14. MATERIAL ASSETS

Material Assets are defined in the '*Advice Notes for Preparing Environmental Impact Statements'* (EPA, Draft 2015) as '*resources that are valued and that are intrinsic to specific places'*. They may be either of human or natural origin. The cultural assets of Archaeology and Cultural Heritage are addressed in Chapter 13 of this Environmental Impact Assessment Report (EIAR). Economic assets of natural heritage include non-renewable resources such as minerals or soils, and renewable resources such as wind and water. These assets are addressed in Chapter 8: Land, Soils and Geology, Chapter 9: Water, and Chapter 10: Air and Climate. Tourism and amenity resources, which are also considered material assets, are addressed in Chapter 5 on Population and Human Health. The Population and Human Health chapter also addresses existing land-uses (economic assets), including forestry and agriculture.

This chapter of the EIAR addresses the likely significant effects of the Proposed Development on transportation infrastructure (Section 14.1 Traffic and Transport) and on Telecommunications and Aviation (Section 14.2), which are economic assets of human origin.

14.1 Traffic and Transport

14.1.1 Introduction

14.1.1.1 Background and Objectives

The purpose of this section is to assess the effects, on roads and traffic, of the additional traffic movements that will be generated during the construction, operational and decommissioning phases of the proposed Slieveacurry Renewable Energy Development (Slieveacurry RED).

For developments of this nature, the construction phase is the critical period with respect to the traffic effects experienced on the surrounding road network in terms of both the additional traffic volumes that will be generated on the road network, and the geometric requirements of the abnormally large loads associated with the wind turbine plant. The requirements of the additional traffic and abnormal sized loads generated during the construction stage were assessed on both the external highway network and at the proposed junction that will provide access to the site.

It should be noted that abnormal weight loads are not a feature of the turbine delivery vehicles, they are abnormal in size only. All construction and delivery vehicles for the Proposed Development will be subject to the standard axle weight requirements set out under Road Traffic Regulations and therefore the loadings from construction traffic will not exceed the relevant standards. Notwithstanding the need to use some specialist vehicles to facilitate turbine delivery, it should be noted that the number of load-bearing axles for any specialist vehicles carrying large loads are designed to ensure that the load on any one axle does not exceed acceptable load bearing statutory limits.

The magnitude of the increase in traffic volumes experienced on the surrounding network is identified during the various construction stages of the Proposed Development. Preliminary traffic management measures are also provided in Sections 14.1.7 and 14.1.10.6 aimed at minimising the traffic impact on the local highway network. Refer also to Section 6 of the Construction and Environmental Management Plan (CEMP – see Appendix 4-4) for the Traffic Management Plan.

14.1.1.2 Statement of Authority

This section of the EIAR has been prepared by Alan Lipscombe of Alan Lipscombe Traffic and Transport Consultants Ltd. Alan is a competent expert in traffic and transport assessments. In 2007 Alan set up a traffic and transportation consultancy providing advice for a range of clients in the private and public sectors. Prior to this Alan was a founding member of Colin Buchanan's Galway office

having moved there as the senior transportation engineer for the Galway Land Use and Transportation Study. Since the completion of that study in 1999, Alan has worked throughout the West of Ireland on a range of projects including: major development schemes, the Galway City Outer Bypass, Limerick Planning Land-Use and Transportation Study, Limerick Southern Ring Road Phase II, cost benefit analyses (COBA) and various studies for the NUI Galway. Before moving to Galway in 1997, Alan was involved in a wide variety of traffic and transport studies for CBP throughout the UK, Malta and Indonesia. He has particular expertise in the assessment of development related traffic, including many wind farm developments including the following; Ardderoo, Derryadd, Knocknamork, Shehy More, Cloncreen, Derrykillew, Coole, Ballyhorgan, Cahermurphy, Lettergull, Barnadivane, Cleanrath and Knockalough.

Alan has a BEng (hons) Degree in Transportation Engineering (Napier University, Edinburgh, 1989), is a member of Engineers Ireland and of the Institute of Highways and Transportation and is a TII accredited Road Safety Audit Team Member.

14.1.1.3 Guidance and Legislation

This section of the EIAR has been completed in accordance with the guidance set out in Chapter 1. The assessment uses standard terminology to describe the likely significant effects associated with the Proposed Development. Further information on the classification of effects used in this assessment is presented in Section 1.7.2 of this EIAR.

14.1.1.4 Scoping and Consultation

The scope for this assessment has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties as outlined in Section 2.5 of Chapter 2 of the EIAR and summarised below.

Transport Infrastructure Ireland

Transport Infrastructure Ireland (TII) responded to Scoping on the 9th March 2020 in which it provided a list of recommendations to be followed when preparing the EIAR.

All relevant TII guidelines and policies have been taken into account in the preparation of this assessment, including the following;

- PE-PDV-02045, *Transport Assessment Guidelines*, Transport Infrastructure Ireland, May 2014
- PE-PAG-02017, *Project Appraisal Guidelines, Unit 5.3, Travel Demand Projections,* Transport Infrastructure Ireland, May 2019
- DN-GEO-03060, *Geometric Design of junctions,* Transport Infrastructure Ireland, April 2017
- TII Automatic Traffic Count Data, N85.

Clare County Council

A pre-application consultation was held with Clare County Council on 7th July 2020 via Microsoft Teams. The meeting was attended by representatives of the Planning Department and Roads & Transportation Department, Slieveacurry Ltd and MKO. MKO provided an overview of the proposed turbine delivery route options for the proposed Slieveacurry renewable energy development. Any issues raised by Clare County Council in respect to the proposals were considered in the design of the Proposed Development.

14.1.1.5 Methodology and Section Structure

The traffic and transport assessment takes cognisance of guidance for such assessments set out by Transport Infrastructure Ireland (TII), in the document PE-PDV-02045 '*Traffic and Transport Assessment Guidelines'*, (TII, 2014).

The Traffic and Transport Section of this chapter is set out as follows:

- A review of the existing and future transport infrastructure in the vicinity of the Proposed Development, including an assessment of available traffic counts and traffic forecasts during an assumed construction year of 2024 (Sections 14.1.2 - Receiving Environment and 14.1.3 – Existing Traffic Volumes).
- A description of the nature of the Proposed Development and the traffic volumes that it will generate during the different construction stages and when it is operational (Section 14.1.4 – Proposed Development and Traffic Generation).
- A description of the abnormally sized large loads and vehicles that will require access to the site (Section 14.1.5 – Construction Traffic Design Vehicles).
- A review of the effects of development generated traffic on links and junctions during construction and when the facility is operational (Section 14.1.6 –Traffic effects during construction and during operation).
- Identification of traffic management for large deliveries during construction (Section 14.1.7 – Traffic Management for Large Deliveries).
- A geometric assessment of the route and its capacity to accommodate the abnormal-sized loads associated with the development (Section 14.1.8 – Route Assessment).
- An assessment of the provision for sustainable modes of travel (in this case primarily with respect to the transport of construction staff) (Section 14.1.9 – Provision for Sustainable Modes of Travel).

