14.0 Traffic and Transportation

14.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the Traffic and Transport impacts of the proposed Keerglen Wind Farm development. The haulage of abnormal loads and the underground electricity export connection works, to be included in a separate future planning application, are considered in this chapter also. It considers the development's whole lifecycle including construction, operation and decommissioning phases of the project. This chapter was informed by desktop studies, site visits and discussions with Mayo County Council. It was produced in accordance with the requirements of Local Government policies and design guides.

14.2 Statement of Competence

Roughan and O'Donovan (ROD) is a leading provider of transport planning services, including traffic and transport assessments, traffic modelling analysis and traffic engineering design. This EIAR chapter was prepared by John Ahern (B.A.I.) who is a Chartered Engineer with over 14 years' experience in the traffic and transportation design industry.

14.3 Methodology

14.3.1 General Methodology Approach

In order to predict and quantify the impacts that would result from the proposed wind farm on the road and traffic network this assessment has considered:-

- Methodology – highlighting the assessment criteria and methodology adopted to assess the significance level of individual and cumulative impacts;
- Description of the Baseline Environment – a review of existing traffic and road characteristics and trends, including the nature of the affected roads and the existing traffic levels;
- Statement of Potential Impacts - an assessment of the impact of the development proposal against the baseline conditions;
- Mitigation and Monitoring Measures – details of any proposed mitigation measures to be incorporated into the proposed wind farm that would be implemented to avoid any significant impacts; and
- Residual Effects – a summary of the residual effects of the development post mitigation implementation.

14.3.2 Significance Criteria

Quantifying the environmental impacts of traffic from a proposed wind farm depends on several key factors. The main factors influencing the significance of an impact relate to the magnitude of change, taking into account the time frame of change and the number and sensitivity of any receptors in the area of interest. For traffic and transportation this can be reviewed in terms of the percentage change in traffic volumes, which is discussed further below.

Roads and streets forming the access routes are considered receptors in this Chapter, particularly when determining the delivery routing of construction materials. The sensitivity of a receptor is based on the relative importance of the receptor using Negligible, Low, Medium and High as a gauge.

The significance levels, Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant and Profound are determined by the magnitude of change along with the sensitivity of receptors to assess the impact of the proposed wind farm. Once the significance of the impact is understood, the correct level of assessment can be undertaken, and appropriate mitigation identified.

14.3.3 Policy Context and Percentage Impact Thresholds for Assessment

The assessment was undertaken following consultation by the Environmental Assessment team with Mayo County Council and Transport Infrastructure Ireland (TII) with reference to the following documents:

- 'Transport Infrastructure Ireland (TII) 'Traffic and Transport Guidelines' (PE-PDV-02045);
- 'TII Publication 'Road Safety Audit Guidelines' (GE-STY-01027); and
- TII Publications Design Standards.

Due to the strategic role of national roads and the need to ensure that the carrying capacity, efficiency and safety of the network is maintained, TII's Traffic and Transport Guidelines (PE-PDV-02045) considers thresholds at which the production of a Traffic and Transport Assessment in relation to planning applications affecting national roads is recommended. The threshold relevant to the subject development are:

- "Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road"
- "Development traffic exceeds 10% of turning movements at junctions with and on National Roads."
- "Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive".

It is important to note that impacts above this level do not suggest that there is a significant impact, only that further consideration is required.

14.4 Description of the Baseline Environment

14.4.1 Overview

A map of the surrounding road network is provided in Figure 14.1. The site is located to the west of the R315 regional road approximately 3.5km south of Ballycastle and 17km north of Crossmolina. The site is accessed from the R315 via a minor local access road L51723.

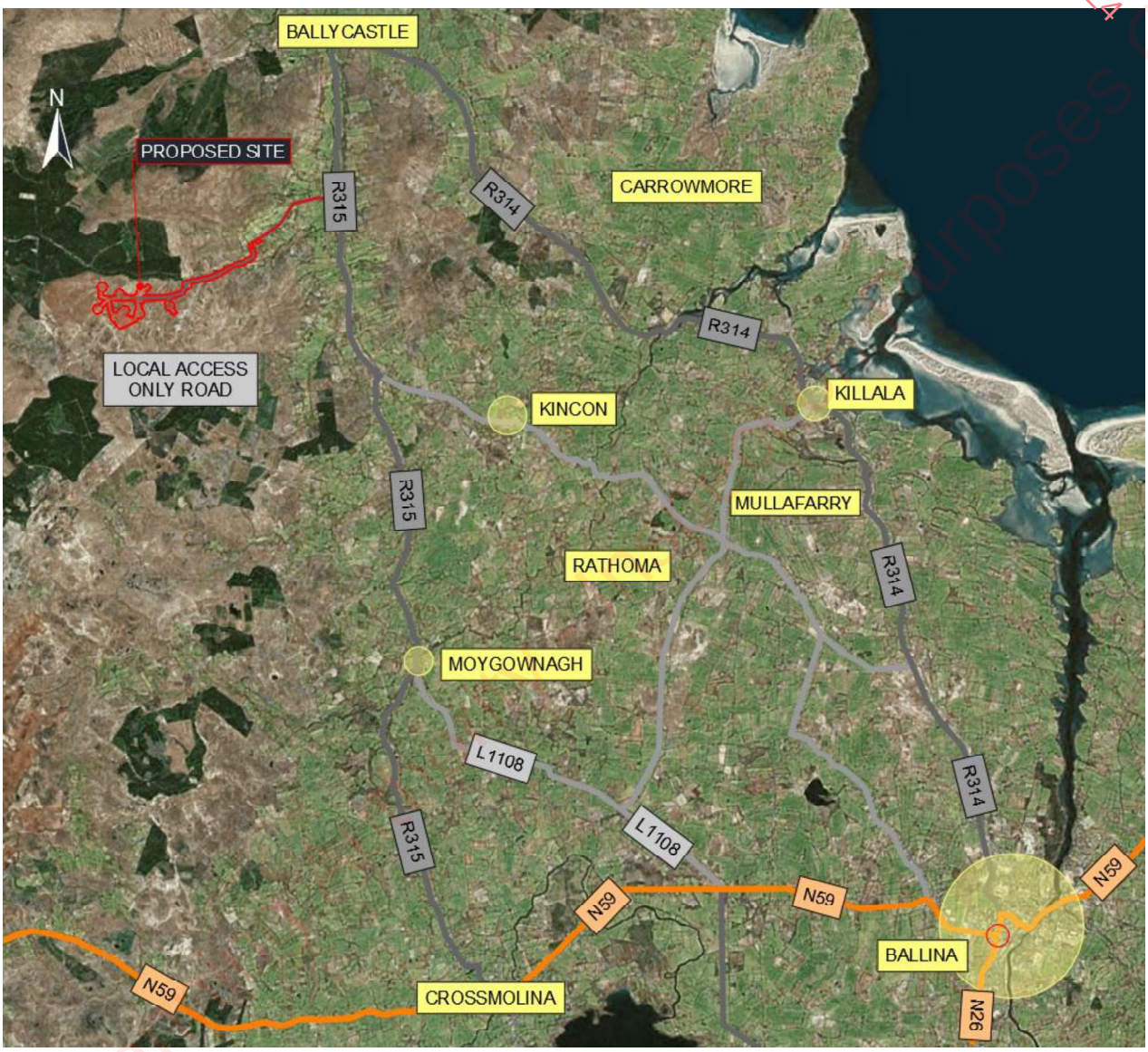

Figure 14.1: Surrounding Road Network

14.4.2 Haulage Route

As with all developments of this nature, the majority of trips generated by the development will occur during the construction phase with the delivery of bulk construction materials such as crushed rock, concrete and steel reinforcement bar.

It is anticipated that majority of bulk materials will be delivered from the south via the N59 and R315 through Crossmolina and Moygownagh. Medium to high sensitive receptors along the route include the L51723 local access road providing access to the proposed site, the R315 though Moygownagh, and the Bridge Street Church Street Junction in Crossmolina. Road and streets beyond this are considered low sensitive receptors and/ or the anticipated traffic generated by the development is not anticipated to trigger the thresholds described in section 14.3.3 as trips disperse into the wider network.

A potential source of crushed rock is the Mullafarry Quarry approximately 13.5km east of the proposed site. The haulage route from the Mullafarry Quarry would include the L1101 through Kincon and the R315.

The roads and street forming the haulage route which meet the assessment thresholds are described in the sections below.

14.4.2.1 N59 National Road

The N59 is a National Secondary Road serving the north and west areas of County Mayo. It runs from Ballina in the northeast of the County to Bangor Erris in the northwest via Crossmolina. It then turns south through Mallaranny, Newport, Westport and onwards to Clifden, Oughterand and Galway.

The N59 is typically a two-lane single carriageway rural road with an interurban posted speed limit of 100km/h. Its typical formation consists of two 3.65m traffic lanes with 0.5m hard strips and verges which vary in width as shown in figure 14.2. The cross section occasionally improves to provide 2.5m wide hard shoulders and wide verges such as the 3km section through Moylaw west of Crossmolina and a 500m section on approach to the Crossmolina urban speed limit zone. The road pavement along the route is well maintained and in good condition. The rural road formation transitions to a typical urban arterial street through towns and villages such as Crossmolina and Ballina. The N59 through Crossmolina consists of a wide carriageway with footpaths and permitted kerbside parking.

