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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED COUMNAGAPPUL WIND FARM, CO. WATERFORD

VOLUME 2 – MAIN EIAR

CHAPTER 14 – TRAFFIC AND TRANSPORTATION

Prepared for:

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14. TRAFFIC AND TRANSPORTATION

14.1 Introduction

This section of the EIAR evaluates the potential impacts of the proposed Coumnagappul Wind Farm, associated grid connection and turbine delivery route on the existing traffic conditions and transportation network, including changes to peak annual average daily traffic and the carrying capacity of the surrounding road network. The assessment examines potential effects on traffic and transportation for the construction, operation and decommissioning phases of the Project and identifies measures to mitigate impacts if required. Potential cumulative impacts with other developments are also assessed.

A full description of the Project assessed in this EIAR is provided in Chapter 2 Development Description and comprises the following elements:

- The wind farm site (referred to in this EIAR as the 'Site');
- The grid connection (referred to in this EIAR as the 'GCR');
- The turbine delivery route (referred to in this EIAR as the 'TDR');
- The project includes the Site, GCR and TDR (referred to in this EIAR as the 'Project');
- The study area for the traffic and transportation chapter comprises elements of the existing or future transportation network that could potentially be impacted by activities associated with the construction, operation and decommissioning of the Coumnagappul Wind Farm, (referred to in this EIAR as the 'Study Area').

14.1.1 Study Area

The proposed project is located within the jurisdiction of Waterford City and County Council, approximately 32km west of Waterford City. The study area includes the assessment of roads associated with the grid connection and the transportation routes.

The transport network comprising the study area is identified in Figure 14.1.

14.2 Assessment Methodology

14.2.1 Contributors to the EIAR

The Traffic and Transportation chapter, Traffic Management Plan and site assessments were completed by Fehily Timoney and Company engineers. The chapter was drafted by Leigh Doyle, checked by Trevor Byrne and Rita Mansfield, and approved by Jim Hughes.

Trevor works as a Principal Engineer for Fehily Timoney and Company. Trevor has over 18 years' experience in engineering consultancy and construction roles. He holds a Master's degree in Sustainable Energy Systems from the University of Edinburgh and an Honours degree in Civil Engineering following his studies at Edinburgh Napier University and Cork Institute of Technology. Trevor is a senior project manager within the Planning and Energy division at FT and is a chartered engineer with Engineers Ireland. His primary area of expertise is in the design and construction of renewable energy projects and urban developments.

Trevor has considerable environmental engineering and environmental impact assessment experience and is a proven project manager with a track record in successfully guiding large scale projects through the consenting process as well as construction stage. He also has significant on-site experience relating to managing the construction of renewable energy developments and environmental coordination roles.

Throughout his career to date, Trevor has provided technical advisory services through all stages of project delivery from feasibility assessment, impact assessment, design, expert witness, contract administration and construction. He has extensive experience in public / landowner consultation, liaison with private and public-sector clients, and with statutory and non-statutory bodies.

Trevor is also experienced in the management of teams delivering Appropriate Assessment (Natura Impact Statements), Environmental Impact Assessment, Ecological Impact Assessment, environmental licensing, environmental management, environmental pollution control and mitigation design.

Leigh is a Project Engineer at Fehily Timoney and Company working in the Energy and Planning department. He has over 2 years' experience and holds a Master's degree in Civil, Structural and Environmental Engineering in UCC. Leigh is a member of the engineering team within the Planning and Energy division at FT and provides technical and engineering support to the EIAR teams for a variety of commercial scale renewable energy projects as well as other developments.

Leigh has experience in the preparation of Traffic and Transportation assessments, Air and Climate Assessments, as well as other technical chapters associated with EIAR's and environmental reports for renewable energy projects ranging from wind farms, solar farms, grid connections, battery energy storage systems and ancillary grid infrastructure projects. He also has experience in the design of renewable energy developments.

Leigh has site experience in the form of environmental walkover surveys and engineering surveys to inform Traffic and Transportation and Hydrology assessments for large scale energy projects. In addition, Leigh also has experience in carrying out fieldwork to support air quality monitoring campaigns and noise and vibration assessments in support of the Infrastructure and Noise teams at FT. Leigh also has experience relating to stakeholder and landowner liaison as part of his day-to-day project work and site work within the Planning and Energy Division.

The TDR route was identified and surveyed by Pell Frischmann Consulting Engineers. Pell Frischmann is a multi-disciplinary and international consultant engineering company working across infrastructure, buildings, and regeneration. The commission was led by Gordon Buchan BEng (Hons), MSc, FCIHT, CMCILT, Divisional Director for Pell Frischmann and Timothy Lockett BSc, MCILT. Gordon has over 15 years' experience in undertaking abnormal load assessments across the UK, Republic of Ireland and northern Europe and has worked on over 500 wind farm sites. Timothy has over 10 years' experience and has worked on over 300 wind farm sites in the UK and Ireland.

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 2 and the CEMP, 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.

Site access points are assessed for suitability in the context of both TII and Local Authority requirements for both geometric design and visibility. Potential disruption as a result of road or lane closures as a result of works along public roads are also assessed.

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 transport 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.

14.2.2 Construction Programming

As described in Chapter 2, the construction of the project in its entirety is expected to take between 24 months. A 24 month construction programme was assumed for construction traffic generation movement calculations as part of this assessment in order to assess for worst case as it would generate the highest peak volume of traffic (i.e. an accelerated construction programme).

The assessment uses a combination of field surveys, automatic traffic counter (ATC) data, desktop studies of potential haulage routes and local roads department consultation conducted by FT Engineers.

14.2.3 Relevant Guidance

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

- TII Publication: Traffic and Transport Assessment Guidelines, TII, 2014;
- TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections, TII, 2021;
- EPA Guidelines on The Information to Be Contained In Environmental Impact Assessment Reports, EPA, 2022;
- Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017;
- TII Project Appraisal Guidelines for National Roads: Estimating AADT on National Roads, TII, 2016;
- TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections, TII, 2021;
- TII Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated, and compact grade separated junctions) DN-GEO-03060, TII, April 2017;
- Waterford Development Plan 2022-2028, Waterford City and County Council;
- Guidelines for Managing Openings in Public Roads, Department of Transport, April 2017.

14.2.4 Sources of Information

- Traffic count data was obtained from 7-day traffic count surveys conducted on the 17th of June 2021
- open-source TII traffic counter information and private traffic count data carried out for historical impact assessments, accessed in June 2023.
- Ordinance survey and aerial mapping, accessed in June 2021, 2022 and 2023;
- Project construction methodologies detailed in the CEMP, accessed in June 2022 and June 2023;
- Site Layout Plans, reviewed in August 2023;
- Route Survey Report for the Turbine Delivery Route carried out by Pell Frischmann in November 2021;

The above sources of information have been used to identify the study area and transport routes to be assessed.

14.2.5 Consultation

Transport Infrastructure Ireland (TII) were consulted as part of the EIAR scoping process. A copy of the correspondence from TII is included in Chapter 5 Appendix 2.

Waterford County Council (WCC) Roads Department were consulted during the EIAR scoping phase and through subsequent email correspondence. An Garda Síochána were also consulted during the EIAR scoping phase. A copy of the correspondence is included in Chapter 5 – Scoping and Consultation.

14.3 Existing Environment

14.3.1 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 14.1.

Table 14-1: 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 **M8** which connects Cork City to the M7 between Nenagh and Portlaoise. The road is the arterial route for traffic connecting Cork to Dublin. The M8 is located approximately 26km to the north-west of the windfarm site. The AADT for the M8 in 2022 according to TII automatic traffic counter (TMU M08 118.1 S) data was 17,459 with approximately 10.3% of this total comprised of HGV traffic.

The **M9** is the next closest motorway to the proposed site. The M9 connects Waterford City to the M7 close to Newbridge and is approximately 34km to the east of the site boundary. The road is the arterial route for traffic connecting Waterford to Dublin. The AADT for the M9 in 2022 according to TII automatic traffic counter (TMU M09 111 N) data was 11,494 with approximately 9.2% of this total comprised of HGV traffic.

For all traffic count positions considered in the assessment, full yearly data available for 2020, 2021 and 2022 was applied. It was noted that the traffic count data for 2020 and 2021 decreased significantly on the previous years, which one would assume is due to an decrease in movement due to Covid 19 restrictions. As a result, the percentage of HGV's on Motorways has increased in 2020 and 2021 by 2-3%.

There are no other motorways located within 50km of the site.

National Primary Routes

The closest national primary route is the N25, which is located approximately 12.1km to the south-east of the site. The N25 road forms the route from Cork to Rosslare Europort via Waterford City. The N25 will connect the N29 to the N72 along the proposed turbine delivery route. The AADT for the N25 in 2022 according to TII automatic traffic counter (TMU N25 090 W) data was 10,536 with approximately 7.2% of this total comprised of HGV traffic.

It is proposed that the N25 will form the most significant part of the turbine delivery route at approximately 47km, connecting the N29 to the N72 which will link to the local road network surrounding the site.

National Secondary Routes

The closest national secondary route to the south of the site is the N72. The N72 connecting the N25 near Dungarvan to the N70 in Killorgan is located approximately 14km from the site boundary. The AADT for the N72 in 2022 according to TII automatic traffic counter data was 4,957 with 4.5% of this total comprised of HGV traffic.

The N72 will form approximately 5.2km section of the turbine delivery route and approximately 1.3km of the grid connection route.

Regional Roads

The closest regional road is the R672 which is located approximately 5.3km to the west of the proposed site. The R672 connects the N25 near Dungarvan to Clonmel with the R671 near Ballynamult. The R672 will form approximately 13km section of the turbine delivery route and approximately 4.15km section of the grid connection route.

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 west of the site, the local road which connects the proposed site entrance to the R672 near Tooraneena (L-5119).

The grid connection utilises the local roads L5068 for approximately 4.6km, the L1041 for approximately 1.2km, the L5111 for approximately 2.25km and the L5113 for approximately 85m. The route requires trenching within undesignated local roads for approximately 4.2km before entering the site and connecting to the onsite substation.

The site location and existing road network is shown on Figure 14-1.

14.3.2 Other Transport Network Infrastructure Within the Study Area

The Carrick on Suir to Clonmel railway line is located approximately 14km north of the site facilitating rail transport between Waterford and Galway with connections available to Dublin, Cork and Kerry.

