is any further information I can provide you with regarding the proposed project, please do not hesitate to contact me by email or telephone.

Turbine ID	ITM Coordinates		Grid Ref	
	X	Y	X	Y
T1	550822	617929	150867	117894
T2	550194	617834	150239	117799
T3	550973	617471	151019	117436
T4	549617	617237	149663	117202
T5	550272	617247	150318	117212
T6	550682	616887	150728	116852

Kind regards,
Eamon Hutton



Eamon Hutton
Project Planner

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PLANNING

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED ANNAGH WIND FARM, CO. CORK

VOLUME 2 – MAIN EIAR

CHAPTER 17 – INTERACTIONS OF THE FOREGOING

Prepared for: EMPOWER



Date: November 2021

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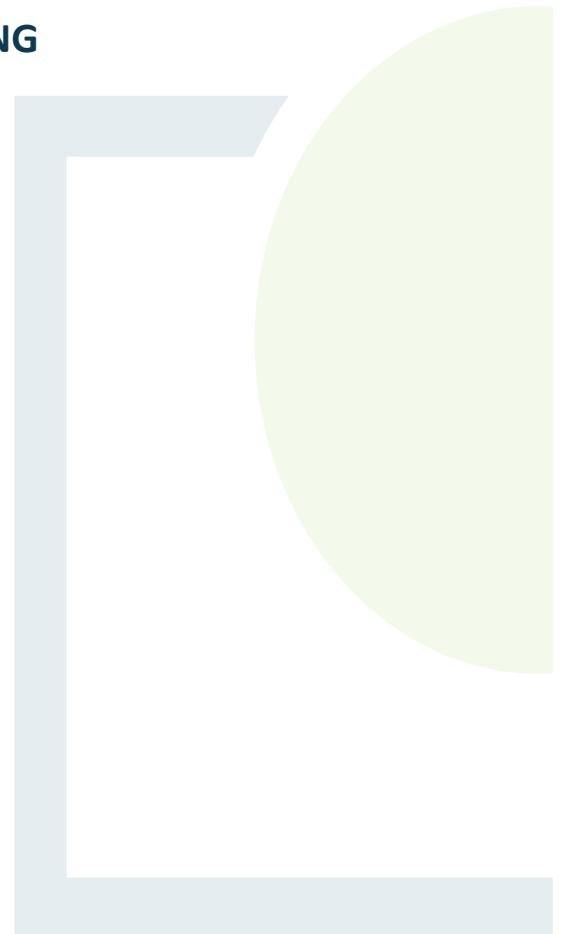


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17. INTERACTIONS OF THE FOREGOING

17.1 Introduction

The requirement for the identification of interactions between the various aspects of the environment as detailed throughout the EIAR is set out in Article 3(1) of the amended EIA Directive 2011/92/EU as amended by the Directive 2014/52/EU, which states the following:

“The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

- a) population and human health;
- b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
- c) land, soil, water, air and climate;
- d) material assets, cultural heritage and the landscape;
- e) the **interaction between the factors referred to in points (a) to (d).**”

In the preparation of this chapter, regard was had to the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact interactions (European Commission, 1999)¹, the EPA’s Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2017)², and the European Commission’s Guidance on the Preparation of the Environmental Impact Assessment Report (2017)³

This Chapter considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of Air Quality & Climate, Noise & Vibration, Biodiversity, Land, Soils & Geology, Hydrology & Water Quality, Population & Human Health, Material Assets, Shadow Flicker, Traffic & Transportation, Archaeology, Architectural & Cultural heritage, Landscape & Visual and Telecommunications & Aviation, as a result of the proposed project as described in Chapter 3 of this EIAR.

Direct, indirect, cumulative, and interactive impacts were considered during the siting of the proposed turbines and associated infrastructure in order to minimise impacts on the environmental aspects mentioned above. The interactions and inter-relationships of the potential impacts as set out throughout this EIAR are detailed in this Chapter. Table 17-1 herein provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the proposed project, including the wind farm, grid connection route (GCR) and turbine delivery route (TDR).