The description of likely significant effects is provided in Section 14.1.10.

14.1.2 Receiving Environment

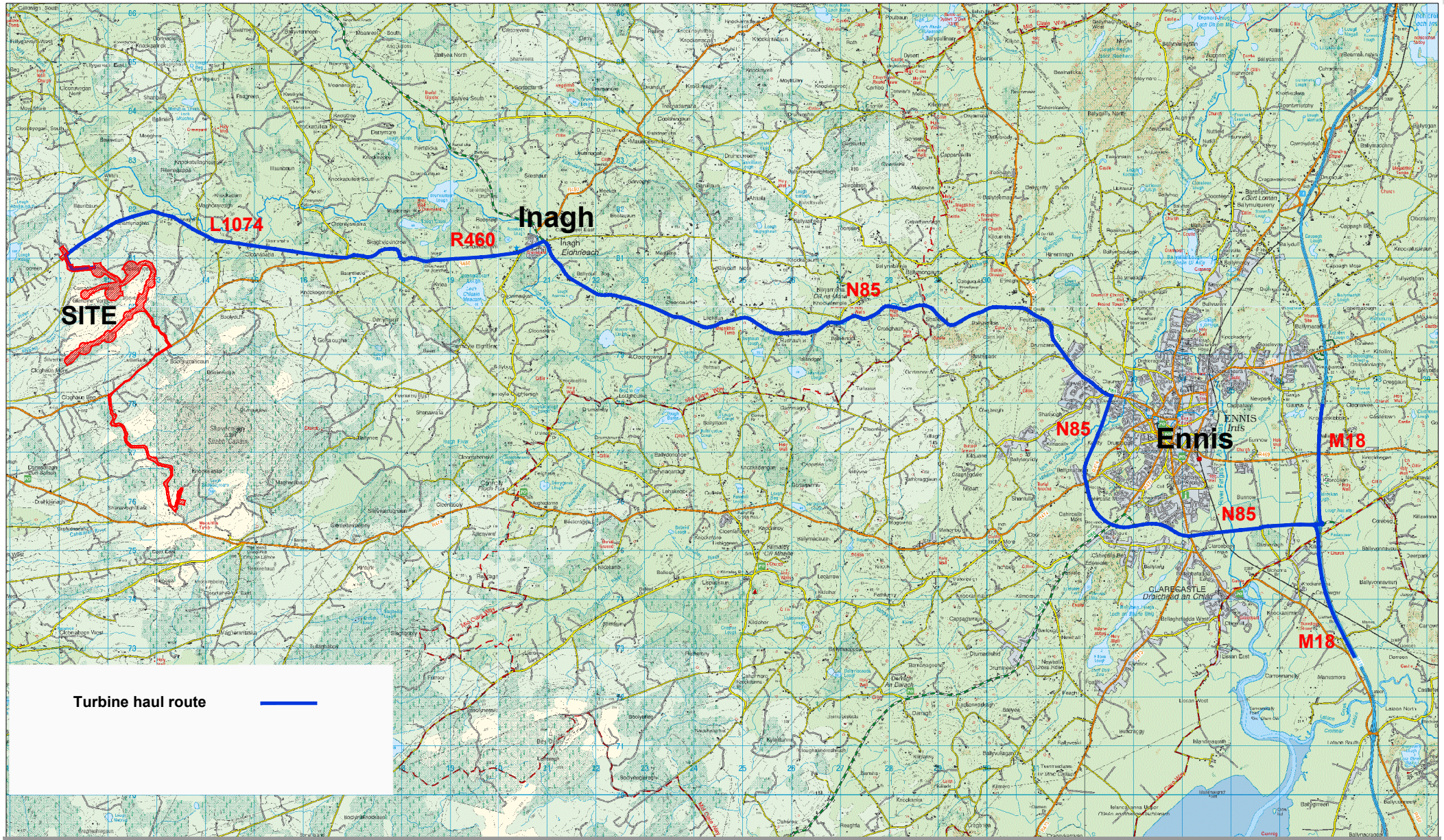
14.1.2.1 Site Location

The proposed Slieveacurry Renewable Energy Development will be located in the townlands of Glendine North and adjacent townlands in County Clare. The site is situated between the R460 Regional Road and the local L1074 local road, approximately 7 kms to the south of Ennistimon and 5kms to the east of Miltown Malbay. The full project description is detailed in Chapter 1, Section 1.4. The site location is shown on Figure 14-1.

14.1.2.2 Proposed Abnormal Size Load Delivery Route

A detailed assessment of the proposed haul route for the abnormally sized loads was made from a point at which the route turns off the western bypass of Ennis (N85) at the Claureen Roundabout onto the N85 heading northwest for 13.7 kms towards Inagh. The route is shown in Figure 14-1 and discussed in detail in Section 14.1.8. The route then turns left in the village of Inagh heading west on the R460 for 4.3 kms before veering right onto the local L1074. The routes continues westbound on the L1074 for 4.2 kms before taking a left hand band on the same road and continuing in a southwest direction for a further 2.0 kms. At this point the route turns left onto the L6230-19 heading south for 0.3 of a km. Access to the site is then gained by turning left onto an existing forest track heading in an eastern direction towards the site.

The locations of the potential pinch points on the haul route, together with the location of the proposed access junction, are discussed in Section 14.1.8, and shown in Figure 14-2a.