The Suir Blueway is located 8.8km north west of the site in County Tipperary connecting Carrick on Suir to Cahir via Clonmel. The route is made up of a walking and cycling trail for 21km which runs from Carrick-on-Suir to Clonmel and a further 32km of waterway along the River Suir which can be canoed or kayaked. The Waterford Greenway is located 14.5km south east of the proposed wind farm. The greenway is a 46km walking and cycling route which commences in Waterford City and terminates in Dungarvan.

14.3.3 Existing Environment Traffic Volumes

Existing traffic volumes on roads in the study area are shown in Table 14-2 below:

Table 14-2: Baseline Traffic Volumes

Road	Projected Baseline AADT		
	HGV	LGV	AADT
M08 - TMU M08 118.1 S: M08 Corrin Bridge, Jn15 to Jn16, Co. Cork[1]	1,799	15,660	17,459
M09 - TMU M09 111.0 N: M09 Between Jn11 Mullinavat and Jn12 M9/N24/N25 Grannagh, Mullinavat, Co. Kilkenny[1]	1,057	10,437	11,494
N25 - TMU N25 090.0 W N25 Between Waterford City and Dungarvan, Kilmacthomas, Co. Waterford[1]	759	9,777	10,536
N72 - TMU N72 160.0 W N72 Between Dungarvan and Cappoquin, west of R671 Jn, Co. Waterford[1]	223	4,734	4,957
R672[2]	110	2,958	3,068
Unclassified Local Road, Seapark, Co. Waterford[2]	1	29	30
Unclassified Local Road, Knockarana, Co. Waterford[2]	7	88	95
Unclassified Local Road, Ballyconnery, Co. Waterford[2]	3	78	81

AADT figures were projected to a proposed construction commencement year of 2026 from 2020, 2021, and 2022 source data in accordance with NRA Project Appraisal Guidelines for National Roads: Unit 5.5 Link-Based Traffic Growth Forecasting, 2011 and TII Project Appraisal Guidelines for National Roads: Unit 5.3 – Travel Demand Projections, 2021.

14.4 Proposed Project

A large infrastructural project of this nature will generate additional traffic on the existing road network as a result of the construction, operation and decommissioning. A detailed description of the project assessed in this EIAR is provided in Chapter 2.

The following sections describe the Project in the context of the existing traffic conditions and transportation network.

[1] Source: TII

[2] Source: 7-Day Automatic Traffic Counter Data

14.4.1 Construction Programme

The construction of the project in its entirety is expected to take 24 months. Given the topographical condition of the site, it is anticipated that the earthworks and the construction of both access tracks and turbine hard standings would extend the development programme by up to 6 months longer than a typical 12 turbine wind farm development. A 24 month construction programme was assumed for the purposes of assessing worst case traffic volumes in the traffic impact assessment.

An indicative construction programme upon which vehicle trip distribution calculations are based is shown in Table 14-3.

Table 14-3: Proposed Construction Programme

Activity	Month																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mobilisation and site setup	X	x																						
Site clearance and felling	X	X	X	x																				
Internal access tracks	X	X	X	X	X	X	x	x	x	x														
Turbine hard standings					X	X	X	X	X	X	X	x												
Turbine foundations								X	X	X	X	X	X											
TDR accomodation works											x													
Turbine Installation													X	x	x	x	x							
Onsite substation												X	X	X	X	x	x	x	x	x	x	x	x	

Activity	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Grid connection cable works												x	x	x	x	x	x	x	x	x	x	x	x	
Private electrical network															x	x	x	x	x	x	x			
Landscaping, reinstatement, demobilisation																							x	x

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 as it would generate peak volumes of construction traffic on the local road network.

14.4.2 Main Wind Farm Site

As described in Chapter 2, the Site includes the wind turbines, internal access tracks, hard standings, the permanent meteorological mast, onsite substation compound, internal electrical and communications cabling, temporary construction compounds and lay down areas, drainage infrastructure and all associated works related to the construction of the wind farm.

14.4.2.1 Site Access

Coumnagappul Wind Farm will have one main site entrance which will be used for both construction and operation as an access point from the public road. The meteorological (met) mast will be accessed from the main site entrance via the internal access track leading to turbine 12 to construct, service and maintain the met mast. The location of the access point is shown on the haul route Figure 14.2. An assessment of the existing geometry and sightlines from these entrances was carried out in February 2022 with existing visibility presented in Table 14-4.

The access point has been selected with consideration for safety of public road users and construction staff and to ensure they can be constructed to comply with the requirements of both Waterford County Council and TII design requirements for direct accesses.

The main site entrance is an existing Coillte Forestry access. This entrance will be upgraded to facilitate the delivery of turbine components. All turbine components accessing the site will use this entrance. The proposed grid connection export cable will exit the site through this access point. This access point will also be used for construction and operation vehicles and will be used by both HGV's and LGV's. This access is currently used by HGV's and machinery associated with forestry activities and will continue to be used for such purposes during the construction and operation phases of the project.

The entrance is an existing entrance to Coillte forestry located on an undesignated local road. The general local road speed limit applies of 80kph. The minimum sight distance for an 80kph road is 160m in line with Transport Infrastructure Ireland (TII) standards (TII Publication DN-GEO-03060).

Line of sight was first established at the center point of the entrance bell-mouth at a 3-metre setback from the road edge. Visibility at this point allows for 62m north (RHS) and 22m south (LHS). The LHS is constrained by forestry and vegetation which hinders visibility. Existing visibility at this access point is currently non-compliant with TII visibility distance requirements in both directions. It is proposed to widen the existing bell mouth and clear forestry and vegetation within the 160m visibility splays in both directions to facilitate the over-sized turbine delivery vehicles entering the site at this point and achieve minimum sight line distances. The detail is shown on 0101-Series planning application drawings included with the planning application. Visual obstructions 1.05m above ground level will be removed to achieve target 'Y' visibility distances in both directions of 160m in accordance with TII design specifications.

This site entrance will be upgraded in accordance with TII design guidelines DN-GEO-03060 and will achieving sightlines of 160m in both directions at a setback distance of X=3m provided the above accommodation works are completed. Refer to drawing number P2360-0101-0003.

Plate 14-1: Proposed Site Entrance Location

Plate 14-2: Existing Visibility to Left from Existing Site Entrance at X=3m

Plate 14-3: Existing Visibility to Right from Proposed Site Entrance at X=3m

Table 14-4: Site Entrance Visibility Results

Access Point	Coordinates (LAT, LON)	Y (m) at x=0m[3]		Y (m) at x=3m[4]		Major Road Average Width (m)	Major Road Speed Limit (kph)[5]
		To Right	To Left	To Right	To Left		
1	52.236131, -7.673508	118	87	62	22	3.2	80

14.4.2.2 Felling

Felling of 5.4 ha of coniferous forestry will be carried out at the main entrance to the wind farm and along the internal access track for approximately 1.2km to accommodate the delivery and construction of turbines, hardstands, crane pads, temporary compounds, borrow pits, access tracks and the proposed onsite substation and to provide for mitigation for Bat species, as detailed in Chapter 9: Biodiversity.

14.4.2.3 Permanent Met Mast

1 no. permanent meteorological (Met) mast will be erected approximately 1km south of the site. The permanent met mast will be of the following configuration:

- 100m high free standing lattice steel mast with a shallow concrete foundation fixed to ground anchors by 3no. guy-wires to measure local meteorological conditions. The mast will include a concrete base measuring 10m by 10m and will be up to 1.5m in depth.

The met mast will be accessed from the proposed wind farm internal access road network and existing agricultural track which will be upgraded as shown on layout plans. A section of new track will lead from the existing agricultural track to the met mast location. The met mast access track will be 3.5m in width and will include drainage.

[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. (TII Standard DN-GEO-03060: Geometric Design of Junctions, June 2017).

[4] From the point "x" metres back from the major road a driver approaching the junction along the minor road will be able to see clearly points to the left and right on the nearer edge of the major road running carriageway at a distance measured from its intersection with the centreline of the minor road. This is called the 'y' distance. (TII Standard DN-GEO-03060: Geometric Design of Junctions, June 2017).

[5] Where no posted speed limit is available for public road in question, a speed limit of 80kph is assumed.

14.4.2.4 Construction Haul Routes

In constructing the wind farm, materials and plant will 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 Figure 14.3.

The traffic impact assessment d assumes all structural fill for access tracks, turbine hardstands, turbine foundations and on-site substation will be sourced from the on site borrow pit instead of local quarries and will reduce the impact on the local road network. This assumes all Clause 804 material for surface courses of roads, foundations, hardstands etc. will be transported from externally licensed quarries. The surrounding quarries currently in operation and indicative haul routes to the site have been identified. This is described in Section 14.4.2.4. The closest external quarry to the site is the Roadstone Quarry in Cappagh, Co. Waterford located approximately 22km (SW) from the wind farm site.

The location of licensed waste facilities are identified in Section 14.4.2.5. All materials required for the construction of the proposed wind farm will approach the site along the R672 and L5119 roads. This will act as the main haul route for the construction phase of the project.

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 substations as well as electrical equipment and cabling;
- HGVs carrying plant and fuel;
- HGVs exporting site waste;
- Cranes and associated elements for the main crane for erecting the turbines;
- Private cars and vans for the commuting workforce.

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

1. Whitechurch, Cappagh, Co. Waterford. Located 22km from Coumnagappul. (Roadstone Cappagh).
2. Gortnahown Stone Quarry, Mitchelstown, Co. Cork. Located 64km from Coumnagappul.

Indicative haul routes for the proposed development are shown in Figure 14.3.

Waste Management Facilities

Authorised waste management facilities have been identified in the greater County Waterford 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 14-5 below. These facilities were identified at the time of the preparation of this EIAR.

Table 14-5: Licensed Waste Facilities in the Vicinity of Coumnagappul Wind Farm

Licensed Waste Facility Location	Type of Waste
Tony Kirwan Civil Engineering Contractors Ltd. Ballycraddock, Kilmeaden, Co. Waterford	Soil and stones
Kilbarry Developments Ltd. Lacken Road, Kilbarry, Co. Waterford	Soil and stone
Kereen Quarries Ltd. Kereen Lower, Cappoquin, Co. Waterford	Iron and steel, concrete, bricks, tiles and ceramics, mixture of concrete, bituminous mixtures, ferrous metal.
BIGbin Waste Tech Ltd. Circle K garage, Kilrush, Dungarvan, Co. Waterford	Bbiodegradable kitchen and canteen waste, mixed municipal waste
Friends of the Earth (Skip & Fuels) Ltd. Carriganard, Six Cross Roads, Co. Waterford	Paper and cardboard packaging, wooden packaging, concrete, bricks, wood, plastic, mixed construction and demolition wastes, plastics, metals, soil and stones, mixed municipal waste, bulky waste.