Figure 14.2: N59 - Typical Interurban Road Conditions and Formation

Figure 14.3: N59 - Typical Urban Road Formation, Crossmolina

14.4.2.2 R315 Regional Road

The R315 is a 21km regional road between Crossmolina to the south and Ballycastle to the north. It passes through Moygownagh approximately 7.5km north of Crossmolina. It typically consists of a 4.5m to 5.0m wide carriageway with narrow verges. The road pavement is maintained to a good condition. Road marking including centre lines and edge lines is provided intermittently. The posted speed limited is 80km/h on interurban sections of the road and reduces to 50 km/h through Moygownagh and on the approaches to Crossmolina and Ballycastle urban areas.

Figure 14.4: R315 - Typical Formation and Road Conditions

14.4.2.3 L51723 Local Access Road

The proposed site entrance is located approximately 2.3km west of the R315 Regional Road. It is accessed using a narrow 2.8m to 3.5m wide local road, the L51723. The road currently provides local access to a small number of houses (13), farms and the Ummerantarry Bog. The road terminates another 1km west of the proposed site entrance with no through route.

The typical formation of the road and the road conditions are shown in figure 14.5. The tight nature of the road and verges restricts the road's capacity. Two-way traffic flow is only achieved with the use of intermittent pavement and verge widenings fronting houses and accesses to farmland. A typical example of where vehicles can pass in opposite directions is shown in figure 14.6. The road pavement is maintained to a moderate condition with evidence of rutting along the wheel paths. The road has a narrow bridge crossing of the Ballinglen River, as shown in figure 14.7, approximately 300m west of the R315.

Figure 14.5: Local Access Road – Typical Road Conditions and Formation

Figure 14.6: Local Access Road – Example of Intermittent Hardstand Front House Permitting Two Way Flow

Figure 14.7 – 4m Wide Ballinglen River Bridge
Note poor visibility of oncoming vehicles

14.4.2.4 R315 and Local Access Road Junction

The local access road serving the proposed site connects to the R315 via a skewed three-way junction approximately 2.2km east of the proposed site entrance. The general arrangement of the junction, as shown in figure 14.8, requires tight u-turn type turning movements when arriving from the south, restricting the movement of larger commercial vehicles from this direction.

A junction visibility check at the site found that the junction provides a 'y distance' of 50m in the south direction (fig. 14.9) and 90m in the north direction (fig. 14.10) at a 2m set back from the road edge or 'x distance'. This is significantly below the stop line visibility standard set out in TII publication DN-GEO-03060 which requires a 'y distance' of 120m where the 85%ile or design speed on the priority movement is 70 km/h.

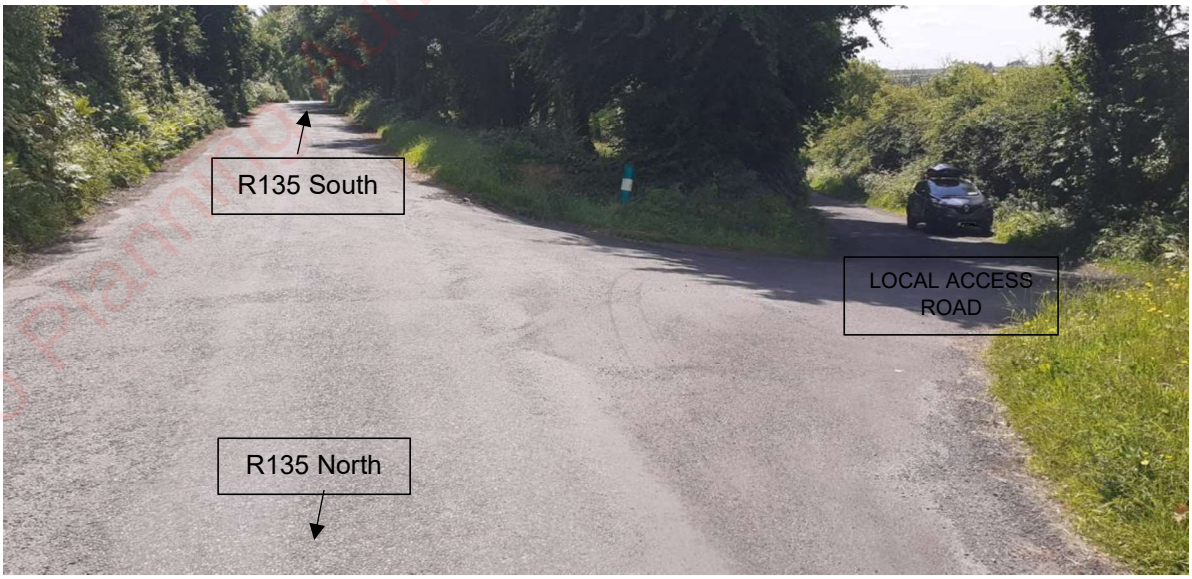

Figure 14.8: R315 and Local Access Road Junction General Arrangement
Note Tight U-turn type movement arriving and departing from the south in the Crossmolina Direction

Figure 14.9: R315 and Local Access Road Junction – Approximately 50m Junction Visibility in South Direction at a 2m Set Back from Road Edge

Figure 14.10: R315 and Local Access Road Junction – Approximately 90m Junction Visibility in North Direction at a 2m Set Back from Road Edge

14.4.3 Haulage Route for Delivery of Turbine Components

A unique transport issue surrounding the realisation of wind farms arises from the movements of abnormal loads in delivering large turbine components. As such, the baseline conditions for a development of this nature relate not only to the road network surrounding the application site, but also the road network from the point of origin of deliveries to the proposed site.

The turbine rotor blade components and tower sections will be delivered to the proposed site from Killybegs Harbour, Co. Donegal.

An overview of the turbine delivery route from Killybegs Harbour, Co. Donegal is presented in Figure 14.11 below. More details of the delivery route and the Points of Interest (POI) are provided in Figure 1.1.

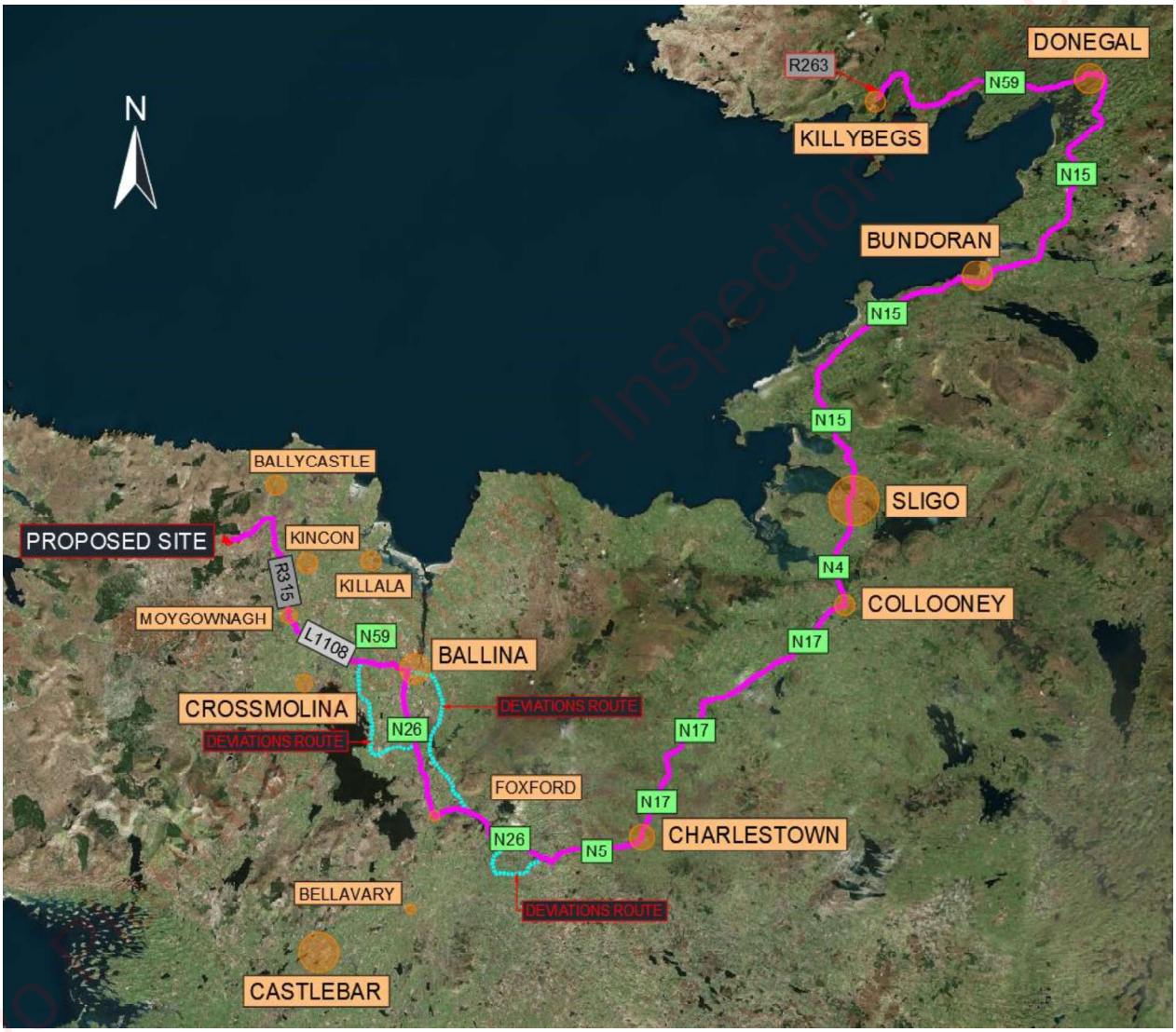

Figure 14.11: Turbine Delivery Route from Killybegs Harbour, County Donegal

The delivery route from Donegal Harbour primarily consists of national roads. Regional and local roads only form part of the route at the start and end of the route where there are no feasible alternatives. Notably, this is the route partly taken for delivery of components to the nearby Oweninney and Sheskin Wind Farms. The route via

N26 is only now viable following the completion of the N26 Cloongullane Realignment project. The route consists of:

- Killybegs Harbour to Donegal via Shore Road, R263 and N56,
- Donegal to Sligo via N15 through/ bypassing Ballyshannon and Bundoran,
- Sligo to Charlestown via N4 and N17
- Charlestown to Ballina via N5, N58 and N26 through/ bypassing Swinford and Foxford,
- Ballina to the proposed via N59, L1108 and R315

Deviations have been identified as alternatives to overcome obstacles or restrictions occurring on the main route.