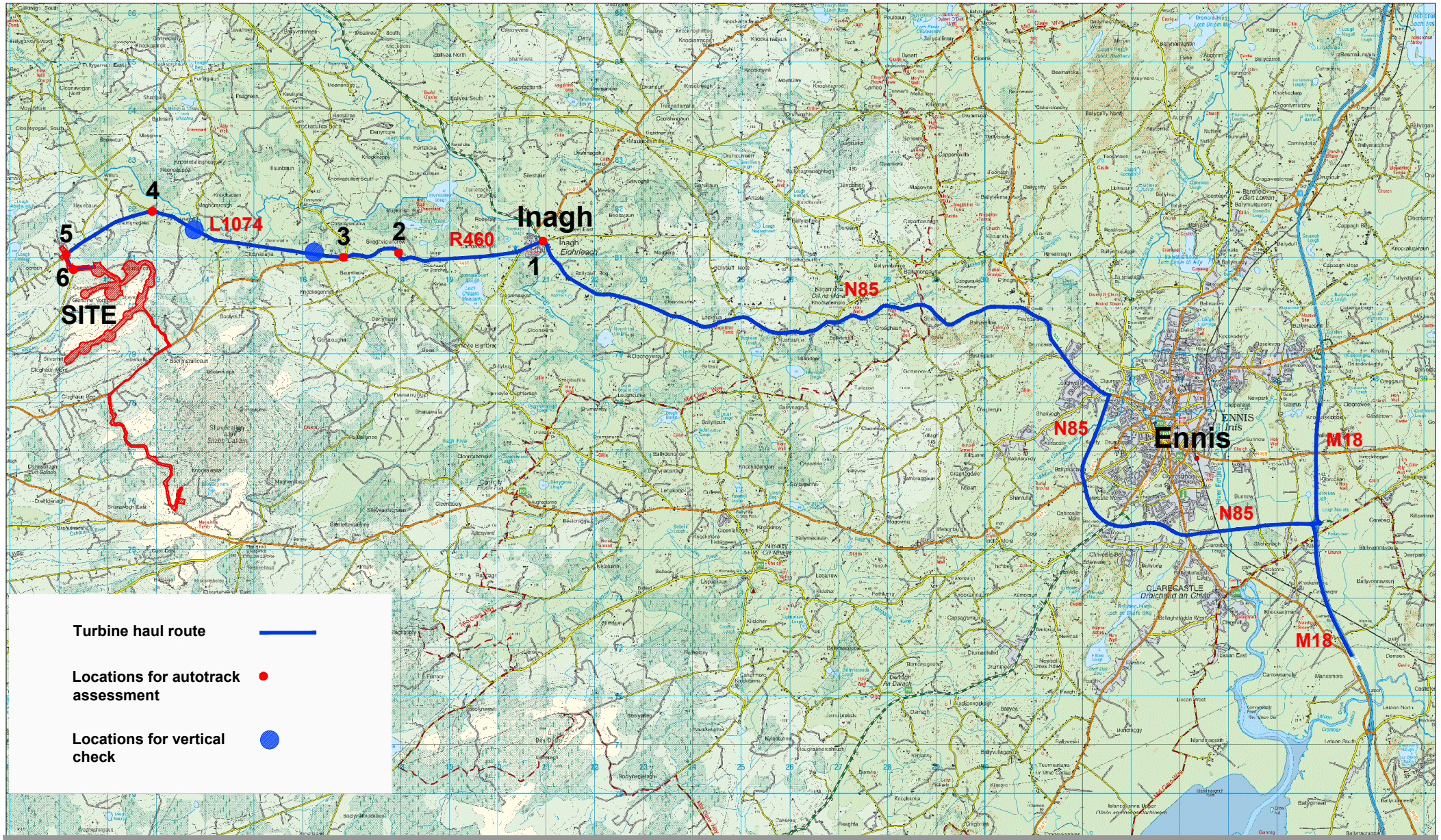
NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-1 Site location and delivery route

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	NTS
PROJECT NO: 8950	DATE: 10.11.21	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



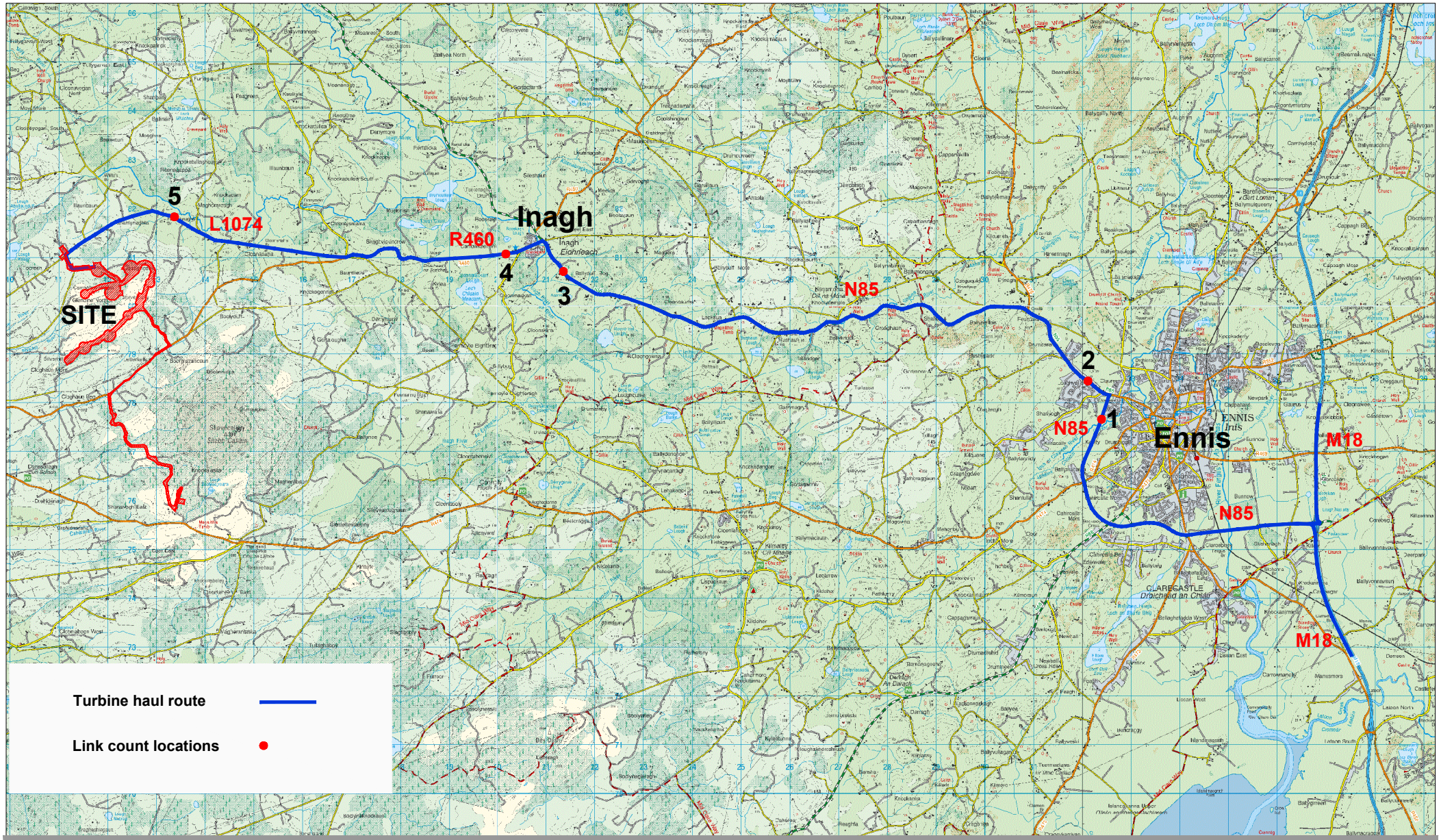
NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-2a Route assessment location plan