¹ European Commission (1999), Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. Office for Official Publications of the European Communities, May 1999

² Environmental Protection Agency (2017), Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA

³ European Commission (2017), Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report. Publications Office of the European Union



Table 17-2 provides further details and examples of the diverse range of interaction and inter-relationships between the key environmental aspects.

Each individual chapter of the EIA has had regard to interactions between different potential impacts. For example, Hydrology & Water Quality has had regard to potential impacts on Biodiversity; and Land, Soils and Geology has had regard to potential impacts on both Biodiversity, Hydrology & Water Quality and Traffic & Transportation.

The project is made up of three distinct elements as listed below and referred to throughout this Chapter.

- The wind farm site (**referred to in this EIA as ‘the Site’**);
- The grid connection route (**referred to in this EIA as the ‘GCR’**);
- The turbine delivery route (**referred to in this EIA as the ‘TDR’**).

The replant lands in the townland of Emlagh, near Moyasta, County Clare have also been considered Cumulatively in this Chapter.



Table 17-1: Matrix of Interaction Between key Environmental Aspects

	Air Quality & Climate	Noise & Vibration	Biodiversity	Land, Soils & Geology	Hydrology & Water Quality	Population, Human Health & Material Assets	Shadow Flicker	Traffic & Transport	Archaeological, Architectural & Cultural Heritage	Landscape & Visual	Telecommunications & Aviation
Air Quality & Climate											
Noise & Vibration											
Biodiversity											
Land, Soils & Geology											
Hydrology & Water Quality											
Population, Human Health & Material Assets											
Shadow Flicker											
Traffic & Transport											
Archaeological, Architectural & Cultural Heritage											
Landscape & Visual											
Telecommunications & Aviation											

= interaction or inter-relationship = no interaction or inter-relationship



Table 17-2: Description of Actions Between Key Environmental Aspects

INTERACTION	DESCRIPTION
Land, Soils & Geology Air Quality & Climate Traffic & Transportation Population & Human Health	<p>During the construction phase of the proposed project there is potential for impact to human health as a result of construction activities. Dust arising from earthworks, tree felling activities, trench excavation along GCR, construction of the new and upgrade of existing access tracks, the temporary storage of excavated materials, the movement of construction vehicles, loading and unloading of aggregates/materials and the movement of material can lead to the migration of dust. Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source. Dust emissions can lead to elevated PM10 and PM2.5 concentrations impacting on air quality and potentially impacting on human health at nearby dwellings. This is further exacerbated by the increase in traffic movements associated with the construction phase which can spread dust. This potential impact is unlikely to occur at the Site due to the setback of the proposed construction site from nearby dwellings. There is greater potential for this impact to occur along the GCR where installation works will be located in close proximity to dwellings. Due to the rolling nature of the proposed grid route works, this will have a short-term, temporary and slight impact on nearby dwellings. Mitigation measures have been set out in Chapter 6: Air Quality & Climate, Chapter 9: Land, Soils & Geology, Chapter 11: Population, Human Health & Material Assets and Chapter 13: Traffic & Transportation to avoid the impact of dust on nearby residential properties. Mitigation measures include the use of a specific haul route, diversions and speed limits to limit the spread of dust and the implementation of a dust control plan where construction works will be in proximity to residential properties.</p>
Land, Soils & Geology Air Quality & Climate Biodiversity Traffic & Transport	<p>During the construction and decommissioning phase of the proposed project there is potential for impact to biodiversity due to vegetation effects (soiling of vegetation from dust) as a result of construction activity which can occur up to 25m from sources and soiling effects which can occur up to 100m from sources. This is likely to occur as a result of excavation and the migration of dust, which can be exacerbated by traffic movements. This can impact on air quality, plant species and habitat. Mitigation has been set out in Chapter 6: Air Quality & Climate, Chapter 8: Biodiversity, Chapter 9: Land, Soils & Geology and Chapter 13: Traffic & Transportation in order to reduce potential soiling and vegetation affects including the covering of loads which may be sources of dust migration. A designated haul route and appropriate storage of soils in accordance with the soils management plan will be utilised to control this potential impact.</p>
Noise & Vibration Land, Soils & Geology Air Quality & Climate Traffic & Transportation Population & Human Health	<p>During the construction phase of the proposed project the construction works in combination with the projected increase in traffic has the potential to impact on human health and residential amenity by causing noise and dust nuisance at nearby dwellings. Project noise levels at the Site are not expected to exceed limits and the setback distance from the Site to nearby dwellings will avoid impact from soiling effects. The use of a designated haul route will control the spread of dust and noise as a result of the increased traffic movements. The proposed GCR works will result in elevated noise levels at nearby dwellings and will be above the guideline limits in some instances. Mitigation measures include the use of temporary barrier or screen to reduce noise impact and the use of a dust control plan to mitigate against the dispersal of dust. Vehicles and machinery in proximity to dwellings will not wait outside residential properties when idle to reduce impact of noise. Due to the rolling nature of these works, the impact is expected to be significant,</p>