14.4.4 Underground Electricity Export Connection Works

Underground Electricity Export Connection works will be required between the subject site and the existing Tawnaghmore ESB Substation or a Large Energy User at Killala Business Park to facilitate the proposed development. The route of the underground electricity export connection works is presented in Figure 14.12 below.

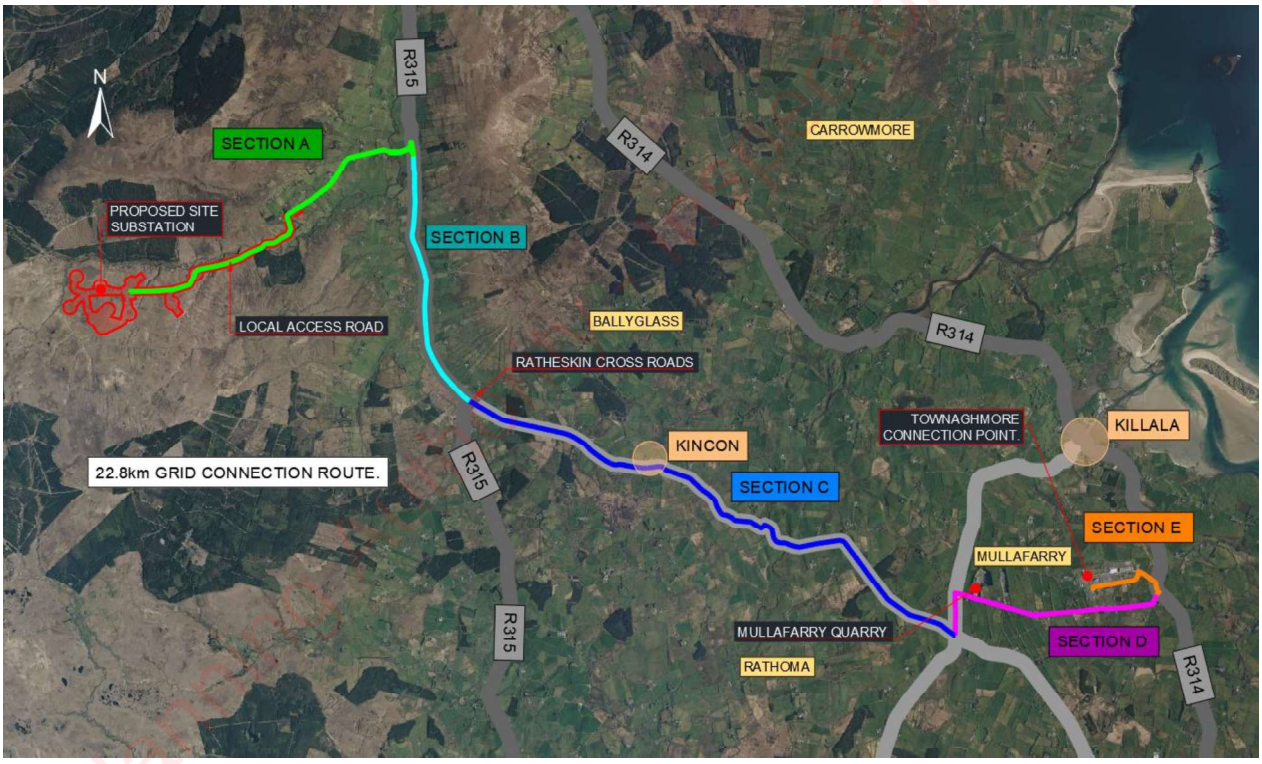

Figure 14.12: Underground Electricity Export Connection Route

As presented in the figure above, the route consists of the following sections.

- Section A

  Section A consists of the local access road as described in section 14.4.2.3.

- Section B

  Section B consists of the R315 regional route, as described in section 14.4.2.2, between the local access road junction and crossroads in Ratheskin.

- Section C

  The typical road conditions and road formation of the L11101 local road is presented in figure 14.13. It is an unlined rural road with a typical pavement width between 4.8m and 5.0m and narrow verges. The posted speed limit is 80 km/h.

  The road formation and speed limit transitions to that of an urban road passing through Kincon with a footpath provided to one side as presented in Figure 14.14. Several houses, a rural housing estate, a church and a national school have direct access onto the L11101 road through Kincon.

  The L11101 crosses the Cloonaghmore River east of Kincon via the Tonerehown Bridge, a 4.3m wide bridge shown in Figure 14.15. The nearest bridge crossings to the Tonerehown Bridge are the Palmerstone Bridge located 3.2km north and a bridge 3.0km south in Ballintober.

Figure 14.13: L1101 Local Road – Typical Road Conditions and Formation

Figure 14.14: L11101 Local Road through Kincon – Typical Urban Road Conditions and Formation

Figure 14.15: Tonerehown Bridge

- Section D

  Section D consist of local rural roads with a default national speed limit of 80kph. The roads consist of an unlined 5.5m to 6.5m wide single carriageway with narrow verges as shown in figure 14.16.

The route passes through Mullafarry providing direct access to Mullafarry Quarry, the Killala Rock Quarry, the Lisglennon water treatment plan and the Mullafarry Prevterian Church.

Figure 14.16: Section D Local Road through Mullafarry Townlands – Typical Road Conditions and Formation

- Section E
  A map of section E of the route is presented in figure 14.17 below.

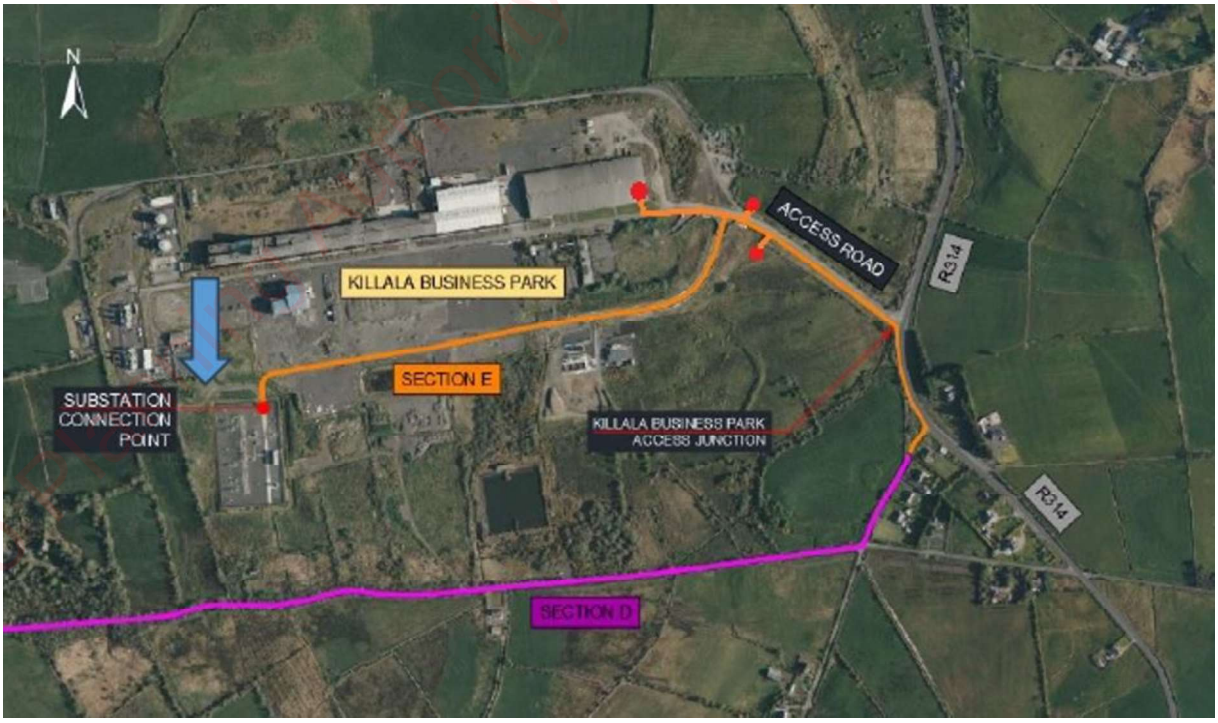

Figure 14.17: Section E Aerial View

Section E includes the R314 regional road and the access road into the Killala Business Park. The R314 regional road is a type 1 single carriageway with 3.65m wide traffic lanes and 2.5m wide hard shoulders. The Killala Business Park access junction, as presented in figure 14.18, is a typical rural high speed junction with left and right turn traffic lanes and ghost islands.