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	NTS
PROJECT NO: 8950	DATE: 10.11.21	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-2b Link count locations

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	NTS
PROJECT NO: 8950	DATE: 10.11.21	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

14.1.2.3 Proposed Construction Traffic Haul Route

The delivery route for general HGV construction traffic may vary depending on the location of the suppliers of concrete and other general construction materials required to construct the Proposed Development. The quarries that could potentially provide stone and ready mix concrete for the proposed development are as follows;

1. Roadstone, Bunratty,
2. Roadstone, Toonagh,
3. McGraths O'Callaghan's Wills, Tulla.

Based on the cement and other suppliers in the vicinity of the Proposed Development it is estimated that the concrete deliveries and general construction traffic will travel on the same route as identified for the abnormal loads.

The assessment presented in this section of the EIAR is based on these worst-case assumptions.

14.1.2.4 Site Entrance

The site will be accessed from one access junction located on the eastern side of the L6230-19, indicated as location 6 in Figure 14-2a. The proposed junction is at the location of an existing forestry access and will provide for all traffic movements generated during the construction of the Proposed Development, and for maintenance staff when operational. Works will be required at this location in order to accommodate access and egress of turbine vehicles and general construction traffic, with the proposed layout discussed in Section 14.1.8.

14.1.3 Existing Traffic Volumes

It should be noted that traffic volumes are discussed in terms of vehicles and passenger car units, or PCUs, where each vehicle is expressed in terms of its demand on the network relative to the equivalent number of cars. For example, an articulated HGV was given a factor of 2.4 passenger car units (as per TII Project Appraisal Guidelines for National Roads Unit 5.2), while one of the extended loaders required to transport the wind turbine equipment was assigned a value of 10.

14.1.3.1 Background Traffic Flows

The link count locations included in the assessment are shown in Figure 14-2b.

It is noted from the outset that due to travel restrictions in place for the Covid-19 virus, the collection of year 2020 traffic counts was not possible. Where available, historic traffic count data on the delivery route from previous assessments were used in addition to count data available from ATC count sites maintained by TII. For the 5 links on the delivery route included in the assessment the origin of the traffic flows adopted for the assessment are as follows;

Count location 1 - N85 south of Claureen Roundabout – Historic count from IDASO Ltd from the year 2018. This was factored to an assumed construction year of 2024 using TII growth forecasts discussed below.

Count location 2 - N85 west of Claureen Roundabout – As above.

Count location 3 - N85 through Inagh – A count was available from the Automatic Count Site (ATC) maintained by TII on the N85 located between Ennistimon and Inagh. This was factored to the year of 2024 using TII growth forecasts discussed below.

Count location 4 - R460 west of Inagh – The only count available at this location was an all-day traffic flow determine for the year 2009 as part of previous work undertaken for the subject site. The method used to determine 2024 traffic flows from the 2009 traffic flow was as follows. The closest historic data available (located on the N18 at Hurlers Cross, source; NRA) indicates that traffic flows reduced by 2% from 2009 to 2012, and increased by 2% between 2012 to 2014, resulting in no change from 2009 to 2014. Using previous NRA / TII data, annual growth factors show that traffic increased by 18% between the years 2014 and 2019. Traffic growth from 2019 to 2024 is determined from current TII factors as discussed below.

Count location 5 - L1074 – There were no counts available on the L1074 undertaken prior to the introduction of the impacts of the Covid 19 travel restrictions being in place. A short period traffic count was undertaken during the PM peak hour (17:00 to 18:00) on Friday July 10th 2020, when a 2-way flow of 75 vehicles was observed, equating to an all-day flow of 866 vehicles (based on PM peak hour to 24hr factor of 11.55 derived from the N85 ATC data). Using the same ATC data, it was established that July 2020 flows were down 15% compared to those observed in 2019 due to the impacts of Covid – 19 restrictions. An all-day figure of 1,000 vehicles was therefore adopted for the year 2020 for the L1074 leading to the site.

14.1.3.2 Future Background Traffic Volumes

This section describes the process adopted to produce background traffic forecasts for an assumed construction year of 2024 from the counts set out above.

Revised guidelines for forecasting annual growth in traffic volumes were produced by TII in May 2019, as set out by county in the '*Project Appraisal Guidelines for National Roads* (Unit 5.3)'. The annual growth rates for light vehicles for the County, and factors for the years relevant to this study, are shown in Table 14-1 and Table 14-2. Traffic volumes are forecast to increase during the period from 2018 to 2024 by 9.7%, and by 8.0% during the period from 2019 to 2024, assuming a medium growth scenario. All day traffic flows for the various years available are compared in Table 14-3.

It should be noted that while the assumed construction year of 2024 may vary slightly, this will not alter the forecast outcomes and effects presented in this section of the EIAR. This is due to the annual growth rate for background traffic being just 1.56% (as shown in Table 14-2) and the traffic volumes generated by the Proposed Development will remain unchanged regardless of construction year, as presented subsequently in Section 14.1.4.

Table 14-1 TII Traffic Growth Annual Factors and Indices for County Clare

Year	Lights – Annual Factor			Lights – Cumulative Index		
	Low	Medium	High	Low	Medium	High
2018	1.0139	1.0156	1.0191	1.000	1.000	1.000
2019	1.0139	1.0156	1.0191	1.014	1.016	1.019
2020	1.0139	1.0156	1.0191	1.028	1.031	1.039
2021	1.0139	1.0156	1.0191	1.042	1.048	1.058
2022	1.0139	1.0156	1.0191	1.057	1.064	1.079
2023	1.0139	1.0156	1.0191	1.071	1.080	1.099
2024	1.0139	1.0156	1.0191	1.086	1.097	1.120

Source: TII Project Appraisal Guidelines – Unit 5.3, May 2019

Table 14-2 TII traffic growth rates by growth scenario

Period	New Factors		
	Low	Medium	High
2018 – 2024	1.086	1.097	1.120
2019 – 2024	1.071	1.080	1.099

Table 14-3 Average all day flows by location and year (2-way vehicles)

Link	2009	2014	2018	2019	2024
1 N85 south of Claureen R'bout	NA	NA	10,698	NA	11,736
2 N85 west of Claureen R'bout	NA	NA	19,475	NA	21,364
3 N85 south of Inagh	NA	NA	NA	6,091	6,578
4 R460 west of Inagh	6,104	6,104	NA	6,214	6,711
5 L1074	NA	NA	NA	1,000	1,080

The TII traffic count data recorded on the N85 in the proximity of Inagh together and the traffic counts on the N85 at the Claureen Roundabout in Ennis were used to determine the existing percentage of HGVs on the study area network which ranged from between 2.6 and 3.8%. Traffic volumes forecast on the study network for the year 2024 are shown by vehicle type in Table 14-4.