14.4.3 Grid Connection

14.4.3.1 Grid Connection Cable Works

As described in Chapter 2, electricity generated from wind turbines will be collected at medium voltage (20/33 kV) by an internal circuit of buried cables which primarily will follow on-site access tracks. This circuit will be terminated at a proposed onsite substation and exported to the grid via a 38kV buried cable to the existing Dungarvan 110kV substation. Alternative routes for the proposed cable have been assessed at a preliminary route development stage.

The underground grid route connection works to Dungarvan 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. These works will be progressive with short sections (up to several hundred metres in length) closed for short periods before moving onto the next section. This will require delivery of plant and construction materials to the sections along the route, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces.

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.

The development will be constructed to ensure that all temporary/permanent works within the road curtilage of the national roads will be as per the Purple Book (Guidelines for Managing Openings in Public Roads April, 2017). All temporary works within the road curtilage of the national roads to install the cable ducts will be subject to National Roads Guidelines, ensuring all trenching and reinstatements will be as per SD2 (Temporary Reinstatements) and SD6 (Permanent Reinstatement) along heavy trafficked carriageway. If any damage to existing footpaths or cycle lanes occurs during the build, these sections will be replaced by the awarded civils contractor as per the Guidelines for Managing Openings in Public Roads 2017 (SD12 Footways: Concrete Permanent Reinstatement).

There is one bridge crossing (WD-N72-007.00) required within the section of the N72 national carriageway (ITM Co-ordinate (623173.800, 595179.559). The method of crossing will be horizontal directional drilling (HDD) under the bridge structure. Appropriate licensing will be sought prior to the commencement of the crossing works. This will be crossed using ESBN Specification and inline with TII and the road Engineers sign off on the design.

A careful approach will be taken to planning the works to ensure minimal impacts on road users and the general public.

Due to the length of cabling within the road corridor (ca. 22.47km), these works are expected to be conducted over a 12-month period. Road closures will be applied for by the appointed contractor and will outline local diversions whilst always maintaining local access for residents, farms and businesses.

The appointed contractor will at all times implement suitable traffic management in the form of a stop-go system. Enforcement of traffic management procedures will include temporary traffic lights/ flag men in place during proposed ducting works. Should the need for weekend or night works be required this will be adhered to by the build contractor and agreed with in writing prior to such works taking place. Road closures will be subject to the applicable statutory licensing processes as implemented by the roads authority. Road closures will be facilitated by the existing network of roads in the area.

The grid connection route is identified in Figure 2.4.

14.4.3.2 Trench Details

Details for trench reinstatement are contained in the CEMP Appendix 2-1 and will be designed and constructed in accordance with Eirgrid specifications[6].

The proposed trench and ducting will be installed at a minimum depth of 1500mm so as not to conflict with the drainage for the national roadway. No existing safety barriers reside along the route in which the ducting is proposed. The ducting will be installed inline with EirGrid / ESBN specification and design reviewed with all relevant stakeholders prior to obtaining a road opening license. Any improvements required to facilitate development will be identified prior to works. The ducting will be placed and designed in such a position to ensure that future routine network improvements such as pavement overlay and strengthening, installation of new verge-side signs and other road furniture are not impacted by the cable trench.

The pavement will be reinstated to a condition equal or better than the existing pavement, pre-construction.

[6] https://www.eirgridgroup.com/customer-and-industry/general-customer-information/transmission-policies-and/

All materials used in the reinstatement of trenches will comply with the requirements of the Department of Transport guidelines for the Opening, Backfilling and Reinstatement of Trenches in Public Roads and the TII Specifications for Road Works.

It is proposed that 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.

Trench excavation, backfilling and road surface reinstatement methodologies are described in Chapter 2 and the CEMP.

14.4.4 Watercourse Crossings Along the GCR

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

Table 14-6: Grid Connection Crossings

Watercourse Name	Coordinates: ITM	Road Name	Crossing Type
Watercourse 1 - Coligan River (COLLIGAN_040)	623170.967, 595184.165 [Cable route Chainage 550m]	N72 - Bridge Crossing (TII bridge: WD-N72-007.00)	There is insufficient cover available to allow the ducts to be installed in the bridge deck. Therefore, the watercourse will be crossed by Horizontal Directional Drilling (HDD) to pass under the bridge and riverbed. Entry and exit pits will be within the N72 road corridor.
Watercourse 2 - Ballynaguilkee Lower stream (FINISK_020)	620455.928, 603348.975 [Chainage 10,550m].	L1041	Existing culverted stream. The preferred crossing method is using a culvert undercrossing or overcrossing method which will be selected based on the cover available above the culvert. Culvert crossings have been designed in line with ESB specifications. Where it is not possible to cross under an existing culvert while maintaining the culvert in place, the culvert may be replaced. All reinstatement works will be carried out to the required Waterford City & County Councils specification and in line with the 'Guidelines for Managing Openings in Public Roads – 2017'.
Watercourse 3 - Unnamed tributary of the Skeheens Stream (COLLIGAN_010)	621231.261, 608261.270 [Cable route Chainage 15,500m]	Unnamed road at a staggered crossroads (Bryan's Crossroads)	GCR: The cable will exit the public road and enter privately owned lands which are in agricultural use. Here the cable will cross the stream utilising a Horizontal Directional Drilling (HDD stream undercrossing).

Watercourse Name	Coordinates: ITM	Road Name	Crossing Type
			Entry and exit pits will be within the adjacent agricultural lands. TDR: the route will exit the public road and enter privately owned lands. The stream will be crossed using a temporary piped culvert crossing.
Watercourse 4 - Skeheens Stream (COLLIGAN_010))	622466.431, 609322.014 [Cable route Chainage 17,950m]	On the access road within the Wind Farm Site.	The crossing is an existing river ford (shallow point where a river or stream may be crossed by wading, or inside a vehicle getting its wheels wet) on the existing forestry track. The riverbed has been modified and raised to allow this crossing. This crossing will be upgraded as part of the Proposed Development by replacement with an open-bottomed culvert. The cable ducting will be installed above the culvert.

For crossings where HDD has been identified as the preferred crossing method, open cut trenching methods will be permitted in dry conditions where there is no-flow in the watercourse and there is no risk of in-stream works. In such instances, cable ducts will be laid under the stream bed which will then be fully reinstated to its pre-existing condition.

A description of construction methodologies for watercourse crossings is presented in in the CEMP and Chapter 2.

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 (ca. 22.47km), these works are expected to be conducted over a 12-month period (ca. 50 weeks), 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.

14.4.4.1 Crossing of the N72 National Road

Where the grid connection crosses the N72 national route, horizontal directional drilling (HDD) will be used.

The launch pit for the HDD will be on the east side of the bridge within the public road and will require a lane closure and Stop/Go system during the drilling works. The alignment of the proposed HDD will lead the bore to emerge on the west side of the bridge within the national road corridor.

There is sufficient room available to accommodate the necessary equipment. The locations of the launch and reception pits will be adequately spaced from the carriageway to ensure the bore is at such depth as not to conflict with the drainage, foundations or surface of the road.

The locations of start and finish points for the HDD have been identified following desktop assessments, site visits and consultation with TII. Site investigation was carried out near the proposed crossing location to confirm the suitability of the proposed crossing method at this location. Site investigation works are described in detail in Chapter 11 of the EIAR.

A detailed methodology for HDD operations is contained in the CEMP in Appendix 2.1.

14.4.5 Turbine Delivery Route

The proposed turbine delivery route is presented in Figure 2.3, Volume IV. A Delivery Route Selection and Assessment was carried out to identify the optimum delivery route to site and is presented as Appendix 2.2, Volume III of this EIAR.

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). A substation transformer unit will be transported to site which will be categorised as an abnormal load. As a result, an abnormal load permit will be sought for this movement. Multiple transformers have already been delivered to ESBN substations in the area without any impact on the structures along the road network. The proposed access route to site is as follows:

- Loads will depart the Port of Waterford (Belview) and travel along the N29, taking the third exit on the Slieverue Roundabout to continue on the N29;
- Loads will proceed to the Luffany Roundabout where they will take the first exit onto the N25;
- Loads will travel west on the N25;
- Loads will continue west onto the N72;
- Loads will depart the N72 and head north on the R672;
- Loads will depart the R672 right near Touraneena onto the L5119;
- Loads will continue north-east on the L5119 to the proposed site entrance.

There will be an objective to maintain the strategic capacity and safety of the N29, N25 and N72 carriageways at all times, cognisant of the National Development Plan, 2021 – 2030, with key sectoral priorities for maintaining the N25 and N72 national road network to a robust and safe standard for users. The detailed design will be carried out with full stakeholder engagement and all concerns that may arise will be eliminated through this process.

In some cases, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/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 development will be constructed to ensure that all temporary/permanent works within the road curtilage of the national roads (N29, N25, N72) will be as per the Purple Book (Guidelines for Managing Openings in Public Roads, 2017). If any damage to existing footpaths or cycle lanes occurs during the delivery of components, these sections will be replaced by the awarded civils contractor as per The Purple Book (Guidelines for Managing Openings in Public Roads 2017 (SD12 Footways: Concrete Permanent Reinstatement).

The location of accommodation works are shown in Figure 2.3 and identified as "Points of Interest (POI's)".

Key elements of the temporary accommodation works for the delivery of turbines are summarised below. A full list of proposed temporary accommodation works are presented in Chapter 2.