Figure 14.18: The Killala Business Park Access Junction

The access road into the Killala Business Park is a wide two-lane single carriageway with public lighting columns positioned in traffic islands down the centre of the road as shown in figure 14.19.

Figure 14.19: The Killala Business Park Access Road: Road Conditions and Formation

14.4.5 Existing Traffic Conditions

14.4.5.1 TII Traffic Counter Information

Transport Infrastructure Ireland (TII) have permanent traffic counter equipment on national roads throughout Ireland. The nearest TII traffic counter is located on the N59, between Crossmolina and Bangor-Erris. AADT refers to the average annual daily 24-hour traffic flow (vehicles). The AADT for the past five years at this location is presented in Table 14.1 below.

Table 14.1 Annual Average Daily Traffic Flows and Percentage HGVs on N59 between Crossmolina and Bangor-Erris, Co. Mayo (TMU N59 070.0S)

Survey Year	AADT	Percentage HGV's
2023	2,125	4.10%
2022	2,103	4.70%
2021	1,884	5.50%
2020	1,709	4.90%
2019	2,175	4.60%

The table indicates that traffic flows on the N59 have rebound to pre-covid levels in the last two years with an AADT of 2,125 vehicles per day. HGVs account for 4% to 5% of the daily average traffic flow.

14.4.5.2 Traffic Survey Information

A traffic survey was carried out by IDASO Ltd. between 18/04/2024 and 24/04/2024. The traffic survey consisted of seven-day Automatic Traffic Counts (ATCs) on the surrounding network as well as two Junction Turning Counts (JTC's) as shown below.

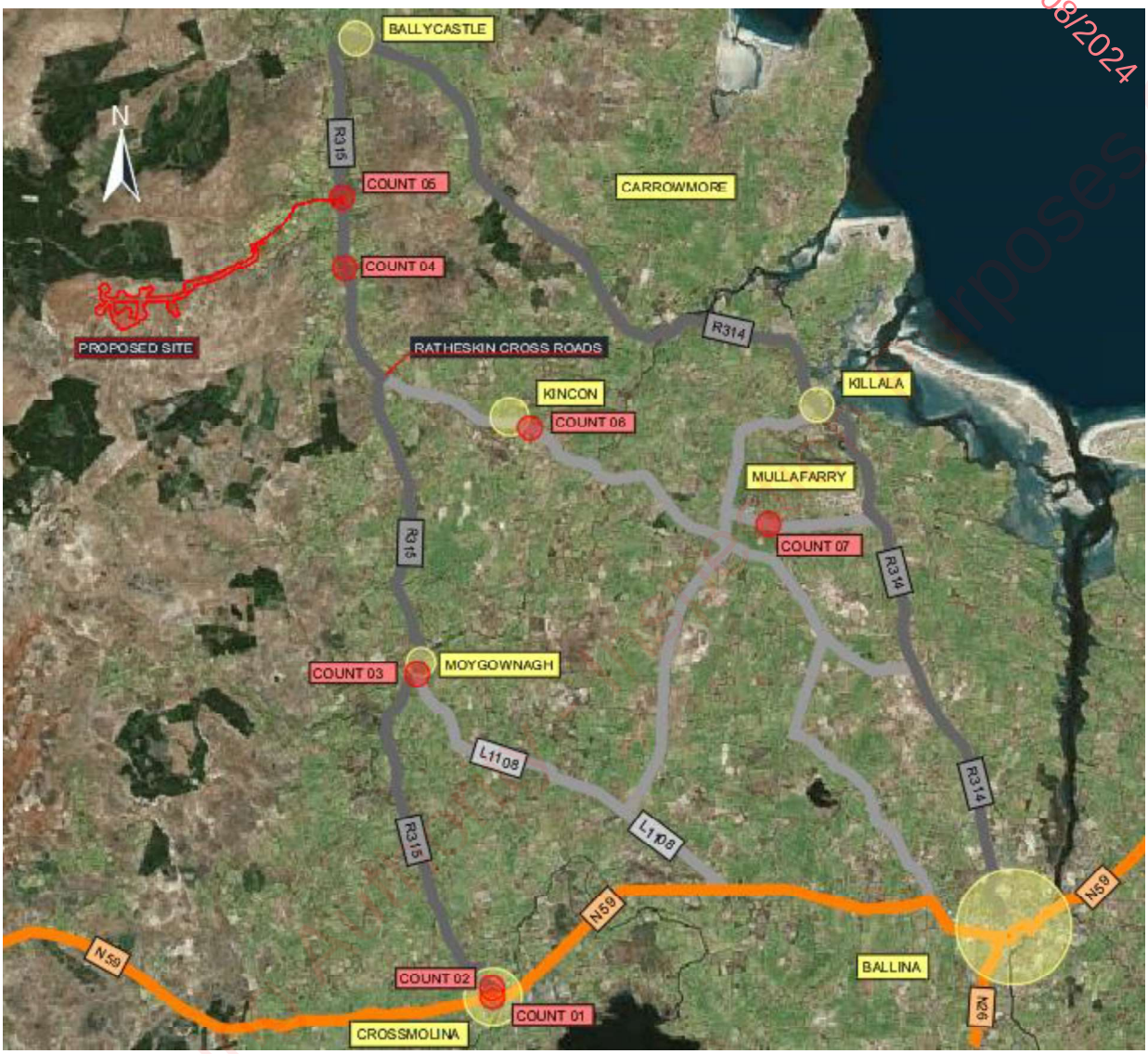

Figure 14.20: Traffic Survey Count Locations

The traffic survey data is summarised in the Table 14.2 below.

Table 14.2 Summary of Traffic Survey Data

Ref.	Road(s)	Location/ Description	ADT veh/day	HGV ADT (%)	85%ile Speed (km/h)
Count 01	N59, R315 Junction	Bridge Street, Church Street Junction Turning Count, Crossmolina	6,971	4.5	na
Count 02	R315	Church Street Link Count, Crossmolina	1,670	2.1	40
Count 03	R315	Link Count, Moygownagh	454	3.1	65
Count 04	R315	Link Count, Creevagh Beg	354	2.7	62
Count 05	R315, Local Access Road Junction	Junction Turning Count	578	6.6	na
Count 06	L11101	Link Count, Kincon	419	2.9	76
Count 07	Local Road	Link Count, Mullafarry	291	12.7	75

The ATC traffic survey data in the table for Counts 02, 03 and 04 shows that the Average Daily Count (ADT) on inter-urban sections of the R315 is generally less than 500. This increases to 1,670 on approach to Bridge Street in the Crossmolina urban area. The ADT on the L11101 and local road through Mullafarry was 419 and 291 respectively. The ATC found the 85%ile traffic speed on the R315 are less than 70km/h, and less than 80km/h on the L11101.

The traffic survey found that the Bridge Street Church Street Junction has a throughput of 6,971 vehicles per day, 4.5% of which are HGVs. The junction between the R315 and the local access road junction serving the site entrance has a throughput of 578 vehicles per day, 6.6% of which are HGVs.

14.4.1 Road Safety

The Road Safety Authority (RSA) website previously hosted an online mapping tool which provides data on the location and severity of every traffic collision recorded in Ireland. The mapping tool has been suspended since 2020 as the RSA and local authorities resolve GDPR issues with sharing the information.

The 2011 to 2016 collisions statistic provided below was collected in preparation of the subject application prior to the suspension of the mapping tool. Although this data is between 8 to 13 years old, it is still considered relevant as the road conditions are similar to those ten years ago.

The study area included the R315 between the proposed development site and Crossmolina, and the N59 between Crossmolina and Ballina. A summary of the collision data is provided in Table 14.3 below.

Table 14.3 Road Safety Authority's Records of Collision on the N59 and R315						
Year	Collision History N59			Collision History R315		
	Fatal	Serious	Minor	Fatal	Serious	Minor
2011	0	0	4	0	0	0
2012	0	0	1	0	0	0
2013	0	0	4	0	0	0
2014	0	0	3	0	0	0
2015	0	1	1	0	0	1
2016	0	0	1	0	0	0
Total	**0**	**1**	**14**	**0**	**0**	**2**

The records indicate that there was only one serious injury collision on the N59 between Ballina and Crossmolina in the five-year study period and zero fatal collisions. Zero fatal or serious injury collisions were recorded on the R315 between Crossmolina and the subject site in the same five-year period.

The frequency and dispersed nature of the recorded road collisions indicate that there are no particular traffic safety issues on the route between the Ballina and the proposed windfarm development.

14.5 Statement of Potential Impacts

14.5.1 Construction Phase Impacts

14.5.1.1 Overview

During the construction phase of the development, the number of trips generated and the route taken by construction vehicles is important in assessing the traffic impact of a proposed wind farm. Construction activities will generate traffic movements from a number of sources. These will include:-

- Delivery, and subsequent removal, of site accommodation, construction plant and equipment at the application site, for example transfer of tracked excavators to and from the area by low-loader and mobile cranes;
- Removal of materials from the application site and areas of road works, for example vegetation clearance and soil removal;
- Removal of excavated ground material, including material excavated for underground electricity export connection trenches.
- Delivery of bulk construction materials to the area, for example for construction of road improvements on the approaches to the proposed site and access tracks within the proposed site, the delivery of reinforcing steel and concrete for turbine foundations, trench backfill material for underground electricity export connection, and underground electricity export connection ducts and cables;
- Delivery of wind turbine components;
- Daily arrival and departure of construction workers, site supervisory staff and inspections by statutory authorities.