Table 14-4 All day flows, percentage HGVs and flows by vehicle type, year 2024

Link	All day flow (vehs)	% HGV's	Vehicles		PCUs		
			HGVs	Cars / lgvs	HGVs	Cars / lgvs	Total
1 N85 south of Claureen R'bout	11,736	3.8%	446	11,290	1,070	11,290	12,360
2 N85 west of Claureen R'bout	21,364	3.2%	684	20,680	1,641	20,680	22,321
3 N85 south of Inagh	6,578	2.6%	171	6,407	410	6,407	6,818
4 R460 west of Inagh	6,711	2.6%	174	6,536	419	6,536	6,955
5 L1074	1,080	2.6%	28	1,052	67	1,052	1,119

14.1.4 Proposed Development and Traffic Generation

14.1.4.1 Development Trip Generation – During Construction

The assessment of the effects of traffic generated during the construction of the Proposed Development is considered in two stages.

- Stage 1 – Site preparation and groundworks, and,
- Stage 2 – Turbine component delivery.

For the purpose of the traffic impact assessment, assumptions based on typical wind farm construction projects regarding the length of the construction phases and work periods etc. must be made to inform the assessment. These assumptions allow for a worst-case scenario assessment but should not be inferred as prescriptive limitations to the construction phase. There are numerous variables which can affect a construction project programme such as weather for example. The construction phase of the Proposed Development will be carried out in accordance with the CEMP, which is submitted as Appendix 4-4 of this EIAR. The CEMP will be agreed with the Local Authority prior to construction commencing.

14.1.4.1.1 *Stage 1 – Site Preparation and Ground Works*

The construction phase of the Proposed Development is expected to last between 12 to 18 months. A period of 12 months was assumed for the purpose of this assessment in order to test the worst-case scenario in terms of traffic volumes per day. For assessment purposes a standard 255 working days per annum was adopted for the site preparation and ground works stage with the total numbers of deliveries made to the site during that period shown in Table 14-5.

During this construction phase, there will be two distinct types of days with respect to trip generation . A total of 8 days will be used to pour the 8 concrete wind turbine foundations. Foundations will likely be poured one per day, with an estimated 70 concrete loads required for each turbine foundation delivered to the site over a 12-hour period. This will result in 5 HGV trips to and from the site per hour. On the remaining 247 working days for this stage, other general materials will be delivered to the site.

During all of Stage 1, based on trip rates typical of wind farm projects, it is estimated that 2,272 two-way trips will be made to the site by trucks and large articulated HGVs, as set out in Table 14-5, with the daily effect on the local road network shown in Tables 14-6 and 14-7. The figures show that on the 8 days that concrete will be delivered to the site an additional 336 two-way PCUs will travel on the network (comprising 70 two-way HGV trips or 140 movements, with 2.4 PCUs per movement), as shown in Table 14-6. Similarly, on the 248 days when other materials will be delivered to the site, traffic volumes on the local network are forecast to increase by an average of 33 PCUs, as set out in Table 14-7.

Table 14-5 Stage 1 – Site preparation and groundworks – HGV movements

Material	Total no. Truck Loads	Truck type
Concrete	560	Trucks
Delivery of plant	56	Large artic
Fencing and gates	2	Large artic
Compound setup	32	Large artic
Steel	20	Large artic

Material	Total no. Truck Loads	Truck type
Sand / binding / stone	64	Truck
Ducting and cabling (internal)	191	Large artic
Grid connection cable laying	0	Large artic
Tree felling	285	Large artic
Crane (to lift steel)	1	Large artic
Road construction	613	Truck
Substation (extension)	72	Large artic
Cranes for turbine	10	Large artic
Re-fueling for plant	166	Large artic
Site maintenance	120	Large artic
Waste Collection/Miscellaneous	80	Large artic
Total	2,272	

Table 14-6 Stage 1 – Concrete foundation pouring – total movements and volumes per delivery day

Material	Total Truck Loads	Truck type	PCU Value	Total PCUs	PCU Movements /day*	2- way PCUs/day
Concrete	560	Truck	2.4	1,344	168.0	336.0
* Estimation based on 8 concrete pouring days						

Table 14-7 Stage 1 – Site preparation and groundworks – total HGV movements and volumes per delivery day

Material	Total Truck Loads	Truck type	PCU Value	Total PCUs	PCU Movements /day*	2- way PCUs/day
Delivery of plant	56	Large artic	2.4	134.4	0.5	1.1
Fencing and gates	2	Large artic	2.4	3.8	0.0	0.0
Compound setup	32	Large artic	2.4	76.8	0.3	0.6

Material	Total Truck Loads	Truck type	PCU Value	Total PCUs	PCU Movements /day*	2- way PCUs/day
Steel	20	Large artic	2.4	48.0	0.2	0.4
Sand / binding / stone	64	Truck	2.4	153.6	0.6	1.2
Ducting and cabling (internal)	191	Large artic	2.4	458.9	1.9	3.7
Grid connection cable laying	0	Large artic	2.4	0.0	0.0	0.0
Tree felling	285	Large artic	2.4	684.0	2.8	5.5
Crane (to lift steel)	1	Large artic	2.4	1.9	0.0	0.0
Road construction	613	Truck	2.4	1470.7	6.0	11.9
Substation (extension)	72	Large artic	2.4	172.8	0.7	1.4
Cranes for turbine	10	Large artic	2.4	23.0	0.1	0.2
Re-fueling for plant	166	Large artic	2.4	397.4	1.6	3.2
Site maintenance	120	Large artic	2.4	288.0	1.2	2.3
Miscellaneous	80	Large artic	2.4	192.0	0.8	1.6
Total	**1,712**			**4,109**	**16.6**	**33.3**

** Estimation based on groundwork period of 247 working days*

14.1.4.1.2 *Stage 2 – Turbine Construction*

During the turbine construction stage, including delivery and assembly, some deliveries to the site will be made by abnormally large vehicles, referred to in this section as extended artics, transporting the component parts of the turbines (nacelles, blades and towers). There will also be deliveries made by normal large HGVs, transporting cables, tools and smaller component parts. The types of load and associated numbers of trips made to the site during the turbine construction period are shown in Table 14-8, which summarises that a total of 64 trips will be made to and from the site by extended artics, with a further 32 trips made by conventional large articulated HGVs.