Table 14-7: Accommodation Works on Delivery Route

POI Ref.	Description of Works
POI 02: N29 / R711 Slieverue Roundabout	Load bearing surface through the centre of the roundabout island. Temporary removal of crash barrier and centre island furniture.
POI 03: N29 / N25 Luffany Roundabout	N29 / N25 Luffany Roundabout - Preparation of local load bearing surfaces for vehicle over-run. Temporary removal of all obstructions including crash barrier and street lighting.
POI 05: N25 / R680 Carrick Road Roundabout:	Load bearing surface through the centre of the roundabout island and removal of road signage.
POI 06: N25 / N72 Junction	Preparation of local load bearing surface through built out green area. Removal of street furniture.
POI 07: R672 / N72 Junction	Preparation of local load bearing surface through cycle lane and ghost island hatched area. Temporary removal of all street furniture along cycle lane to facilitate vehicle overrun and to avoid local monument.
POI 08: N72 / R672 Junction	Preparation of local load bearing surface through cycle lane and pedestrian footway. Temporary removal of all street furniture.
POI 10: R672 Colligan	Load bearing surface to be laid and road bollard to be temporarily removed.
POI 12: R672 Colligan	Load bearing surface to be laid. Hedge, wall section and fence may need to be removed and reinstated (to be determined at a later date and appropriate consents sought in advance of works).
POI 13: R672 West of Colligan	A load bearing surface will be laid and one traffic bollard will be removed.
POI 14: R672 North of Garrycline	Will require third party land take. Load bearing surface to be laid. Trees and vegetation should be removed. Road signage to be temporarily removed.

POI Ref.	Description of Works
POI 15: West of Colligan	Load bearing surface to be laid. Temporary removal of all street furniture. Trailer suspension raise to oversail the verge. Fence and vegetation may need to be removed and reinstated (to be determined at a later date and appropriate consents sought in advance of works).
POI 26: R672 Clooncogaile Cross Roads	Loads to utilise third party land to the north of the road where a load bearing surface will be laid. Ditches will be temporarily culverted and the verge reprofiled. Fences and road signage will be temporarily removed and reinstated. Included in Proposed Development Red Line Boundary.
POI 27: Unclassified Road east of Clooncogaile Cross Roads	Trees and vegetation may need to be cut (to be determined at a later date and appropriate consents sought in advance of works) and utility pole to be temporarily removed.
POI 28: Ford's Cross Roads	Utility pole to be temporarily removed and road to be widened.
POI 17: Bryan's Cross Roads	Will require third party land take. Temporary stream crossing and load bearing surface. Temporary removal of fencing and cutting of hedgerow. Included in Proposed Development Red Line Boundary.
POI 18: Sweep Crossroads	Trailer suspension raise to oversail stone wall. Utility pole and hedge may need to be removed (to be determined at a later date and appropriate consents sought in advance of works).
POI 19: West of Blaentasour	Road widening required to a minimum driveable surface of 4.5m and clearance of 5.5m corridor. Vegetation trimming may be required (to be determined at a later date and appropriate consents sought in advance of works).

Pell Frischmann (PF) were commissioned by Fehily Timoney (FT) to undertake a study of the delivery route for wind turbine Abnormal Indivisible Loads (AIL) associated with the construction and development of Coumnagappul Wind Farm. The Route Survey Review (RSR) has been prepared to help inform the EIAR on the issues associated with the development of the site with regard to off-site transport and access for AIL traffic and includes a detailed swept path analysis (SPA). The report identifies the key issues associated with AIL deliveries and identifies remedial works, either in the form of physical works or as traffic management interventions that will be required to accommodate the predicted loads. A copy of this report is contained in Appendix 2.2. The use of the Vestas V162 turbine at the site was assessed. Following a review of the components, it is considered that the V162 blade and combination of the mid tower with the width of the base tower represents the largest components for further assessment based on the possible combinations available. Their details are contained in Appendix 2.2.

Turbine blades will be carried on a hybrid trailer to reduce the need for mitigation in constrained sections of the route. Towers will be carried in a 4+7 clamp adaptor style trailer, whereas loads such as the hub, nacelle housing and drive train will be carried on a six axle step frame trailer.

The locations of the above accommodation works are indicated in Figure 2.3. Specific details of the proposed temporary works are presented in the accompanying route assessment report in Appendix 2.2.

14.4.5.1 Existing Utilities and Overhead Lines

All overhead utilities and obstructions will be removed at any locations that the swept path analysis indicated possible conflict and where the lifting trailer is raised, namely at R672 Hickeys Cross road and at the Sweep Crossroads. The removal of overhead utilities will be either temporary disconnections or permanent re-routing. Such works will be carried out by the utility providers in advance of turbine delivery to site.

The permanent re-routing of overhead utilities will result in a temporary disruption to power and telecommunications services for existing residents and business and will also involve temporary road works to 'underground' these services. The location of the rerouting will be agreed with the utility provider.

A traffic management plan will be agreed with Waterford County Council in advance of any such works. Any trenching and road reinstatement works associated with utility diversions will be subject to a road opening license and is expected to be carried out in such a way as to ensure one lane of traffic will be open to traffic at all times. Such works will be carried out over a number of days (estimated 1 day per service).

However, if the permanent re-routing of overhead utilities is not possible, 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 carried out before the first turbine deliveries.

The schedule of turbine component deliveries will be determined by the turbine supplier however it is reasonable and worst case to assume that five 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 5 months. This is based on a total of 7 no. loads per turbine to deliver blades, tower sections and nacelles, with each convoy consisting of components for two turbines at a time. Over the course of the 5 -month installation period, it has been assumed convoys will be scheduled to deliver components to site every 4 weeks. It is reasonable to assume a worst-case scenario where temporary disconnections will be required during off peak times, on five different occasions over the course of five months (approximately once every month) to facilitate convoys, with a duration of several hours between disconnection and re-connection of services on each occasion. The impact on residents and businesses is assessed in Chapter 6, Population, Human Health and Chapter 17 Material Assets.

Temporary disconnections of overhead utilities will result in a significantly greater impact on local residents and businesses in terms of disruption to services than permanent diversions. It will also result in greater disruptions to traffic flows as the delivery of components through the town on each occasion will take slightly longer due to additional temporary works each time.

At TDR nodes where it has been identified that relocation of existing utilities is required to facilitate the temporary accommodation requirements, all such works will be carried out in advance of the formation of groundworks associated with the creation of new load bearing surfaces and all such activities will take place within the immediate vicinity of the proposed TDR node areas assessed in this EIAR.

14.4.5.2 Existing Structures Along TDR

There are a number of existing watercourse crossing structures along the turbine delivery route that will be crossed by the proposed oversized loads associated with the delivery of turbine components.

The Route Survey Report (RSR) identifies the key issues associated with AIL deliveries and identifies remedial works, either in the form of physical works, vehicle modifications or traffic management interventions that will be required to accommodate the predicted loads. Vehicle modifications including suspension raises and increased ground clearance at vertical constraint locations are identified at the Sweep Crossroads (POI 18). No structural reinforcement of existing structures is predicted to be required to facilitate the delivery of the proposed loads along the TDR.

The Preliminary Traffic Management Plan which can be found in Appendix 2.1 – Construction Environmental Management Plan (Appendix A thereof) contains a report detailing a locations of potential passing bays along the TDR and haul routes carried out from the local road L-5119 to the undesignated local road at the proposed wind farm site entrance.

14.5 Assessment of Likely Significant Effects

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.

14.5.1 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.

14.5.2 Construction

14.5.2.1 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.

Tree felling will be required as part of the project. Felling of coniferous forestry is required at the site entrance and at the first 1.2km of internal access road through Coillte forestry to accommodate the delivery and construction of some turbines, hardstands, crane pads, temporary compounds, borrow pits, access tracks and the proposed onsite substation.

For the purposes of assessing worst case, it has been assumed that clearance felling for the project will take place at the start of the construction programme in advance of the commencement of the main balance of plant construction works. HGV's associated with the felling works will approach and leave the site via the routes identified in Figure 14.3.

It is likely that significant areas will be felled in advance of the commencement of wind farm construction. Haul routes used for felling activities will generally be the same as those identified for the project construction.

Felling of 5.4 ha of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of turbines, hardstands, crane pads, temporary compounds, borrow pits, access tracks and the proposed onsite substation.

The following sawmills are located in the vicinity of the proposed development:

- Trihy Sawmills LTD, Grange, Co. Waterford;
- Sheehan Patrick Sawmills Ltd, Ballyporeen, Co. Tipperary;
- Pollards Sawmills, Clonmel, Co. Tipperary;
- Richard White Sawmills Limited, Blue Hill, Co. Kilkenny;
- Murphy Sawmill, Enniscorthy, Co. Wexford;
- Forristal Sawmill, Thomastown, Co. Kilkenny;

All of the above sawmills are located close to motorways and national routes and area easily accessible from the project transport routes.

The construction of the permanent met mast will be carried out by a small crew and the following mobile plant:

- Low-loader
- Flatbed trucks
- Works Van
- Telescopic Handler
- Mobile Crane

Access to the mast location will be via a separate entrance and access track south of the wind farm site and forestry road network as shown in the layout plans.

Construction of the met mast will take place over a number of days. Construction traffic will consist of a small number of truck movements for delivery of mast sections and construction plant and crew.

14.5.2.2 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 2.4.

Construction Traffic Related Impacts

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 12 months on the assumption that an average of 75m of cable is installed each day. These works will lead to additional traffic associated with the cable route construction.

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.

Off-line sections of the proposed grid connection through private lands will not generate an impact to existing 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.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.

14.5.2.3 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 Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised. As described in Section 14.4, accommodation works are required along the turbine delivery route such as hedge or tree cutting, removal of wall sections, street furniture, vegetation, fences, temporary culverting of ditches and stream crossings, relocation of powerlines/poles, lampposts, signage and temporary local road widening through the laying of compacted load bearing aggregate to verges and roundabouts.

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.

14.5.3 Operation

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 substations have been designed in accordance with network operator requirements with welfare facilities. However, they will not require full time operational staff and will 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 requirements.

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.

14.5.4 Decommissioning

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process.

The foundation pedestals will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust.

It is proposed that all the internal site access tracks and turbine hard standings will be left in place. These will continue to be used for recreation, forestry and agriculture. Turbine hardstandings will be covered over with topsoil previously stripped and used for landscaping purposes during the construction stage and left to revegetate naturally. The recreational trails and associated signage will be left in situ.

The temporary accommodation requirements along the TDR will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs.

Grid connection infrastructure including the on-site substation and ancillary electrical equipment will form part of the national grid and will be left in situ.

It is expected that the decommissioning phase will take no longer than 6 months to complete.

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 2 of this EIAR.