An assessment of the anticipated construction activities and the quantity of materials required for the main construction elements at the proposed wind farm has been made by the applicant. The construction programme and the main construction activities can be categorised into three main stages. These are:

i) **Stage 1 – Civil Engineering Works** is anticipated to take 9 months. It includes road construction and road improvement works, drainage works, construction of crane pads and peat storage areas, construction of the turbine foundations and construction of civil works associated with the sub-station. Stage 1 is anticipated to take 9 months. Note, material excavated during the works will be redistributed within the proposed site.

ii) **Stage 2 – Electrical Works** in anticipated to take 2 to 3 months and is likely to have some overlap with stage 1 activities. This stage includes cable laying and electrical installations at the sub-station.

iii) **Stage 3 – Turbine Works** including delivery and mechanical erection, turbine commissioning and turbine testing. This stage is anticipated to take 4 months. It is not intended to commence the turbine works until stage 1 and 2 are substantially completed.

iv) **Underground Electricity Export Connections –** The underground electricity export connection work is anticipated to take 12 months to complete and is likely to overlap with the activities in stage 1, stage 2 and possibly stage 3. The underground electricity export connections typically require trench excavations, laying of ducts and chambers, backfilling the trenches with suitable fill materials, installation of electrical cabling and pavement resurfacing.

The traffic generated by the main construction activities is presented in Table 14.4 below.

Table 14.4 Main Traffic Generating Construction Activities

Construction Stage	Description of Main Construction Activity	Estimated Quantity	Activity Duration	Avg. trips/ movements generated in both directions	Comments
All	Daily arrival and departure of Site Operatives	30 no.	64 weeks	60 vehs/ day	Assuming all operatives drive separately
1	Imported stone for access roads and crane pads	24,000 tonnes	25 weeks	18 HGVs/ day	Based on 22 tonnes of stone per vehicle
1	Imported steel for turbine foundations	380 tonnes	16 weeks	2 HGV/ day	
1	Imported concrete for turbine foundations	4,800m^3	4 weeks	127 HGVs/ day	
2	Cable deliveries for on-site installation	10km of cable	9 weeks	1 HGV/ week	Based on 2km per vehicle
2	Ancillary deliveries associated with on-site cable installation	1100 tonnes of sand	9 weeks	3 HGVs/ week	Based on 22 tonnes per vehicle
2	Site Sub-Station	Varies	9 weeks	< 1 HGV/ week	
3	Delivery of Wind Turbine Components	80 components	8 weeks	10 abnormal load HGV/ week	10 components per turbine x 8 turbines
Underground Electricity	Removal of excavated material arising from the trench	55,000 tonnes	52 weeks	20 HGVs per day or	Assuming 4 crews working at separate

Table 14.4 Main Traffic Generating Construction Activities

Construction Stage	Description of Main Construction Activity	Estimated Quantity	Activity Duration	Avg. trips/ movements generated in both directions	Comments
Export Connection				100 HGVs per week	locations for 130 days (6 months) on 22.8 km cable route and 22 tonnes per vehicle.
Underground Electricity Export Connection	Import backfill and trench reinstatement materials	56,000 tonnes	52 weeks	20 HGVs per day or 100 HGVs per week	Assuming 22 tonnes per vehicle.
Underground Electricity Export Connections	Cable and chamber deliveries for site installation.	Approximately 200m of cable and 1 chamber per day	52 weeks	2 HGV per day	Assuming cable delivery vehicle required each day
Underground Electricity Export Connection	Daily arrival and departure of Site Operatives	30 no. site operatives	52 weeks	60 vehs/ day	Assuming all operatives drive separately
Underground Electricity Export Connection	Transference of site operative from site depot to works area	30 no. site operatives	52 weeks	6 mini-buses per day	Based on 12 workers per mini-bus

The stage 1 activities will generate an average of 80 vehicles per day including 20 HGVs per day. This increases to a peak of 187 vehicles per day including 127 HGVs per day for a 4-week period while the concrete foundations are being poured. The concreting activities for the foundations are required to be completed within a short timeframe (12 hrs) to ensure the integrity of the bases.

The traffic generated from activities in stage 2 and 3 is low with 60 vehicles per day by site operative and less than 5 HGVs movement per day generated by the delivery of materials.

The underground electricity export connection works will generate an average of 108 vehicles per day including 42 HGVs to point locations along underground electricity export connection route. These underground electricity export connection works are likely to overlap with stage 1 activities generating a combined average of 188 vehicles per day on the R315 and N59 including 62 HGVs per day, and a peak average of 295 vehicles per day including 169 HGVs per day during the concreting works. The timing of the underground electricity export connection works on the local access road to the site entrance will not coincide with the delivery of concrete and other bulk materials to ensure the access of deliveries is not impeded by temporary works areas.

A key transport issue will be the delivery of large turbine components during stage 3. There will be approximately 10 delivers per week over an 8-week period. Several turbine components will be delivered at the same time in convey arrangements.

14.5.1.2 Traffic Movements Associated with Main Construction Activities and Underground Electricity Export Connection Activities

The stage 1 construction activities and the underground electricity export connection works will generate the most traffic movements during the construction phase. The potential impact of these traffic movements on the surrounding road network is summarised in table 14.5 below.

Table 14.5 Percentage Impact of Peak Construction Phase Traffic

Road	Baseline	Timing of Impact/ Element of Works	Daily Generated Traffic during Typical Stage 1 Construction Activities				Daily Generated Traffic during Peak Construction			
	PCU/ day equivalent [1]		LV/ day	HGV/ day	PCU/ day equivalent [2]	% PCU/ day impact	LV/ day	HGV/ day	PCU/ day equivalent [2]	% PCU/ day impact
Local Access Road	97	Underground Electricity Export Connection Works	108	42	163	168%	108	42	163	168%
Local Access Road	97	Stage 1	60	20	106	109%	60	127	352	363%
R315, [placename]	367	Stage 1 & Underground Electricity Export Connection Works	126	62	269	73%	126	169	515	140%
R315, Moygownagh	474	Stage 1 & Underground Electricity Export Connection Works	126	62	269	57%	126	169	515	109%
R315, Crossmolina	1721	Stage 1 & Underground Electricity Export Connection Works	126	62	269	16%	126	169	515	30%
Bridge Street Church Street Junction, Crossmolina	7020	Stage 1 & Underground Electricity Export Connection Works	126	62	269	4%	126	169	515	7%
N59, Crossmolina	6341	Stage 1 & Underground	126	62	269	4%	126	169	515	8%

Table 14.5 Percentage Impact of Peak Construction Phase Traffic										
Road	**Baseline**	**Timing of Impact/ Element of Works**	**Daily Generated Traffic during Typical Stage 1 Construction Activities**				**Daily Generated Traffic during Peak Construction**			
	PCU/ day equivalent [1]		**LV/ day**	**HGV/ day**	**PCU/ day equivalent [2]**	**% PCU/ day impact**	**LV/ day**	**HGV/ day**	**PCU/ day equivalent [2]**	**% PCU/ day impact**
		Electricity Export Connection Works								
Local Road, Kincon	437	Underground Electricity Export Connection Works	66	42	163	37%	66	42	163	37%
Local Road, Mullafarry	337	Underground Electricity Export Connection Works	66	42	163	48%	66	42	163	48%

Note 1: Provided in Traffic Survey Data

Note 2: Vehicle to PCU conversions as per TII values: Motor Cycle – 0.4, Passenger Car/LGV – 1.0, Medium Goods Vehicle (MGV/OGV1) – 1.5, Buses and Coaches – 2.0 and Heavy Goods Vehicle (HGV/OGV2) – 2.3

The L51723 local access road serving the entrance of the proposed wind farm is sensitive to change due to the low levels of traffic currently using the road, the narrow road conditions, the poor pavement, and the constraints on two-way traffic. The underground electricity export connection works will increase traffic on the local access road to the site entrance by 168%. The stage 1 average daily and peak construction activities will increase traffic on the road by 109% and 363%. The large increase of HGVs, from a low baseline to 127 HGVs per day at peak construction, is also notable. These figures indicate that the construction stage of the proposed wind farm will have a very significant impact on the local access road serving the entrance to the proposed wind farm. The increase in heavy vehicles using the road is also likely to have a significant long term negative effect on the condition of the pavement.

The construction stage activities are anticipated to increase daily traffic on the R315 through Moygownagh by 57% on average and by 109% during peak construction. This percentage increase in traffic is considered to have a moderate temporary negative effect on baseline traffic conditions as the R315 is constructed and maintained to a good standard with adequate capacity to take the additional temporary traffic.

Stage 1 construction phase activities will increase the daily throughput at the Bridge Street Church Street Junction by between 4% and 7%. A review of the junction's baseline traffic profile, and the traffic profile of the peak traffic generated by the development is provided in Table 14.6 below.