Table 14-8 Stage 2 – Wind turbine plant – total HGV and Extended artic movements

Material	Units	Quantity per Unit	Total Quantity	Quantity per Truck	Total Truck Loads	Truck type
Nacelle	8	1	8	1	8	Extended Artic
Blades	8	3	24	1	24	Extended Artic
Towers	8	4	32	1	82	Extended Artic
Sub total					***64***	
Transformer	8	1	8	1	8	Large Artic
Drive train and blade hub	8	1	8	1	8	Large Artic
Base and other deliveries	8	2	16	1	16	Large Artic
Sub total					***32***	
Total					96	

For the purposes of this assessment an assumed delivery period is provided although this may be subject to change. It is assumed that the turbine delivery element will progress at the rate of 3 extended artic trips made by convoy to the site on 2 days per week, resulting in this stage taking approximately 12 days/nights spread over an assumed 11-week period. On a further two days per week, lasting for approximately 4 weeks, the remaining equipment required during this phase will be delivered to the site. The additional traffic movements for these 2 types of days are summarised in Tables 14-9 and Table 14-10. In Table 14-9, a PCU equivalent value of 10 was allocated to each extended artic movement, resulting in an additional 60 PCUs on the study network on these 2 days per week, while an additional 19 PCUs are forecast to be on the network on two other days per week, as shown in Table 14-10, during the turbine construction phase.

Table 14-9 Stage 2 – Wind turbine plant– total Extended artic movements and volumes per delivery day

Material	Units	Truck Type	PCU Value	Total PCUs	2-way PCUs/ day
Nacelle	1	Extended Artic	10	10.0	20.0
Blades	3	Extended Artic	10	30.0	60.0
Towers	4	Extended Artic	10	40.0	80.0
Total per turbine	8			80.0	160.0

Material	Units	Truck Type	PCU Value	Total PCUs	2-way PCUs/ day
Total per delivery day	3			30.0	60.0
*Estimation based on 3 abnormal sized loads being delivered per day on 2 days per week (total 64 loads will take 22 nights spread over 11 weeks)					

Table 14-10 Stage 2 - Wind turbine plant - total HGVs movements and volumes per delivery day

Material	Quantity per Unit	PCU Value	2-way PCUs / day
Transformer	1	2.4	4.8
Drive train and blade hub	1	2.4	4.8
Base & other deliveries	2	2.4	9.6
Total	3		19.2

**Estimation based on equipment for 2 turbines being moved per week spread over 2 days*

14.1.4.1.3 *Construction Employee Traffic*

It is estimated that a maximum of 70 staff members will be employed on the site at any one time during the site preparation and groundworks stage of construction, reducing to a maximum of 45 staff at any one time during the turbine construction stage. If a worst case is assumed that all staff will travel to / from the site by car, at an average of 2 persons per car, then a total of 70 PCU movements (each trip is two way) will be added to the network during the groundworks stage of the development, reducing to 45 pcu trips during the turbine construction stage.

14.1.4.2 Development Trip Generation – During Operation

It is assumed that the Proposed Development will be unmanned once operational and will be remotely monitored. Traffic associated with the operational phase of the proposed renewable energy dev will be from the wind farm developers and maintenance personnel who will visit individual turbines.

It is estimated that the traffic volumes that will be generated by the development once it is operational will be minimal. The site will be unmanned but will generate maintenance trips, with approximately two maintenance staff travelling to site at any one time. The impact on the network of these trips during the operational stage is discussed in Section 14.1.6.

14.1.5 Construction Traffic Design Vehicles

14.1.5.1 Construction Traffic Vehicle Types

The delivery of turbine components including blades, tower sections and nacelles is a specialist operation due to the oversized loads involved. The blades are the longest turbine component and in the case of the Proposed Development, a maximum blade length of 75.0m has been considered for the purpose of this route assessment. Any other blade length within the proposed range (66.5m to 75m) will be shorter and therefore the autotracks present the worst case scenario.

For the purpose of the assessment set out in this EIAR, it is assumed that the blades, which are the largest turbine components, will be transported using a standard extended arctic. As this method involves transporting the blade in a horizontal position it represents the worst case in terms of the geometric requirements on the road network. It is noted, however, that during the delivery phase consideration will be given to using alternative transportation technologies, including the use of scissor lift adaptors which raise the rear of the blade over existing obstructions, and in extreme cases, the use of blade lift adaptors that can transport blades at an angle to both lift the rear of the blade and shorten the wheelbase of the transporter.

The key dimensions are as follows:

Transport of Blades – Super Wing Carrier with blade

Total length	81.0 m
Length of blade	75.0 m
Inner radius	28.0 m

Transport of Tower – Using low-bed or drop deck trailers

Total length (with load)	46.7 m
Length of load	30.0 m
Inner radius	25.0 m

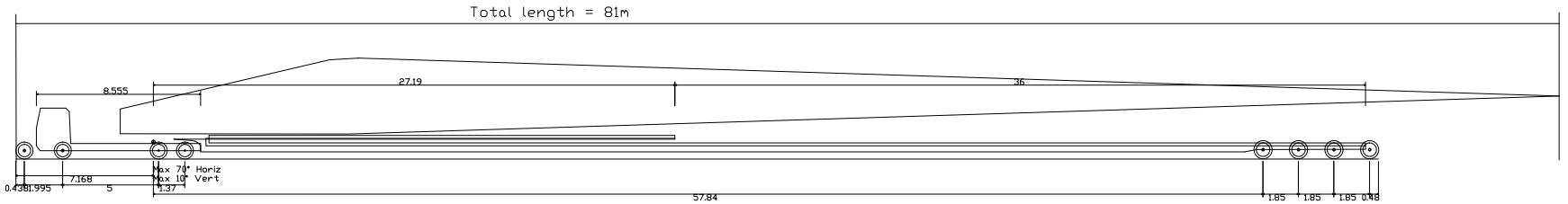
The critical vehicles in terms of size and turning geometry requirements and used in the detailed route assessment discussed in Section 14.1.8, are the blade and tower transporters. The geometry of the design vehicles are included as Figures 14-3 and 14-4.

The vehicles used to transport the nacelles will be shorter in length compared to the blade and tower transporters.

All other vehicles requiring access to the site will be standard HGVs and will be significantly smaller than the design test vehicles.

14.1.6 Traffic Effects During Construction and During Operation

As detailed below, transportation of large turbine components will be carried out at night when traffic is at its lightest and in consultation with the relevant Roads Authority and An Garda Síochána with deliveries accompanied by Garda escort.