14.6 Impact Assessment

14.6.1 Construction

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 done 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 8m^3 of concrete;
- An average tipper truck carries approximately 10m^3 of soil/rock/aggregate;
- A construction period of 18 - 24 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, an 18-month construction programme has been assumed here;
- It has been assumed that cable trenching works associated with the construction of the grid connection, which is expected to take 12 months to complete, will be carried out in parallel with the wind farm construction;
- 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 aggregates will be imported from local quarries. More detail on material volumes can be found in Chapter 11.
- An average of 1m of engineering fill will be imported for the formation of wind turbine foundations per turbine;

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
- Offsite substation
- Grid connection cable works
- Private electrical network.
- Landscaping, reinstatement, demobilisation.

Table 14-8 and Image 14-1 show construction stage vehicle trips and their distribution across the 24-month construction programme for the entire project.

Table 14-8: 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	13	14	15	16	17	18	19	20	21	22	23	24
Total Trips per month	43629	1607	1607	1524	1524	1548	1548	2080	2383	2383	2239	2257	2793	2200	1962	1962	1962	1795	1760	1593	1593	1593	1426	1446	843
Total HGV Trips per month (x2)	19441	800	800	718	718	741	741	790	1093	1093	949	967	1342	1233	995	995	995	828	793	626	626	626	458	478	37
Total LGV Trips per month (x2.5)	24188	806	806	806	806	806	806	1290	1290	1290	1290	1290	1451	968	968	968	968	968	968	968	968	968	968	968	806
Total Trips Per Week	10146	374	374	354	354	360	360	484	554	554	521	525	650	512	456	456	456	417	409	370	370	370	332	336	196

Activity	One-Way Movements	Month																						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Total HGV Trips Per Week	4521	186	186	167	167	172	172	184	254	254	221	225	312	287	231	231	231	192	184	145	145	145	107	111	9
Total LGV Trips Per Week	5625	188	188	188	188	188	188	300	300	300	300	300	338	225	225	225	225	225	225	225	225	225	225	225	188
Total Trips Per Day	1691	62	62	59	59	60	60	81	92	92	87	87	108	85	76	76	76	70	68	62	62	62	55	56	33
HGV Trips Per Day	754	31	31	28	28	29	29	31	42	42	37	37	52	48	39	39	39	32	31	24	24	24	18	19	1
LGV Trips Per Day	938	31	31	31	31	31	31	50	50	50	50	50	56	38	38	38	38	38	38	38	38	38	38	38	31
Total Trips Per Hour	169	6	6	6	6	6	6	8	9	9	9	9	11	9	8	8	8	7	7	6	6	6	6	6	3

Activity	One-Way Movements	Month																						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Total HGV Trips Per Hour	75	3	3	3	3	3	3	3	4	4	4	4	5	5	4	4	4	3	3	2	2	2	2	2	0
Total LGV Trips Per Hour	94	3	3	3	3	3	3	5	5	5	5	5	6	4	4	4	4	4	4	4	4	4	4	4	3

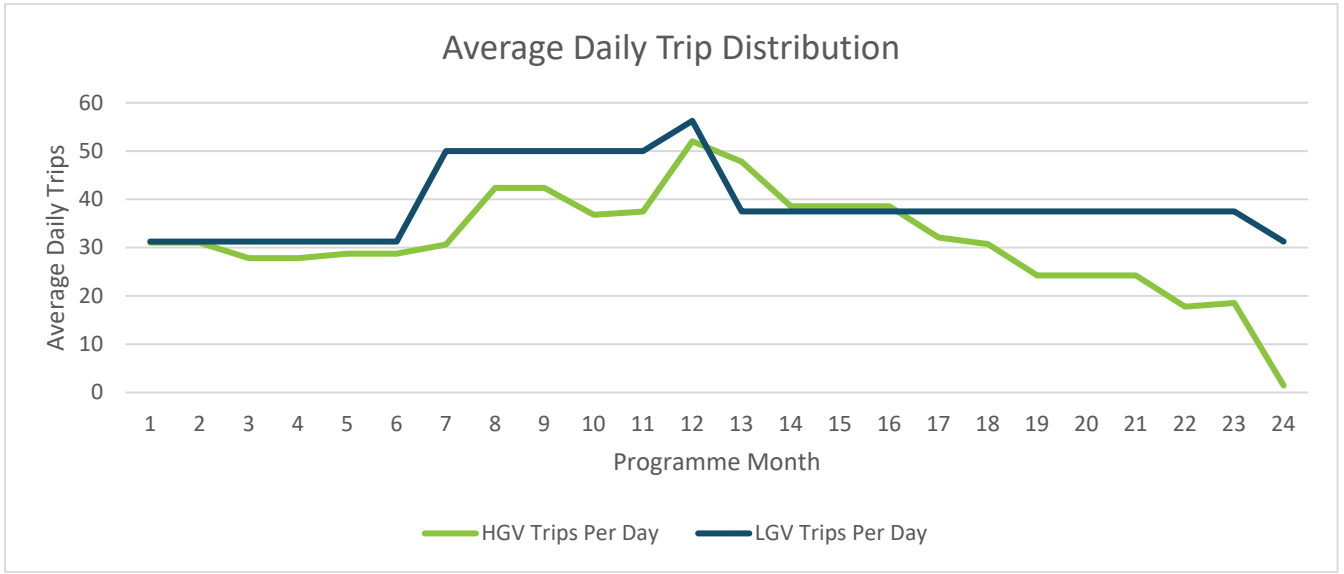

Image 14-1: Average Daily Trip Distribution – Project Including Grid Connection Cable Work

The construction phase for the Proposed Development will lead to 42,742 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 92 HGV trips per day over a construction period of 24 months. This increases to an average of 195 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 44 trips per day on average rising to 56 trips during peak construction periods which occur for LGV traffic during months 6 and 7.

The combined HGV and LGV average daily increase is 161 trips per day throughout the construction programme.

The predicted AADT during the construction phase of the proposed project is presented in Table 14-9. The impact on predicted future traffic on the surrounding road network is also presented in this table.

Table 14-9: Predicted AADT with Average Daily Construction Phase Traffic

Location	Predicted AADT During Construction (Estimated Site Start 2026)	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
N25 - TMU N25 090.0 W N25 Between Waterford City and Dungarvan, Kilmacthomas, Co. Waterford	11,337	873	29	902	3.3%	10,464	31	10,495	0.30%	60	11,397	0.53%
N72 - TMU N72 160.0 W N72 Between Dungarvan and Cappoquin, west of R671 Jn, Co. Waterford	5,323	257	29	285	11.2%	5,066	31	5,097	0.62%	60	5,383	1.13%
R672	3,293	139	29	168	20.6%	3,153	31	3,185	0.99%	60	3,353	1.82%
Unclassified Local Road, Seapark, Co. Waterford (Google Maps Ref: 52.253040, -7.662433)	32	1	29	30	2410.1%	30	31	62	102.54%	60	92	189.41%
Unclassified Local Road, Knockarana, Co. Waterford (Google Maps Ref: 52.172295, -7.704772)	102	8	29	37	344.3%	94	31	125	33.38%	60	162	58.83%
Unclassified Local Road, Ballyconnery, Co. Waterford (Google Maps Ref: 52.126696, -7.671200)	87	4	29	32	803.4%	84	31	115	37.29%	60	147	68.64%

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 standing and foundation construction, turbine installation, on-site substation construction, grid connection cable works and internal electrical works.

It should be noted that the traffic increases presented include all construction stage traffic associated with the project including the grid connection cable works, and therefore represents an absolute worst-case. In reality, traffic impact on roads associated with the grid connection route will be considerably less than shown here due to the nature of grid connection cable works which are spread over a distance of approximately 22.5km of public roadway. Additionally, although the percentage increases on the unclassified local road network are quite high as shown in Table 14-9 above, the actual number of HGVs currently using these roads are very low which gives the impression of a significant impact when in reality there is not. The unclassified local road network will continue to operate well within its carrying capacity with the additional construction traffic.

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.

The predicted AADT for the project during peak months of the construction phase of the proposed project is presented Table 14-9.

Table 14-10: Predicted AADT with Peak Construction Phase Traffic

Location	Predicted AADT During Construction (Estimated Site Start 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development during Peak Construction Month	Predicted HGV Daily Trips During Peak Construction Month	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development during 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
N25 - TMU N25 090.0 W N25 Between Waterford City and Dungarvan, Kilmacthomas, Co. Waterford	11,337	873	30	903	3.5%	10,464	38	10,501	0.36%	68	11,404	0.60%
N72 - TMU N72 160.0 W N72 Between Dungarvan and Cappoquin, west of R671 Jn, Co. Waterford	5,323	257	30	287	11.7%	5,066	38	5,104	0.74%	68	5,391	1.27%
R672	3,293	139	30	170	21.6%	3,153	38	3,191	1.19%	68	3,360	2.05%
Unclassified Local Road, Seapark, Co. Waterford	32	1	30	31	2527.9%	30	38	68	123.04%	68	99	213.58%
Unclassified Local Road, Knockarana, Co. Waterford	102	8	30	38	361.1%	94	38	131	40.06%	68	170	66.34%
Unclassified Local Road, Ballyconnery, Co. Waterford	87	4	30	34	842.6%	84	38	121	44.74%	68	155	77.40%

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

14.6.1.1 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 14-11 and Image 14-2.