Table 14.6 Summary of Traffic Profile at Bridge Street Junction and Hourly Percentage Impacts

Hour Period, hour starting	Baseline Throughput, PCU/ hr	Peak Construction Stage Traffic Throughput, PCU/hr (% increase on Baseline conditions)	Combined Baseline and Peak Construction Stage Traffic, PCU/hr
0700	270	102 (+38%)	429
0800	445	42 (+9%)	455
0900	454	42 (+9%)	464
1000	411	42 (+10%)	421
1100	404	42 (+10%)	414
1200	443	42 (+10%)	453
1300	453	42 (+9%)	463
1400	446	42 (+9%)	456
1500	514	42 (+9%)	523
1600	571	70 (+13%)	730
1700	724	0	724
1800	578	0	578
1900	347	0	347

Note: Shaded cells indicate peak traffic flows

The data presented in table 14.6 shows how the majority of construction stage traffic generated by the development will not coincide with daily AM and PM peak baseline traffic hours. Construction stage traffic will increase traffic through the junction by 9% and 0% in the AM and PM network peak hours.

Peak traffic generated by the construction activities has the largest percentage increase on baseline traffic conditions between 1600 and 1700 hours. A capacity analysis using LinSig was carried out between these hours to assess the impacts of this additional traffic on the junction. Linsig presents the results of a junction model in Degrees of Saturation (% DoS). A priority-controlled junction is considered to be performing satisfactorily if the DoS is at or below 85%. A priority-controlled junction operating above this level of DoS is likely to have queues building and excessive delays. A summary of a capacity analysis carried out on the junction between these hours is summarised in table 14.7 below. The LinSig junction capacity analysis is provided in full in Appendix 13.1.

Table 14.7 Summary of Bridge Street, Church Street, The Boreen Junction Capacity Analysis

Lane Description	Daily Peak Impact			
	Baseline		Baseline + Peak Construction Traffic	
	Av Delay (s/PCU)	% DoS	Av Delay (s/PCU)	% DoS
N59 West	1.0	8.9%	1.0	8.9%
N59 East	1.3	17.7%	1.3	17.7%
The Boreen	1.7	1.8%	1.8	1.9%
Church Street	1.6	8.1%	1.9	14.7%

The results from the junction capacity analysis presented above indicates that the peak construction traffic will have a negligible impact on the capacity of the junction. The largest impact will be on traffic entering the junction from Church Street where delays are anticipated to increase from 1.6 second per PCU to 1.9 seconds per PCU. Thus the construction stage traffic is considered to have a negligible temporary impact on the capacity of the Bridge Street Church Street junction.

The underground electricity export connection works will increase the baseline traffic flows on the local roads through Kincon and Mullafarry by 26% and 37%. This percentage increase in traffic will have slight temporary negative effects on baseline traffic conditions. These roads are constructed and maintained to a good standard with adequate capacity to take the additional temporary traffic.

14.5.1.3 Traffic Movement Associated with the Delivery of Turbine Components

The delivery route for the turbine components from the Killybegs Harbour, Co. Donegal will use a similar route as used for the delivery of turbine components to the nearby Oweninney and Sheskin wind farms. The proposed delivery route differs to that of the Oweninney and Sheskin wind farm west of Ballina where the route turns off the N59 onto the L1108. The route then follows the L1108 to the R315 south of Moygownagh, and continues to the proposed site via the R315 and the local access road to the site entrance.

Although relatively few in number, the delivery of turbine components will have a significant temporary effect on the road and traffic environment along the delivery route. These impacts will be mitigated through measures described in Section 14.7.

14.5.1.4 Underground Electricity Export Connection Work Temporary Traffic Controls

The route for the underground electricity export connection works is approximately 22.8km long. The underground electricity export connection installation will be carried out in 100m long segments which will move along the route every 1 to 2 days. Temporary traffic management controls will be implemented to maintain existing traffic flow and to safely guide traffic around the works area.

An inspection of the route found the roads generally have adequate width to implement a one-way shuttle/ reversible flow using stop/ go batons or temporary traffic signals with the following exceptions;

- The L51723 local access road described in section 14.4.2.3 is too narrow to maintain even a single lane of traffic around a works area, in consultation with local residents, a plan of action will be put in place to facilitate local access and emergency responders. This may include schedule works outside peak hours and using escorts to direct vehicle pass the work areas.
- The Ballinglen River Bridge as described in section 14.4.2.3 is too narrow to maintain even a single lane of traffic around a works area on the bridge. It is proposed to install the underground electricity export connections via a directional drill to maintain access across the bridge.
- The Tonerehown Bridge as described in section 14.4.4 is also too narrow to maintain a single lane of traffic around a works area on the bridge. It is proposed to install the underground electricity export connections via a directional drill to maintain access across the bridge.

The temporary shuttle flow arrangement will only cause momentary delays to road users on the route. Thus, the effect of the underground electricity export connection work on existing traffic is considered not significant and temporary.

The backfilling and reinstatement of road pavements will be carried out on regional and local roads as per the second edition of the Department of Transport's Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Road (also known as the Purple Book), and on national roads as per TII's Requirements for the Reinstatement of Openings in National Roads, CC-PAV-04007. Both these publications require a very high standard of reinstatement to prevent a failing of the pavement in the future. Thus, the effects of trenching and reinstatement activities on the road pavements are considered not significant.

14.5.2 Operational Phase Impacts

Traffic generated during the operational phase of the wind farm development will be minimal with only occasional visits by maintenance and monitoring vehicle anticipated. This impact of these vehicles is considered to have a imperceptible effect on baseline conditions.

14.5.3 Decommissioning Phase Impacts

The operational life of the wind farm is expected to be 30 years after which it is likely to be decommissioned. The impact of the decommissioning phase is considered to be similar in nature to but normally less than the construction phase. The busiest periods for the construction, such as during the base pours, will not occur during the decommissioning periods. Certain elements of underground apparatus may be left in place while tower sections and blades are likely to be dismantled to eliminate the requirement for abnormal load vehicles.

Given the potential changes to baseline traffic conditions over a 30-year period, detailed consideration of the decommissioning phase of the development is not included as part of this assessment. It is proposed that in advance of the decommissioning process a Traffic Management Plan would be prepared to ensure that traffic impacts are minimised during this phase.

14.6 Cumulative Impacts

An Bord Pleanála are currently considering an application for the development of the Glenora Wind Farm approximately 20km north of the proposed site. The construction programme proposed in the Glenora Wind Farm application was examined to confirm that the construction phases of the two proposed developments will not overlap and give rise to cumulative impacts.

There are no further known cumulative impacts to consider in the assessment of the proposed site.

14.7 Mitigation and Monitoring Measures

The following mitigation and monitoring measures will be implemented to reduce the potential traffic and transport impacts on the environment.

14.7.1 Construction Phase

14.7.1.1 Construction Traffic Management Plan

As with all construction projects, the contractor will be obliged to carry out a comprehensive Construction Traffic Management Plan (CTMP) in consultation with the local authority, Mayo County Council and the Garda Síochána before the commencement of the construction phase. The purpose of such a plan is to outline the measures to manage the expected construction traffic during the construction period. The plan will be reviewed throughout the construction phase and revised on a needs basis as works progress.

Furthermore, site construction traffic will, through consultation with Mayo County Council, the Garda and any identified third parties, be routed and timed to avoid unnecessary impacts at any identified sensitive locations and/or at sensitive times of the day. The Construction Traffic Management Programme will identify such issues and include procedures regarding notifications of deliveries and agreement on scheduling of deliveries, in particular abnormal loads. Likewise, procedures and timetables regarding the passage and escort of abnormal loads will be agreed in advance as part of the Construction Traffic Management Programme. Constraints and Points Of Interest (POI) along the delivery route for abnormal loads will be fully resolved and verified in advance of the deliveries being schedule via comprehensive reporting and swept path analysis. The swept path analysis will be carried out on Auto-Track using vehicle profile information and turbine specifications to determine the scale of potential mitigation works. Any deliveries of abnormal loads will be carefully co-ordinated with neighbouring developments to avoid conflict. The CTMP will outline management procedures for such co-ordination.

Maintaining access for emergency services during the course of any road works and/or during the construction phase at the application site will also be considered and included as part of the Construction Traffic Management Plan.

Local residents likely to be affected by construction deliveries using the local road network to and from the application site will be notified prior to the commencement of deliveries via leaflet/letter and/or advertisement via the local press. A Plan of Action for the L51723 will be put in place, in consultation with local residents, to minimise and mitigate disruption.

It is acknowledged that any Construction Traffic Management Plan will include a requirement that the condition of the road infrastructure on the access routes to and from the application site via the local, minor road network will be recorded before and after completion of the construction phase.

Visual inspections will also be undertaken and recorded at regular, frequent intervals, to ensure that the existing road infrastructure remains in an acceptable condition throughout the duration of construction activities, or, should evidence of any defects arise during the construction period, remedial actions and/or works can be put in hand forthwith.

Wheel washes for construction vehicles will be provided (if necessary) at the development site to prevent mud and dust being brought onto the public road. The site entrance and public road would also be monitored and swept clean where necessary.

Construction vehicles and site personnel will be instructed to adhere to the approved access routes and timing restrictions. Construction plant, equipment and vehicles will be parked onsite. No vehicles associated with the proposed wind farm will be parked on the public roads.