75 m blade

Overall Length	81m
Overall Width	2.550m
Overall Body Height	2.661m
Min Body Ground Clearance	0.375m
Track Width	2.500m
Lock to Lock Time	6.00s
Wall to Wall Turning Radius	9.800m

NOTES:

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Figure 14-3 Design blade extended artic profile

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy		SCALE: NTS
PROJECT NO: 8950	DATE: 12.08.21		DRAWN BY: AL

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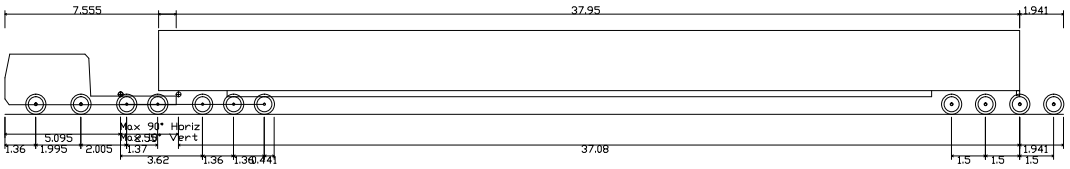

Tower	
Overall Length	46.666m
Overall Width	2.550m
Overall Body Height	3.695m
Min Body Ground Clearance	0.427m
Max Track Width	2.520m
Lock to Lock Time	6.00s
Wall to Wall Turning Radius	9.800m

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-4 Design tower extended artic profile

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy		SCALE: NTS
PROJECT NO: 8950	DATE: 12.08.21		DRAWN BY: AL

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Effect on Link Flows – During Construction

Background traffic volumes, as established previously and set out in Table 14-4, and development generated traffic volumes, are shown for the typical construction day scenarios discussed in Section 14.1.4 and are set out in Table 14-11 to 14-14, with the traffic effects summarised in Table 14-15 to 14-18. The actual figures presented in the tables will be subject to change, however they are considered to represent a robust estimation of the likely effects.

In terms of daily traffic flows the potential effects may be summarised as follows:

During Stage 1 – Concrete Pouring

For these 8 days an additional 406 PCUs will travel on the study network. On these days, the percentage increase in traffic volumes experienced on the study network will be between +1.8% on the N85 to the west of the Claureen Roundabout, to +6.0% on the N85 passing through Inagh, to +5.8% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +36.3% on the L1074 approaching the site.

During Stage 1 - Site Preparation and Groundworks

On average an additional 101 PCUs will travel on the local highway network during these 247 days. This will result in a percentage increase in traffic volumes on the study network of between +0.5% on the N85 to the west of the Claureen Roundabout, to +1.5 on the N85 passing through Inagh, to +1.5% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +9.2% on the L1074 approaching the site.

During Stage 2 - Turbine Construction Stage – Delivery of large equipment using extended articulated vehicles

The additional 105 PCUs (made up of cars and large extended artics) will appear on the study network for 22 nights. On the nights this impact occurs, volumes will increase by between +0.5% on the N85 to the west of the Claureen Roundabout, to +1.5 on the N85 passing through Inagh, to +1.5% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +9.4% on the L1074 approaching the site.

The most significant traffic impact may be experienced during these days primarily due to the slow speeds, size and geometric requirements of these vehicles. The provision of traffic management measures, including ensuring that these deliveries are made at night (as set out in Sections 14.1.7 and 14.1.10.6 and included in the CEMP), will be required to minimise the impact of development traffic on the study network on these days.

During Stage 2 - Turbine Construction Stage – Other deliveries using conventional articulated HGVs

For 7 days on the delivery route 64 additional PCUs (made up of cars and standard articulated HGV movements to the site and back) will travel on the study network. On these days, the percentage increase on the study network will be between +0.3% on the N85 to the west of the Claureen Roundabout, to +0.9 on the N85 passing through Inagh, to +0.9% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +5.7% on the L1074 approaching the site.

Table 14-11 Daily effects of development traffic during concrete pouring

Link	Background PCUs			Development PCUs			Total PCUs (Background + Development)		
	Car	HGV	Total	Car	HGV	Total	Car	HGV	Total
1 N85 south of Claureen R'bout	11,290	1,070	12,360	70	336	406	11,360	1,406	12,766
2 N85 west of Claureen R'bout	20,680	1,641	22,321	70	336	406	20,750	1,977	22,727
3 N85 south of Inagh	6,407	410	6,818	70	336	406	6,477	746	7,224
4 R460 west of Inagh	6,536	419	6,955	70	336	406	6,606	755	7,361
5 L1074	1,052	67	1,119	70	336	406	1,122	403	1,525

Table 14-12 Daily development traffic during site preparation and groundworks

Link	Background PCUs			Development PCUs			Total PCUs (Background + Development)		
	Car	HGV	Total	Car	HGV	Total	Car	HGV	Total
1 N85 south of Claureen R'bout	11,290	1,070	12,360	70	33	103	11,360	1,103	12,463
2 N85 west of Claureen R'bout	20,680	1,641	22,321	70	33	103	20,750	1,674	22,424
3 N85 south of Inagh	6,407	410	6,818	70	33	103	6,477	443	6,921
4 R460 west of Inagh	6,536	419	6,955	70	33	103	6,606	452	7,058
5 L1074	1,052	67	1,119	70	33	103	1,122	100	1,222

Table 14-13 Daily development traffic during turbine construction - extended artics (large turbine components)

Link	Background PCUs			Development PCUs			Total PCUs (Background + Development)		
	Car	HGV	Total	Car	HGV	Total	Car	HGV	Total
1 N85 south of Claureen R'bout	11,290	1,070	12,360	45	60	105	11,335	1,130	12,465
2 N85 west of Claureen R'bout	20,680	1,641	22,321	45	60	105	20,725	1,701	22,426
3 N85 south of Inagh	6,407	410	6,818	45	60	105	6,452	470	6,923
4 R460 west of Inagh	6,536	419	6,955	45	60	105	6,581	479	7,060
5 L1074	1,052	67	1,119	45	60	105	1,097	127	1,224

Table 14-14 Daily effect of development traffic during turbine construction – other deliveries (small turbine components)

Link	Background PCUs			Development PCUs			Total PCUs (Background + Development)		
	Car	HGV	Total	Car	HGV	Total	Car	HGV	Total
1 N85 south of Claureen R'bout	11,290	1,070	12,360	45	19	64	11,335	1,089	12,424
2 N85 west of Claureen R'bout	20,680	1,641	22,321	45	19	64	20,725	1,660	22,385
3 N85 south of Inagh	6,407	410	6,818	45	19	64	6,452	429	6,882
4 R460 west of Inagh	6,536	419	6,955	45	19	64	6,581	438	7,019
5 L1074	1,052	67	1,119	45	19	64	1,097	86	1,183