INTERACTION	DESCRIPTION
	<p>brief/temporary and localised. Potential impacts along the turbine delivery route (TDR) may occur due to the construction of temporary accommodation works to facilitate the delivery of large turbine components. Mitigation is set out in Chapter 6: Air Quality & Climate, Chapter 7: Noise & Vibration, Chapter 9: Land, Soils & Geology and Chapter 13: Traffic & Transportation to reduce the potential impact these construction activities may have on residential amenity and human health.</p>
<p>Hydrology & Water Quality Land, Soils & Geology Biodiversity Traffic & Transportation</p>	<p>The construction phase of the proposed project has potential to impact on water quality, aquatic biodiversity and habitats as a result of excavation and tree felling. This can result in the deterioration of water quality due to sediment and nutrient release to watercourses and has potential to impact on European sites hydrologically connected to the project, including the Site, GCR and TDR. Furthermore, the potential for spillage of hydrocarbons from refuelling or from malfunctioning machinery also has potential to impact on water quality and aquatic biodiversity. Excavation works associated with the installation of the GCR may result in suspended solids reaching watercourse, affecting water quality and biodiversity. Suspended solids also have the potential to reach watercourses by being transported from the construction site to the public road on the wheels of construction traffic. This has potential to migrate to roadside drains. Mitigation measures have been set out in Chapter 8: Biodiversity, Chapter 9: Land, Soils & Geology, Chapter 10: Hydrology & Water Quality and Chapter 13: Traffic and Transportation, in order to reduce potential impact on watercourses and biodiversity. This includes the use of silt fencing, the avoidance of excavations in adverse weather conditions and the use of bunded hydrocarbon stores and refuelling areas. Mitigation by design has also been included in the project. The setback of proposed works from watercourses will reduce potential sediments from reaching water courses and the use of a clear-span bridge at the main watercourse crossing at the Site and use of horizontal directional drilling on the public road along the GCR will avoid instream works.</p>
<p>Land, Soils and Geology Hydrology & Water Quality Population & Human Health</p>	<p>Construction activities associated with the proposed project have potential to result in the erosion of exposed soil which can lead to sediment and nutrient concentrations in surface water run-off. This has potential to impact on ground water and the water of the aquifer beneath the Site and GCR area. Similarly, the potential for spillage of hydrocarbons used on site has potential to impact on ground water quality. This has potential to impact on drinking water of nearby wells which can impact on human health. Mitigation measures are set out in Chapter 9: Land, Soils & Geology and Chapter 10: Hydrology & Water Quality to avoid potential impact on ground water. Furthermore, there are no recorded groundwater supply wells in proximity to the turbine locations where potential for impact to ground water is highest. Excavations associated with the substations, tracks, compound and grid connection will not extend into the underlying bedrock aquifer.</p>
<p>Land, Soils and Geology Hydrology & Water Quality Traffic & Transportation Population & Human Health</p>	<p>The activities associated with the construction and decommissioning of the proposed project have potential to result in soil compaction due to use of heavy machinery and construction traffic at the Site. Soil compaction can reduce the infiltration of runoff and may result in areas of standing water which pose potential health and safety issues to construction workers and the general public. There is potential for silt to be carried from the construction site to the public road on the wheels of construction traffic which can cause the soiling of the public road, reducing skid resistance and causing a potential traffic hazard. Mitigation measures have been set out in Chapter 9: Land, Soils & Geology, Chapter 10: Hydrology & Water Quality, Chapter 11: Population, Human Health & Material Assets and</p>