Additional measures will also be required to minimise potentially significant environmental effects occurring from the transportation of construction materials such as:

- Ensuring the proper transport of materials e.g. vehicle loads will be enclosed or covered with tarpaulin to restrict the escape of particulate matter; and
- Proper servicing and maintenance of vehicles will be undertaken to avoid any leaks or spills of oil, petrol or concrete.

14.7.1.2 Passing Bays and Temporary Access Tracks

The proposed development includes the construction of passing bays along the L51723 local access road serving the proposed site entrance. These bays have been located to ensure good visibility of approaching vehicles, and to increase the opportunities for two-way traffic flow during the delivery of bulk materials.

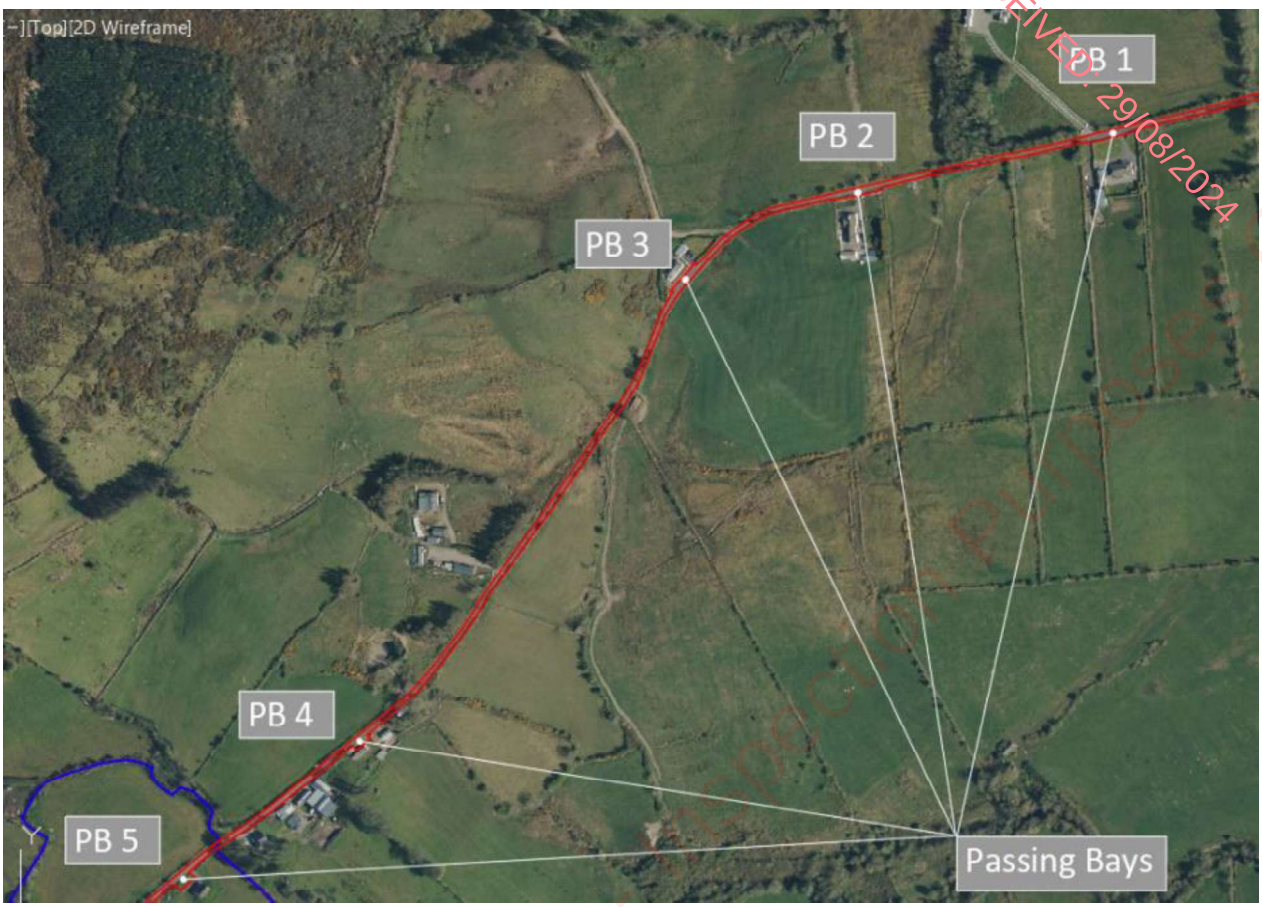

Figure 14.21: Location of Proposed Passing Bays on the Local Access Road

A temporary access track, as shown in figure 14.22 (and Appendix 13.2), will be constructed between the local access road and the R315 regional road for the duration of the construction stage of the development. The access track will allow HGV's delivering bulk material to bypass the existing junction which is unsuitable for the anticipated levels of truck movements. The temporary access track will form a new temporary junction with the R315 approximately 165m south of the existing junction.

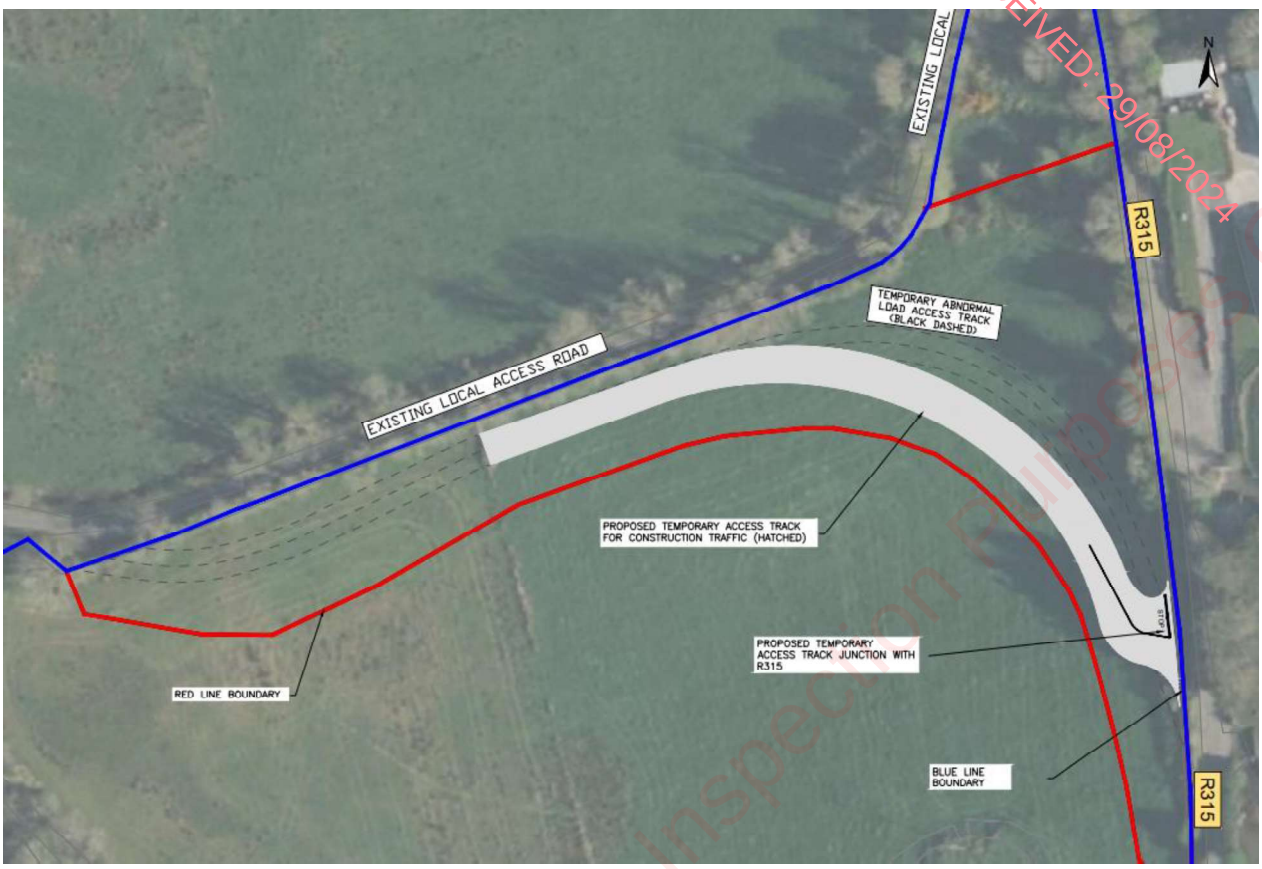

Figure 14.22: R315, Local Road Temporary Access Track to Facilitate Left Turn Movement of Turbine Delivery Vehicles.

Extract from drawing No. KWF-ROD-GEN-SW_AE-SK-CH-300101 (Appendix 13.2)

The proposed junction is proposed to cater for the daily access and egress of several 10.2m long construction delivery vehicles. This design requirement was verified using Auto-Track on the proposed general arrangement of the junction as shown in figure 14.23 below and on drawing no. KWF-ROD-GEN-SW_AE-SK-CH-300102.