Table 14-11: 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	13	14	15	16	17	18	19	20	21	22	23	24
Mobilisation and site setup	132	66	66																						
Site clearance and felling	913	228	228	228	228																				
Internal access tracks	975	97	97	122	122	146	146	171	24	24	24														
Turbine hard standings	1151					216	216	216	144	144	72	72	72												
Turbine foundations	2219								370	370	370	370	370	370											
TDR Accomodation works	33											33													
Turbine Installation	87													17	17	17	17	17							
Onsite substation	424												35	35	35	35	35	35	35	35	35	35	35	35	
Private electrical network	1337														251	251	251	167	167	84	84	84			
Site Maintenance	206	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Landscape & Demobilisation	20																							10	10
Site staff	8901	323	323	323	323	323	323	516	516	516	516	516	516	323	323	323	323	323	323	323	323	323	323	323	323
Total Trips per month	37247	1607	1607	1524	1524	1548	1548	2080	2383	2383	2239	2257	2261	1669	1430	1430	1430	1263	1228	1061	1061	1061	894	914	843
Total HGV Trips per month (x2)	14995	800	800	718	718	741	741	790	1093	1093	949	967	971	862	624	624	624	457	422	255	255	255	88	108	37

Activity	One-Way Movements	Month																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Total LGV Trips per month (x2.5)	22253	806	806	806	806	806	806	1290	1290	1290	1290	1290	1290	806	806	806	806	806	806	806	806	806	806	806	806
Total Trips Per Week	8662	374	374	354	354	360	360	484	554	554	521	525	526	388	333	333	333	294	286	247	247	247	208	213	196
Total HGV Trips Per Week	3487	186	186	167	167	172	172	184	254	254	221	225	226	201	145	145	145	106	98	59	59	59	20	25	9
Total LGV Trips Per Week	5175	188	188	188	188	188	188	300	300	300	300	300	300	188	188	188	188	188	188	188	188	188	188	188	188
Total Trips Per Day	1443.7	62	62	59	59	60	60	81	92	92	87	87	88	65	55	55	55	49	48	41	41	41	35	35	33
HGV Trips Per Day	581.2	31	31	28	28	29	29	31	42	42	37	37	38	33	24	24	24	18	16	10	10	10	3	4	1
LGV Trips Per Day	862.5	31	31	31	31	31	31	50	50	50	50	50	50	31	31	31	31	31	31	31	31	31	31	31	31
Total Trips Per Hour	144.4	6	6	6	6	6	6	8	9	9	9	9	9	6	6	6	6	5	5	4	4	4	3	4	3
Total HGV Trips Per Hour	58.1	3	3	3	3	3	3	3	4	4	4	4	4	3	2	2	2	2	2	1	1	1	0	0	0
Total LGV Trips Per Hour	86.3	3	3	3	3	3	3	5	5	5	5	5	5	3	3	3	3	3	3	3	3	3	3	3	3

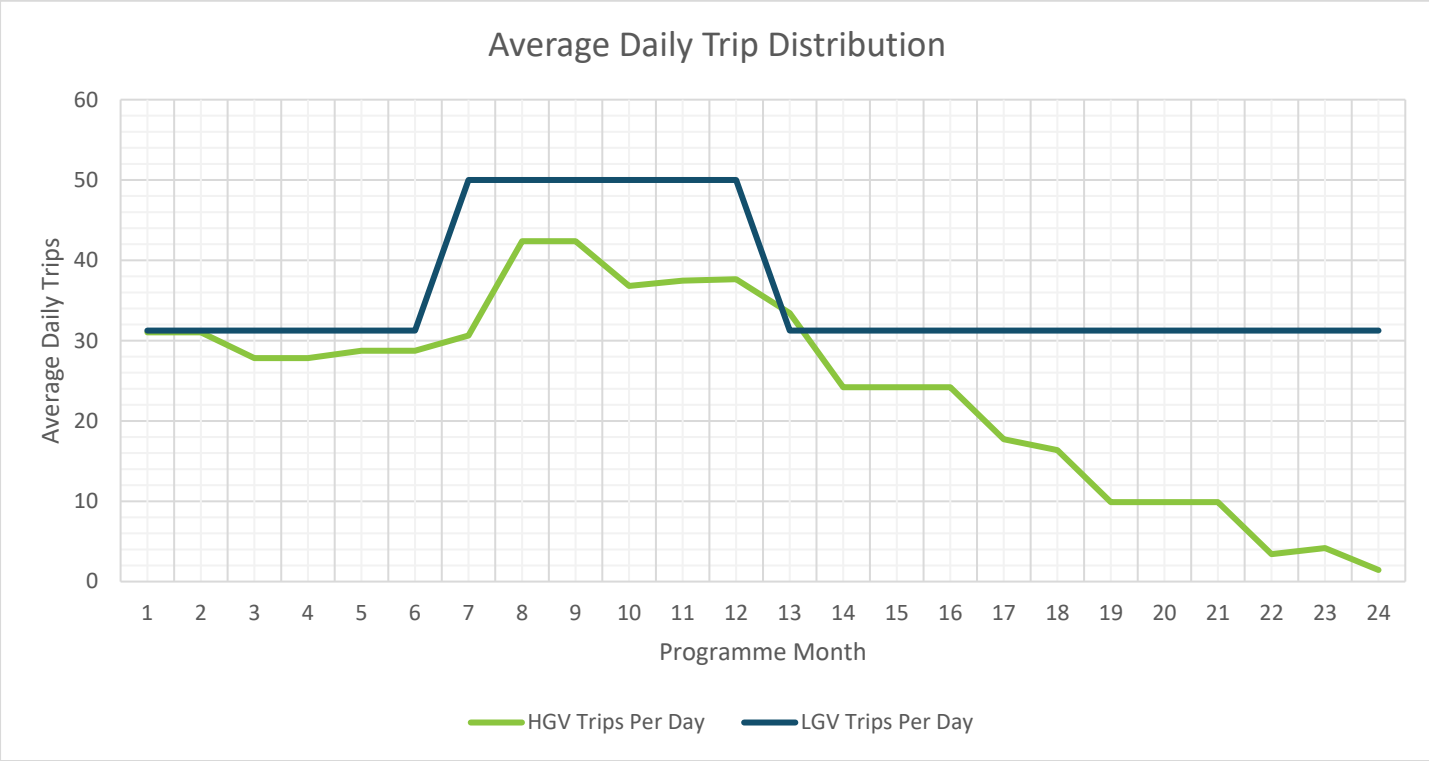

Image 14-2: Average Daily Trip Distribution - Project Excluding Grid Connection Cable Works

It is estimated that the construction phase for the main wind farm site will lead to 14,995 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 30 HGV trips over the course of the construction programme. The peak months for HGV trips occur in months 8 and 9 where average daily HGV trips rise to 42.

An average workforce of 25 persons is anticipated, increasing to 40 persons during peak periods. This is calculated to give rise to an average daily increase of 38 LGV trips per day over a construction period of 24 months. The peak months for LGV trips occurs in months 7 to 12 inclusive where average daily LGV trips rise to 50.

The combined HGV and LGV average daily increase for the wind farm site excluding grid connection works is 68 trips per day throughout the construction programme.

The predicted AADT during the construction phase of the main wind farm site is presented inTable 14-12. The impact on predicted future traffic on the surrounding road network is also presented in this table.

Table 14-12: Predicted AADT with Construction Phase Traffic - Main Wind Farm Site Only

Location	Predicted AADT During Construction (Estimated Site Start 2026)	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
N25 - TMU N25 090.0 W N25 Between Waterford City and Dungarvan, Kilmacthomas, Co. Waterford	11,337	873	30	903	3.5%	10,464	38	10,501	0.36%	68	11,404	0.60%
N72 - TMU N72 160.0 W N72 Between Dungarvan and Cappoquin, west of R671 Jn, Co. Waterford	5,323	257	30	287	11.7%	5,066	38	5,104	0.74%	68	5,391	1.27%
R672	3,293	139	30	170	21.6%	3,153	38	3,191	1.19%	68	3,360	2.05%
Unclassified Local Road, Seapark, Co. Waterford	32	1	30	31	2527.9%	30	38	68	123.04%	68	99	213.58%
Unclassified Local Road, Knockarana, Co. Waterford	102	8	30	38	361.1%	94	38	131	40.06%	68	170	66.34%
Unclassified Local Road, Ballyconnery, Co. Waterford	87	4	30	34	842.6%	84	38	121	44.74%	68	155	77.40%

The works will result in a less than 1% temporary increase in traffic volumes on the N25 and approximately a 1.3% increase in traffic volumes on the N72. These roads form part of the TDR and haul routes for the construction of the project. A section of the N72 forms part of the proposed grid connection cable route.

The R672 and unclassified local roads near Seapark, Knockarana, and Ballyconnery will see a more significant temporary increase in traffic volumes over the course of the construction phase of ca. 2.05%, 214%, 66% and 77% respectively according to the table. These regional and local roads from part of the TDR, GCR and construction haul routes. The percentage increases on the unclassified local road network are quite high as shown in the tables above, however, the actual number of HGVs currently using these roads are very low which gives the impression of a significant impact when in reality there is not. The unclassified local road network will continue to operate well within its carrying capacity with the additional construction traffic.

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 moderate in significance without appropriate mitigation.

14.6.1.2 Grid Connection

The volume and distribution of vehicle trips generated by the construction of the grid connection cable works are presented in Table 14-13 and Image 14-3.

Table 14-13: Vehicle Trip Distribution - Grid Connection Cable Work

Activity	One-Way Movements	Month																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Grid connection cable works	2223	0	0	0	0	0	0	0	0	0	0	0	185	185	185	185	185	185	185	185	185	185	185	185	0
Site staff	774	0	0	0	0	0	0	0	0	0	0	0	65	65	65	65	65	65	65	65	65	65	65	65	0
Total Trips per month	6382	0	0	0	0	0	0	0	0	0	0	0	532	532	532	532	532	532	532	532	5032	532	532	532	0
Total HGV Trips per month (x2)	4447	0	0	0	0	0	0	0	0	0	0	0	371	371	371	371	371	371	371	371	371	371	371	371	0
Total LGV Trips per month (x2.5)	1935	0	0	0	0	0	0	0	0	0	0	0	161	161	161	161	161	161	161	161	161	161	161	161	0
Total Trips Per Week	1484	0	0	0	0	0	0	0	0	0	0	0	124	124	124	124	124	124	124	124	124	124	124	124	0
Total HGV Trips Per Week	1034	0	0	0	0	0	0	0	0	0	0	0	86	86	86	86	86	86	86	86	86	86	86	86	0
Total LGV Trips Per Week	450	0	0	0	0	0	0	0	0	0	0	0	38	38	38	38	38	38	38	38	38	38	38	38	0
Total Trips Per Day	247	0	0	0	0	0	0	0	0	0	0	0	21	21	21	21	21	21	21	21	21	21	21	21	0
HGV Trips Per Day	172	0	0	0	0	0	0	0	0	0	0	0	14	14	14	14	14	14	14	14	14	14	14	14	0

Activity	One-Way Movements	Month																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
LGV Trips Per Day	75	0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6	0
Total Trips Per Hour	25	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	0
Total HGV Trips Per Hour	17	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
Total LGV Trips Per Hour	8	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0