INTERACTION	DESCRIPTION
	Chapter 13: Traffic & Transportation in order to reduce the potential for the migration of soil to the public road, reduce potential for soil compaction, reduce the occurrence of standing water and maintain best practice health and safety standards on-site and off-site during construction.
Hydrology & Water Quality Biodiversity	During the construction and decommissioning phases of the proposed project, sanitary waste and material waste accumulated at the Site has potential to impact on water quality and biodiversity if mishandled or disposed of inappropriately. As set out in the Construction Environmental Management Plan (CEMP) included in Appendix 3.1, all on-site waste will be stored appropriately and disposed of at a licenced waste facility.
Population & Human Health (Land Use) Biodiversity Material Assets	The construction of the project will result in the felling of 12.6 hectares of broadleaf forestry. This will result in a change of land use from commercial forestry to renewable energy, a loss in habitat which will impact on biodiversity and a loss in renewable material assets (trees). The impact on biodiversity is expected to be slight to imperceptible following mitigation and the impact on material assets will be neutral due to the requirement to provide replant lands elsewhere. The proposed replant lands are located at Emlagh, County Clare. These replant lands will provide the required area of commercial forestry which will be felled at the Site during the construction of the proposed Annagh Wind Farm.
Land, Soil & Geology, Noise & Vibration, Biodiversity Hydrology & Water Quality	During the construction phase there is potential for impact to biodiversity including bird species during felling, vegetation clearance and movement of soil and operating machinery. These activities will generate noise with potential to displace species and impact on foraging and nesting habitats at the Wind Farm, Grid Route and TDR. Secondary habitat degradation may occur through a deterioration in water quality as a result of earthworks. Prior to mitigation, potential impacts on avifauna are considered temporary and moderate to imperceptible and potential impacts on aquatic species and habitats are considered temporary and significant during the construction period. Mitigation measures have been set out in Chapter 9: Land, Soils & Geology and Chapter 10: Hydrology & Water Quality in order to avoid impact on water quality and aquatic species and habitat. Mitigation measures have been set out in Chapter 8: Biodiversity to avoid impact on species and habitats including avifauna and mammals during construction. Measures include all felling and clearing of vegetation will be carried out outside of the breeding season for birds, badgers and red squirrel, where possible, and night-time works will be limited to avoid impact on bats. A buffer zone between turbines and treelines will be applied to minimize risk to bat populations. Pre-construction monitoring surveys will be undertaken, and an Ecological Clerk of Works will be present to oversee the construction works and vegetation clearing. Mitigation measures have been set out in Chapter 7: Noise & Vibration to reduce noise where possible during the construction phase of the project. Following implementation of mitigation measures, the potential impact to species and habitat as a result of this potential interaction is considered non-significant and temporary.
Air Quality & Climate Population & Human Health (Human Health) Material Assets	The operational phase of the proposed project will result in the production of clean sustainable electricity which will offset the burning of fossil fuels and carbon emissions, resulting in positive benefit to air quality. This will result in an overall benefit to human health. The renewable electricity generated will provide greater energy security to the national grid, reducing the nation's dependency on fossil fuel and reducing the costs associated with fossil fuel importation.