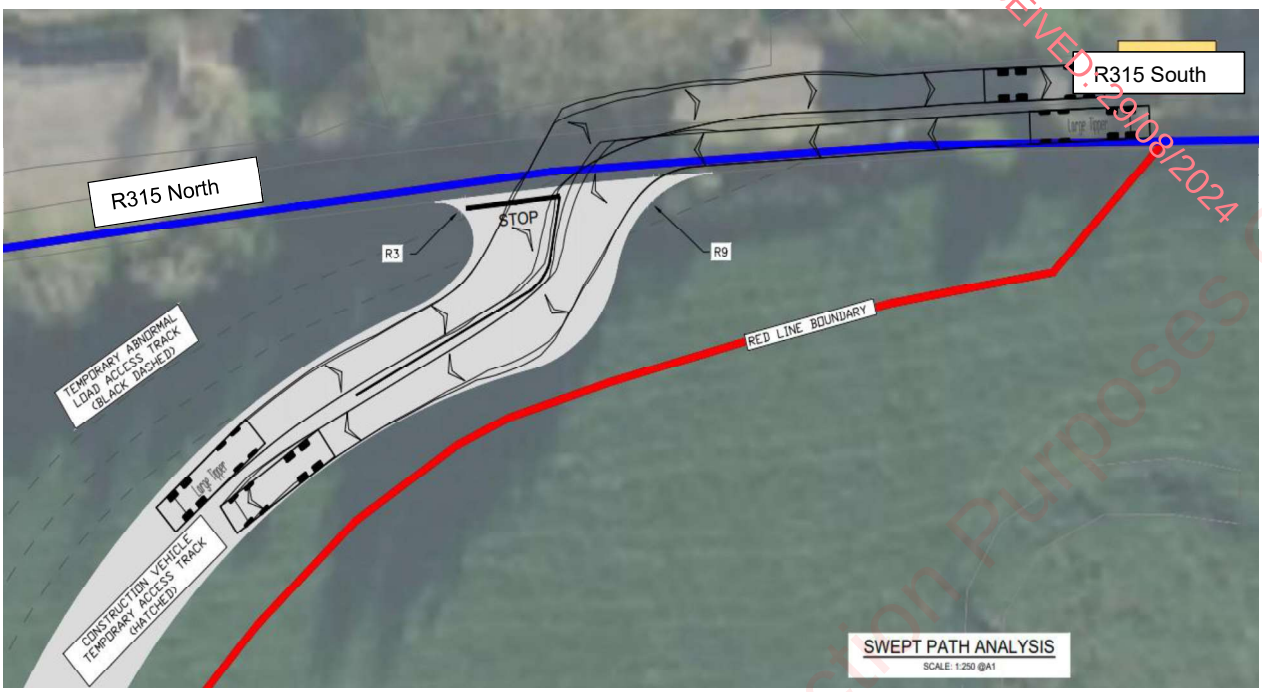

Figure 14.23: Swept Path Analysis of Construction Delivery Vehicle
Extract from drawing No. KWF-ROD-GEN-SW_AE-SK-CH-300102

A design review of the proposed temporary access junction was also carried out to ensure consistency with the junction visibility requirements set out in TII publication DN-GEO-03060 Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions). The junction visibility must achieve the required minimum stopping sight distance, or 'y distance' as shown in the extract below, from a set-back from the road edge shown as the x-distance below. The appropriate y and x distances are 120m and 2m for a junction where the 85%ile or design speed on the priority movement is 70 km/h.

The design review involved plotting the junction visibility splays on the general arrangement of the junction as shown on drawing no. KWF-ROD-GEN-SW_AE-SK-CH-300102. The review found that the minimum visibility requirement is achievable with the setting back and removal of boundary hedges and trees. These finding were verified on site as shown in figure 14.25 (view north) and 14.26 (view south).

Details of the junction visibility review and the swept path analysis can be viewed on drawing no. KWF-ROD-GEN-SW_AE-SK-CH-300102 found in Appendix 13.3.

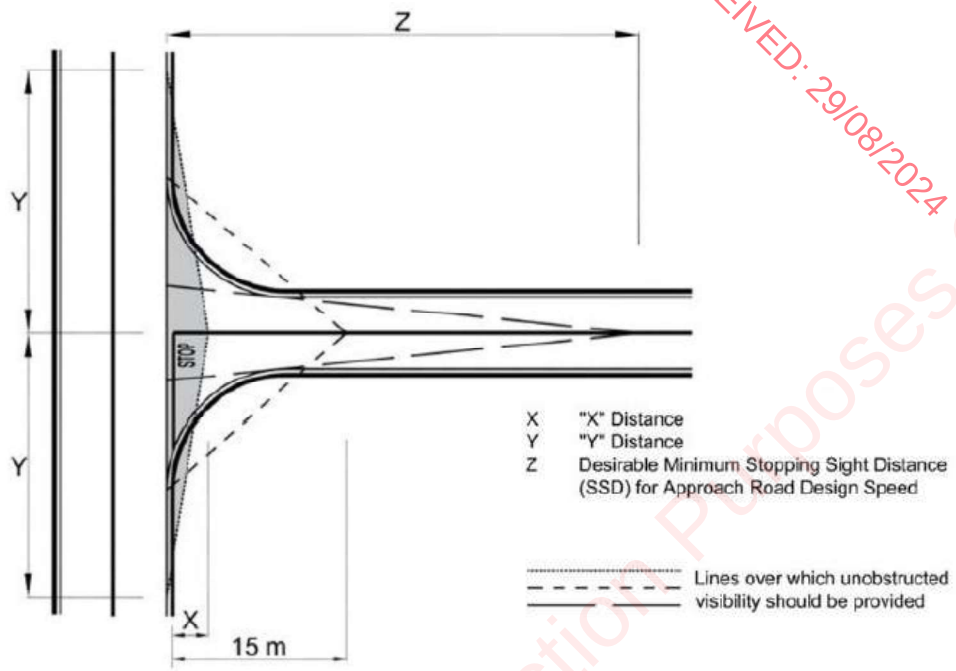

Figure 14.24: Extract from DN-GEO-03060 – Visibility splays

Figure 14.25: View North from R315 Centreline at Location of Proposed Temporary Access Junction
Note no crest or sag in road prohibiting junction visibility.

Figure 14.26: View South from R315 Centreline at Location of Proposed Temporary Access Junction
Note no crest or sag in road prohibiting junction visibility if the boundary hedge is set back/ removed.

A separate temporary access track will also be constructed to facilitate the left turn movements of turbine delivery vehicles from the R315 onto the local access road also presented on figure 14.22 above. These turning movement will be carried out under semi static traffic control measures, as with the entire delivery route, to ensure junction safety.

An assessment of the turbine delivery route will be carried out to identify locations beyond the immediate surrounding road network where temporary access tracks and upgrades to existing roads will be required to facilitate the delivery of abnormal loads. Notwithstanding, the developer and their agents will continue to liaise with Mayo County Council, and any other relevant authorities, both before and during construction activities at the application site. Liaison will be maintained to:-

i) Develop and agree the nature of mitigating road works identified during the preparation of the Construction Traffic Management Plan prior to works commencing at the application site; and,
ii) Monitor, record and confirm the performance of the traffic management measures and road works put in place prior to works commencement and any further remedial road works undertaken during and/or after the construction phase at the application site.

14.7.2 Decommissioning Phase

Similar to the construction phase, a Construction Traffic Management Plan (CTMP) will be prepared for the decommissioning phase of the wind farm. The decommissioning phase CTMP will be prepared in consultation with Mayo County Council. It will set out traffic management measures to be taken to mitigate potential impacts on the existing road network.

14.8 Residual Effects

14.8.1 Construction Phase

Residual effects will be limited primarily to the construction phase of the proposed wind farm. Table 14.8 summaries the proposed mitigation measures and the anticipated effect of the traffic and transport impacts pre and post mitigation.

Table 14.8 Impacts, Mitigation and Residual Effects

Impact	Significance of Impact before Mitigation	Proposed Mitigation	Significance of Residual Effect
Construction Traffic on Local Access Road	Temporary Very Significant	• Preparation of a Construction Traffic Management Plan to include delivery schedule, road improvements, road widenings including passing bays, junction improvements, temporary signage and road maintenance measures (wheel wash, road sweeping etc.). • Notification of local residents and Plan of Action • Conduct Road Condition Survey	Temporary Moderate to Significant
Construction Traffic on Remaining Road network	Temporary Moderate	• Preparation of a Construction Traffic Management Plan to include designated delivery route, delivery schedule, road improvements, temporary signage and road maintenance measures (wheel wash, road sweeping etc.). • Conduct Road Condition Survey	Temporary Slight
Abnormal Load Delivery Vehicles	Significant Temporary Impact	• Agree haul route with Mayo County Council and the Garda. • Schedule deliveries appropriately to minimise impact. • Road improvements, road widening and removal of street furniture/utilities to support the transfer of abnormal loads. • Abnormal vehicles will be escorted. • Notification of local residents. • Conduct Road Condition Survey • Liaise and co-ordinate with neighbouring wind farm development(s) to prevent conflict	Slight Temporary Impact with localised delays during night time hours
Underground Electricity Export Connection Works Traffic Controls	Not significant temporary	• Preparation of a Construction Traffic Management Plan to include designated delivery route, delivery schedule, road improvements, temporary signage and road maintenance measures. • Conduct Road Condition Survey pre and post construction	Not significant temporary

14.9 Conclusions

The traffic and transport effects resultant from the construction of the proposed wind farm and the underground electricity export connections will be reduced to an acceptable level through the preparation and execution of a Construction Traffic Management Plan. In areas of constraint, appropriate mitigations measures have been proposed to reduce the residual impacts to a minimum.