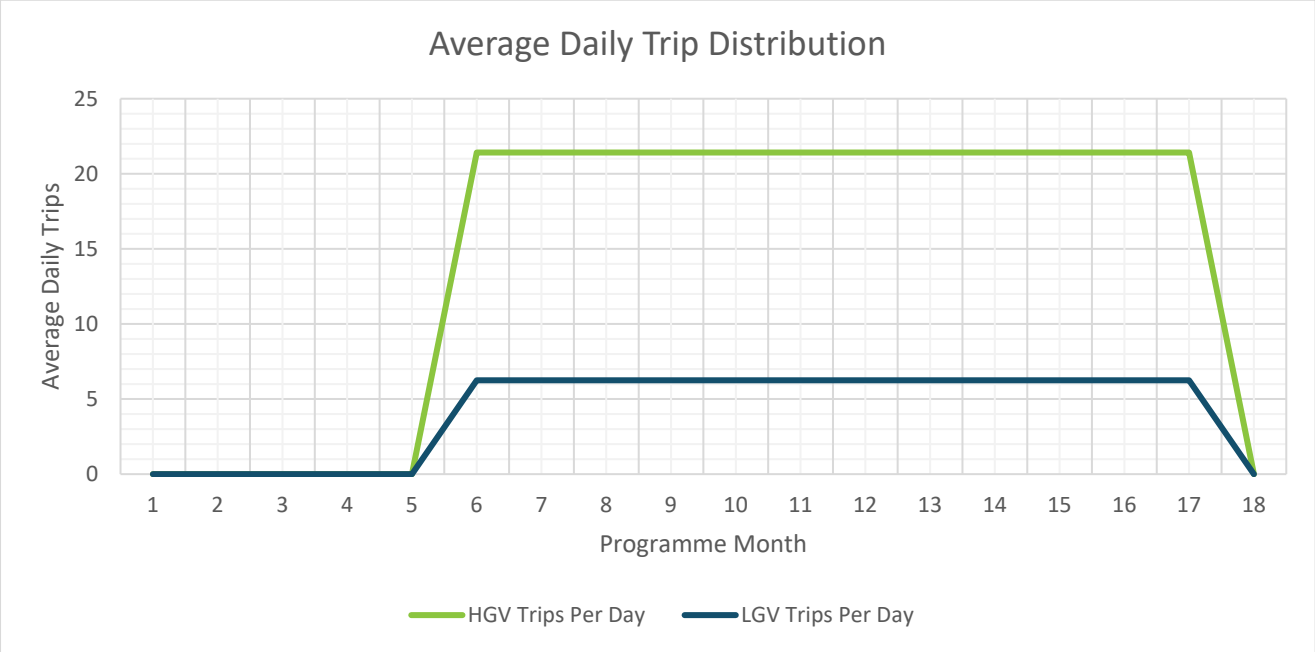

Image 14-3: Average Daily Trip Distribution - Grid Connection Cable Works

It is estimated that the construction phase for the grid connection cable works will lead to 6,382 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 7 HGV trips per day over the course of the construction programme. The pattern of HGV trips will remain relatively steady throughout the construction works and does not exceed 14 HGV trips per day on average over an 24-month duration.

The workforce associated with this activity is expected to give rise to an average daily increase of 3 LGV trips per day over the course of the construction programme. The pattern of LGV trips will remain relatively steady throughout the construction works and does not exceed 6 LGV trips per day on average over a 24-month duration.

The combined HGV and LGV average daily increase is 10 trips per day and does not exceed 21 trips per day throughout the construction programme.

As described in Section 14.5.2.2, 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. In such a scenario, as each of the works areas would be isolated from each other, the impacts associated with the works at each location would be as described above for that locality and would not act cumulatively with each other.

The predicted AADT during the construction phase of the grid connection cable works is presented in Table 14-14. The impact on predicted future traffic on the surrounding road network is also presented in this table.

Table 14-14: Predicted AADT with Construction Phase Traffic – Grid Connection Cable Works

Location	Predicted AADT During Construction (Estimated Site Start 2026)	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
N72 - TMU N72 160.0 W N72 Between Dungarvan and Cappoquin, west of R671 Jn, Co. Waterford	5,323	257	7	264	2.8%	5,066	3	5,069	0.06%	10	5,333	0.19%
R672	3,293	139	7	147	5.1%	3,153	3	3,156	0.10%	10	3,303	0.31%
Unclassified Local Road, Seapark, Co. Waterford	32	1	7	8	602.3%	30	3	34	10.25%	10	42	32.54%
Unclassified Local Road, Knockarana, Co. Waterford	102	8	7	16	86.0%	94	3	97	3.34%	10	112	10.11%

The works will result in a less than 0.5% temporary increase in total traffic volumes on the N72 and R672. These roads form part of the TDR, GCR and haul routes for the construction of the project.

The unclassified local roads near Seapark and Knockarana which are representative of the local roads along which the grid connection cable route, turbine delivery and haul routes will see a higher temporary increase in traffic volumes over the course of the construction phase of ca. 33% and 10% respectively according to the table for reasons previously stated. 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 1 no. trip per hour and is not expected to exceed 2 no. trips per hour throughout the duration of the works.

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

14.6.1.3 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.

It has been assumed that all turbine blades will be carried on a hybrid trailer to reduce the need for mitigation in constrained sections of the route. Where constraints are significant, it is possible to raise the scissor lift to a maximum of 10m in height. This allows loads to be either lifted over height constraints and to reduce the overall swept path of the delivery vehicle. The turbine blades will be transported in the flat position for the majority of the delivery route.

Overhead utilities and obstructions will need to be removed at any locations that the blade is raised on the scissor lift. The removal of overhead utilities will be either temporary disconnections or permanent re-routing. Such works will be carried out by the utility providers in advance of turbine delivery to site.

The permanent re-routing of overhead utilities will result in a temporary disruption to power and telecommunications services for existing residents and business and will also involve temporary road works to 'underground' these services. In addition, a traffic management plan will be agreed with Waterford County Council in advance of any such works. Any trenching and road reinstatement works associated with utility diversions will be subject to a road opening license and can be carried out in such a way as to ensure one lane of traffic will be open to vehicles on the road at all times. Such works will be carried out over a number of days.

However if the Permanent re-routing of overhead utilities is not possible, 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 carried out 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 5 months.

It is reasonable to assume a worst-case scenario where temporary disconnections will be required during off peak times, on up to five different occasions over the course of five months to facilitate convoys, with a duration of several hours between disconnection and re-connection of services on each occasion.

Temporary disconnections of overhead utilities will result in a significantly greater impact on local residents and businesses in terms of disruption to services than permanent diversions. It will also result in greater disruptions to traffic flows as the delivery of components through the town on each occasion will take slightly longer due to additional temporary works each time.

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.

14.6.2 Operation

The trip generation for the project once operational is anticipated to be minimal as both the wind farm and substations will be operated remotely as described in Section 14.5.3.

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.

14.6.3 Decommissioning

Impacts associated with the decommissioning of the project will be similar in nature to the construction stage but of a much lower magnitude primarily due to the following key reasons:

- Wind farm access tracks will be left in-situ;
- The grid connection will form part of the grid network and will be left in place;
- Wind turbine components will be dismantled on site and can be removed on standard HGV's eliminating the requirement for temporary accommodation requirements needed at construction stage.

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 transmission and distribution system 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.

14.7 Mitigation Measures

14.7.1 Construction

14.7.1.1 Main Wind Farm Site

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

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 Preliminary Traffic Management Plan has been completed and is found in Appendix 2.1 – Construction Environmental Management Plan (Appendix A thereof). The traffic management plan (TMP) will be agreed with the road's authority and An Garda Siochána prior to commencing construction.

14.7.1.2 Grid Connection Works

Mitigation measures that will be implemented in full for the grid connection works include:

Road Opening : 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.

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.

Surface Overlay after Trench Reinstatement: following temporary reinstatement of trenches on public roads, sections of the public roads will receive a full surface overlay. Details will be agreed with the roads authority. At a minimum they will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

14.7.1.3 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 accommodation requirements 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 Siochána. 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 Waterford County Council will be carried out in advance to manage turbine component deliveries.

14.7.2 Operation

Site entrances to the site will be maintained continually to ensure visibility conditions at these entrances has not deteriorated. Hedgerow maintenance will be required periodically to ensure continued visibility at site entrances.

14.7.3 Decommissioning

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

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 wind farm project and no mitigation is required.

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

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

14.8 Residual Impacts

The implementation of mitigation measures outlined in Section 14.7 will ensure that residual impacts are minimised throughout the duration of the proposed activities.

14.8.1 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 to moderate in significance following mitigation.

14.8.2 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 14.5.3, 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.

14.8.3 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 14-15: Summary of Residual Impacts

Phase	Project Element	Main Receiving Environment	Description of Potential Effect		
			Duration	Quality	Significance
Construction	Main Wind Farm Site	R672, L5119 and surrounding local road network	Short-term	Negative/Adverse	Slight
	Turbine Delivery Route	N29, N25, N72, R672, L5119, Unclassified Local Road, Seapark Co. Waterford	Temporary	Negative/Adverse	Slight
	Grid Connection	Local road network along Grid Connection Route, N72, L7001, L5065, R672.	Short-term	Negative/Adverse	Slight to moderate
Operation	Main Wind Farm Site	R672, L5119 and surrounding local road network	Long-term	Neutral	Imperceptible
	Turbine Delivery Route	N29, N25, N72, R672, L5119, Unclassified Local Road Seapark, Co. Waterford	Long-term	Neutral	Imperceptible
	Grid Connection	Local road network along Grid Connection Route, N72, L7001, L5065, R672.	Long-term	Neutral	Imperceptible
Decommissioning	Main Wind Farm Site	N30, N80, L2026 and surrounding local road network	Temporary	Negative/Adverse	Not significant
	Turbine Delivery Route	N29, N25, N72, R672, L5119, Unclassified Local Road Seapark, Co. Waterford	Temporary	Negative/Adverse	Not significant
	Grid Connection	Local road network along Grid Connection Route, N72, L7001, L5065, R672.	N/A	N/A	N/A
Unplanned Events (i.e. Accidents)	Main Wind Farm Site	N30, N80, L2026 and surrounding local road network	Temporary	Negative/Adverse	Not significant - Slight
	Turbine Delivery Route	N29, N25, N72, R672, L5119, Unclassified Local Road Seapark, Co. Waterford	Temporary	Negative/Adverse	Not significant - Slight

Phase	Project Element	Main Receiving Environment	Description of Potential Effect		
			Duration	Quality	Significance
	Grid Connection	Local road network along Grid Connection Route, N72, L7001, L5065, R672.	Temporary	Negative/Adverse	Not significant - Slight

14.9 Cumulative Impacts

All known existing and proposed projects within the cumulative study area of 20km that could potentially generate a cumulative impact with Coumnagappul Wind Farm in relation to traffic and transportation during construction, operation and decommissioning were identified and examined as part of this assessment. Table 14-16 provides details of the projects within the study area that were considered for cumulative impacts.