INTERACTION	DESCRIPTION
	Therefore, this will have a positive impact on both material assets and a positive impact on air quality, displacing up to 42,966 tonnes of CO2 emissions per annum which would otherwise be released to the atmosphere as a result of the burning of fossil fuels. This will also benefit in reducing climate change.
Noise & Vibration Landscape & Visual Shadow Flicker Population & Human Health	The operation phase of the proposed project has potential to impact on residential amenity and human health as a result of a combination of noise, visual impact and the effects of shadow flicker on nearby residential receptors. These impacts have been considered in Chapter 7: Noise & Vibration, Chapter 11: Population, Human Health & Material Assets, Chapter 12: Shadow Flicker and Chapter 15: Landscape & Visual. Mitigation has been set out where relevant. The predicted noise limits will fall within the guideline noise limits at the Site apart from one noise sensitive location at particular wind speeds. Mitigation will be put in place which includes noise reduction modes for specific turbines during these conditions. The occurrence of shadow flicker will be eliminated through the use of shadow flicker detection systems on each wind turbine which will identify the conditions where shadow flicker can occur and cease operation until the conditions for shadow flicker are no longer present. A significant setback distance has been applied between the proposed turbines and nearby residential dwellings. The closest dwelling to the turbine locations is 690m. This provision aims to provide adequate setback in order to maintain residential amenity at nearby dwellings. The setback also aims to reduce noise and potential occurrences of shadow flicker impact.
Population & Human Health (Recreation, Amenity & Tourism) Landscape & Visual Archaeological, Architectural & Cultural Heritage	The operational phase of the proposed development has potential to impact on landscape and cultural heritage which may have an effect on tourism in the area. As outlined in Chapter 14: Archaeological, Architectural & Cultural Heritage, there are no visually sensitive monuments in proximity to the Site. Similarly, there are no major tourism attractions in proximity to the Site as detailed in Chapter 11. The Ballyhoura Mountains are the most prominent tourism and recreation attraction in proximity to the Site. The proposed Annagh wind turbines are viewed in the context of the nearby Boolard and Rathnacally turbines and therefore do not represent a brand new visual element to the landscape. Furthermore, the proposed Annagh turbines will not be visible from all areas of the trail network, and it is unlikely that their visibility will detract from the recreational offering of the area. It is therefore considered that the proposed Annagh turbines will have a non-significant neutral impact on recreation and tourism in the area due to the distance of the proposed Annagh turbines from significant features. The proposed development will not be considered an unfamiliar sight due to the existing renewable energy development of the adjacent Boolard and Rathnacally Wind Farms. As further outlined in Chapter 11: Population, Human Health & Material Assets, wind farm development does not have a significant bearing on Tourism as concluded from studies conducted by Fáilte Ireland. Therefore, the impacts associated with landscape and visuals during the operational phase of the proposed development will not have a significant impact on Population & Human Health (Recreation, Amenity & Tourism) and Archaeological, Architectural & Cultural Heritage.
Land, Soils and Geology Hydrology & Water Quality Population & Human Health Material Assets	The potential susceptibility of the proposed project to major accidents and natural disasters is considered in Chapter 11: Population, human Health & Material Assets. This assessment considers the potential impact of landslides/slope failure, forest fire and flooding.



INTERACTION	DESCRIPTION
Biodiversity Architectural & Cultural Heritage	<p>These events have potential to impact on soils and geology, hydrological regimes, water quality, human health and safety of construction workers, forestry workers and the general public, material assets including property and renewable energy projects, roads, infrastructure and natural resources, biodiversity and archaeological monuments. Slope stability has been considered in Chapter 9: Land, Soils and Geology. Given the low slope angles recorded across the site and the presence of competent ground as recorded in the site investigation, no slope stability issues are anticipated across the site. Flood risk is considered in Chapter 10: Hydrology & Water Quality and had regard to the potential impact flooding might have on slope stability. The flood risk assessment concluded that the proposed development will not result in a significant alteration to the existing hydrological regime and will not result in significant increase in run-off. This was also assessed with a 20% increase predicted run-off flow to account for potential future climate change. Safety measures have been built into the design of the proposed development to avoid potential for fire and avoid potential for the spreading of fire as set put in Chapter 11: Population, Human Health & material Assets, including significant setback between infrastructure and treelines, and significant setback of the proposed wind farm from nearby residential and agricultural structures.</p>

17.2 Conclusions

The proposed Annagh Wind Farm project has potential to impact on various environmental aspects as detailed throughout this EIAR. As outlined in this Chapter, there are interactions and inter-relationships between these aspects as described above. The EIAR has considered these interactions and inter-relationships throughout the assessment, firstly through the design of the wind farm site, grid connection route and turbine delivery route, to avoid impacts where possible and also in the definition of suitable mitigation measures to minimise potential impacts. It is therefore considered that the significant impacts associated with the interactions of environmental effects outlined in this chapter will be avoided due to the implementation of mitigation measures as detailed throughout this EIAR.



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