Table 14-16: Existing and Proposed Projects Assessed for Cumulative Impacts

The existing energy developments and planning applications listed in Table 14-16 below were obtained from a planning search on the Waterford County Council Planning Website, accessed in August 2023. The search included developments lodged within the last 10 years within 20km of the Site.

Wind Farm Name	Number of turbines	Distance and Direction from proposed site	Status
Tierney Single Turbine	1	5.1km west of Site Proximity to proposed main wind farm site.	Operational Privately owned operational (since 2015) single 150 kW turbine (hub height 30 m, tip height 44 m)
Kilnagrance Single Turbine	1	14km east of Site Reason for Assessment Proximity to proposed main wind farm site.	Operational Privately owned (KWT Energy Ltd) operational (since 2016) single turbine with a 60 m tip height
Woodhouse Wind Farm	8	17.2km west of Site Reason for Assessment Proximity to proposed main wind farm site and proposed off-site substation at Dungarvan. Shares sections of TDR and haul route with Coumnagappul WF.	Operational Woodhouse Wind Farm (ESB) is an operational wind farm (since 2015) and was constructed in 2 phases comprising a total of 8 no. wind turbines with a 126 m tip height (45m blade length).
Knocknamona Wind Farm	8	17.6 km west of Site	Permitted

Wind Farm Name	Number of turbines	Distance and Direction from proposed site	Status
		Reason for Assessment Proximity to proposed main wind farm site and proposed off-site substation at Dungarvan. Shares sections of TDR and haul route with Coumnagappul WF.	Was granted permission in September 2022 (PL93.309412) and is located immediately south of the existing Woodhouse Wind Farm. The Knocknamona Wind Farm will comprise 8 no. wind turbines with a 146.3 m tip height.
Dyrick Hill Wind Farm	12	7.9 km southwest of Site Reason for Assessment Proximity to proposed main wind farm site and sharing of TDR, GCR and haul routes.	Proposed (at planning) Proposed private development (EMPower) submitted for planning in June 2020 (Case reference: PA93.317265) comprising a 12-turbine array with a 185m tip height.
Mothel Solar Farm	Solar	14.7km northeast of Site Reason for Assessment Proximity to proposed main wind farm site and sharing of sections of TDR.	Permitted

14.9.1 Proposed Wind Farm, Dyrick Hill, Co. Waterford.

Dyrick Hill Wind Farm (ABP. Ref. 312434) consisting of 12 wind turbines of approximately 7.2MW with combined output of approximately 86.4 MW and associated works. The development is located approximately 15.5km south-west of the Coumnagappul Wind Farm along the public road network which is still at planning stage and is not operational.

The proposed Dyrick Hill Wind Farm shares a common grid connection point at the 110kV Dungarvan substation with Coumnagappul Wind Farm. The proposed Dyrick Hill Wind Farm if constructed will share the grid route for approximately 7.37km, (2.05km) on the L-5068 Local Road and (5.32km) on the R672 regional road. These roads have been assessed and it is considered that these roads have enough space to accommodate the grid connection infrastructure for both wind farm projects.

It is likely the development will be constructed in advance of the Coumnagappul Wind Farm however in the situation where construction works take place at the same time as Coumnagappul Wind Farm, the applicant is committed to phasing significant construction activities to avoid major traffic disruption on the surrounding road network. According to documents submitted to Waterford County Council within the planning application, the development's construction stage is anticipated to take 18-21 months. It is estimated that during civil construction, approximately 5,789 loads will be delivered to the Dyrick Hill Site. This breaks down to approximately 290 loads per month or an average of 3 to 86 loads per day excluding Sundays and bank holidays.

The peak number of deliveries per day will occur during the concrete pour for Turbine Foundation construction. An estimated 50, depending on the capacity of the concrete truck (6 or 7m3), concrete truck deliveries will be required per turbine foundation. Some other materials will also be delivered on such days, a realistic estimation of peak deliveries is approximately 86 deliveries per day (for at least 20 separate days in the construction programme when the Turbine Foundations will be poured). Concrete pours for foundation bases and hardstand areas at the two wind farm projects will be scheduled at different times. The contractor responsible for the Coumnagappul Wind Farm will coordinate with the contractor of the Dyrick Hill Wind Farm to complete shared grid connection works, such as ducting, cabling, joint bay installation, and cable pulling. By doing this simultaneously, they will minimise traffic disruption and reduce the need for additional road openings, restoring normal road capacity efficiently.

Potential negative cumulative effects on the road network are anticipated to have a temporary impact and moderate in significance during the construction phase.

The wind farm does not generate any perceptible levels of traffic during operation as it is remotely operated. In the highly unlikely event of a significant turbine component replacement during the Coumnagappul Wind Farm operational phase, this will involve a small number of HGV trips and potential abnormal load deliveries along the TDR route over a short period of time.

It is considered that no cumulative impact will be created as a result of this development during the operation or decommissioning phases of the Coumnagappul Wind Farm.

14.9.2 Operational Wind Farm, Woodhouse, Co. Waterford.

Woodhouse Wind Farm (WCC. Ref. 041788) consists of 8 wind turbines of approximately 2.75MW with combined output of approximately 22 MW and associated works. The development is located approximately 23km south of the Coumnagappul Wind Farm along the public road network. The wind turbines comprise towers up to 80 metres high, with a diameter of about 4 metres at the base. Three blades of up to 45 to 46 metres length will be attached.

This wind farm has been operational for several years and will not be decommissioned during either the construction stage or decommissioning stage of Coumnagappul Wind Farm, should it be granted planning permission.

It is considered that no cumulative impact will be created as a result of this development during the operation or decommissioning phases of the Wind Farm.

14.9.3 Permitted Wind Farm, Knocknamona, Co. Waterford.

Knocknamona Wind Farm (Planning Ref: 14/600109/ PL93.244006) is located approximately 23km South of the Coumnagappul Wind Farm along the public road network. Site. The development, consisting of 8 no. wind turbines will have an estimated combined output of approximately 34 MW. The overall height of the wind turbine generators is up to 126 metres. It is proposed that 1 no. meteorological mast measuring up to 99 metres in height will record wind and weather conditions at the site. The access roads, substation compound, electrical equipment, control building and ancillary site works are permitted but not yet operational.

It is likely the development will be constructed in advance of the Coumnagappul Wind Farm however in the situation where construction works take place at the same time as Coumnagappul Wind Farm, the applicant is committed to phasing significant construction activities to avoid major traffic disruption on the surrounding road network. According to documents submitted to Waterford County Council within the planning application, the development's construction stage is anticipated to take 18-21 months. It is estimated that during civil construction, approximately 5,789 loads will be delivered to the Dyrick Hill Site. This breaks down to approximately 290 loads per month or an average of 3 to 86 loads per day excluding Sundays and bank holidays.

The peak number of deliveries per day will occur during the concrete pour for Turbine Foundation construction. An estimated 50, depending on the capacity of the concrete truck (6 or 7m3), concrete truck deliveries will be required per turbine foundation. Some other materials will also be delivered on such days, a realistic estimation of peak deliveries is approximately 86 deliveries per day (for at least 20 separate days in the construction programme when the Turbine Foundations will be poured). Concrete pours for foundation bases and hardstand areas at the two wind farm projects will be scheduled at different times. The contractor responsible for the Coumnagappul Wind Farm will coordinate with the contractor of the Dyrick Hill Wind Farm to complete shared grid connection works, such as ducting, cabling, joint bay installation, and cable pulling. By doing this simultaneously, they will minimise traffic disruption and reduce the need for additional road openings, restoring normal road capacity efficiently.

Potential negative cumulative effects on the road network are anticipated to have a temporary impact and moderate in significance during the construction phase.

The wind farm does not generate any perceptible levels of traffic during operation as it is remotely operated. In the highly unlikely event of a significant turbine component replacement during the Coumnagappul Wind Farm operational phase, this will involve a small number of HGV trips and potential abnormal load deliveries along the TDR route over a short period of time.

It is considered that no cumulative impact will be created as a result of this development during the operation or decommissioning phases of the Coumnagappul Wind Farm.

14.9.4 Solar PV Development at Mothel, Co. Wateford

A planning application has been submitted for a solar farm of up to 30 megawatt (MW) (Planning Ref. 19183 and PL93.304651) located at two sites approximately 14.7km North-East of the site in Curraghduff townland (northern parcel) and in Mothel townland (southern parcel) comprising of: photovoltaic panels on ground mounted steel frames on an area of approximately 145,000 square meters, up to 24 no. battery storage containers, up to 4 no. inverter / transformer stations, one storage container, new site access, temporary construction compound / material storage area in northern parcel; photovoltaic panels on ground mounted steel frames on an area of approximately 50,000 square meters, up to 2 no. inverter / transformer stations, one storage container, new site access and temporary construction compound / material storage area in southern parcel; and underground cables and ducts, perimeter fencing and access gates, CCTV and all ancillary development services and work. Permission sought for a period of ten years and 30 year operational life from the date of commissioning of the solar farm.

Negative or adverse effects from the cumulative impact of this project in combination with the Coumnagappul Wind Farm project on the receiving environment associated with these activities coinciding is considered to be temporary in duration and moderate to significant without adequate mitigation. The construction programmes for these developments will be agreed between the developers and the planning authority to ensure no significant cumulative effects. In each case, trenching works will be subject to a road opening license and traffic management plan agreed with Waterford County Council.

14.9.5 Operational Single Turbine Development, Tierney, Co. Waterford

The closest existing and permitted wind developments is the Tierney Wind farm (Planning Ref. 13465) consisting of one single 150kW turbine with the construction of a site access track and all ancillary works located approx. 5.1km west of the proposed site operating since 2015.

14.10 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 will be reduced and are not expected to exceed 'slight to moderate' 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 2-1 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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