Table 14-15 Daily summary effect of development traffic during concrete pouring

Link	Background	Development	Total	% increase	Estimated No. of days
1 N85 south of Claureen R'bout	12,360	406	12,766	3.3%	8
2 N85 west of Claureen R'bout	22,321	406	22,727	1.8%	8
3 N85 south of Inagh	6,818	406	7,224	6.0%	8
4 R460 west of Inagh	6,955	406	7,361	5.8%	8
5 L1074	1,119	406	1,525	36.3%	8

Table 14-16 Daily summary effect of development traffic during site preparation and ground works

Link	Background	Development	Total	% increase	Estimated No. of days
1 N85 south of Claureen R'bout	12,360	103	12,463	0.8%	247
2 N85 west of Claureen R'bout	22,321	103	22,424	0.5%	247
3 N85 south of Inagh	6,818	103	6,921	1.5%	247
4 R460 west of Inagh	6,955	103	7,058	1.5%	247
5 L1074	1,119	103	1,222	9.2%	247

Table 14-17 Daily summary effect of development traffic during turbine construction – extended artics (large turbine components)

Link	Background	Development	Total	% increase	Estimated No. of days
1 N85 south of Claureen R'bout	12,360	105	12,465	0.8%	22
2 N85 west of Claureen R'bout	22,321	105	22,426	0.5%	22
3 N85 south of Inagh	6,818	105	6,923	1.5%	22
4 R460 west of Inagh	6,955	105	7,060	1.5%	22

Link	Background	Development	Total	% increase	Estimated No. of days
5 L1074	1,119	105	1,224	9.4%	22

Table 14-18 Daily summary effect of development traffic during turbine construction – other deliveries (small turbine components)

Link	Background	Development	Total	% increase	Estimated No. of days
1 N85 south of Claureen R'bout	12,360	64	12,424	0.5%	8
2 N85 west of Claureen R'bout	22,321	64	22,385	0.3%	8
3 N85 south of Inagh	6,818	64	6,882	0.9%	8
4 R460 west of Inagh	6,955	64	7,019	0.9%	8
5 L1074	1,119	64	1,183	5.7%	8

An assessment of the impact on link capacities in the study area was undertaken for the various construction stages as set out in Table 14-19, Table 14-20 and Table 14-21. The capacity for each link in the study area is shown in Table 14-19. The capacities range from a daily flow of 11,600 vehicles on the N85 south of the Claureen Roundabout down to 5,000 on the R460 and L1074 and are based on road widths and capacities set out in the TII Standards document DN-GEO-03031 Road Link Design, Table 6/1.

Background, or do-nothing traffic flows, are compared to flows forecast for the various construction delivery stages in Table 14-20 with the percentage capacity reached for each link and stage shown in Table 14-21. Based on this assessment the following points are noted;

- On the external network the N85 to the west of the Claureen Roundabout is the busiest road with the link capacity forecast to operate at 260% for the do-nothing scenario, increasing to a maximum of 264% during the 8 days that the concrete foundations will be poured. During all other construction days, it is forecast that construction traffic will increase traffic volumes on this link by a maximum of one percentage point.
- Similarly, on the N85 to the south of the Claureen Roundabout is also forecast to operate over capacity for the do-nothing scenario at 107%. This is forecast to increase to a maximum of 110% during the 8 days that the concrete foundations will be poured. During all other construction days, it is forecast that construction traffic will increase traffic volumes on this link by a maximum of one percentage point.
- A similar scenario exists on the R460 to the west of Inagh which is also forecast to operate over capacity for the do-nothing scenario at 139%. This is forecast to increase to a maximum of 147% during the 8 days that the concrete foundations will be poured. During all other construction days, it is forecast that construction traffic will increase traffic volumes on this link by a maximum of two percentage points.
- All other sections of the haul routes are forecast to operate within capacity for the duration of the construction period.

Table 14-19 Carriageway widths, link type and link capacity

Link	Width (m)	Link type	Link capacity
1 N85 south of Claureen R'bout	7.0	Type 1 single	11,600
2 N85 west of Claureen R'bout	7.0	Type 2 single	8,600
3 N85 south of Inagh	7.0	Type 2 single	8,600
4 R460 west of Inagh	6.0	Type 3 single	5,000
5 L1074	6.0	Type 3 single	5,000

Table 14-20 Link capacity and summary of link flows by construction delivery stage

Link	Link capacity	Construction delivery stage				
		Background traffic	Concrete pour	Other site works	Turbine plant	Turbine equipment
1 N85 south of Claureen R'bout	11,600	12,360	12,766	12,461	12,465	12,424
2 N85 west of Claureen R'bout	8,600	22,321	22,727	22,422	22,426	22,385
3 N85 south of Inagh	8,600	6,818	7,224	6,919	6,923	6,882
4 R460 west of Inagh	5,000	6,955	7,361	7,056	7,060	7,019
5 L1074	5,000	1,119	1,525	1,220	1,224	1,183

Table 14-21 Link capacity and % of link capacity by construction delivery stage

Link	Link capacity	Construction delivery stage				
		Background traffic	Concrete pour	Other site works	Turbine plant	Turbine equipment
1 N85 south of Claureen R'bout	11,600	107%	110%	107%	107%	107%

Link	Link capacity	Construction delivery stage				
2 N85 west of Claureen R'bout	8,600	260%	264%	261%	261%	260%
3 N85 south of Inagh	8,600	79%	84%	80%	80%	80%
4 R460 west of Inagh	5,000	139%	147%	141%	141%	140%
5 L1074	5,000	22%	31%	24%	24%	24%

Effect on Link Flows – During Operation

Once the Proposed Development is operational, it is estimated that there will be approximately two maintenance staff will access the site at any particular time, to carry out operational maintenance, with a similar number of vehicle trips. It is considered that the traffic impact during this phase will be imperceptible.

Effect on Junctions – During Construction

The capacity of the existing N85 / R460 junction located in the village of Inagh was assessed using the industry standard junction simulation software PICADY, which permits the capacity of any junction to be assessed with respect to existing or forecast traffic movements and volumes for a given period. The capacity for each movement possible at the junction being assessed is determined from geometric data input into the program with the output used in the assessment as follows:

- Queue – This is the average queue forecast for each movement and is useful to ensure that queues will not interfere with adjacent junctions.
- Degree of Saturation or Ratio of Flow to Capacity (% Sat or RFC) – As suggested, this offers a measure of the amount of available capacity being utilised for each movement. Ideally each movement should operate at a level of no greater than 85% of capacity.
- Delay – Output in minutes, this gives an indication of the forecast average delay during the time period modelled for each movement.

Scenarios Modelled

While other junctions and links on the network will experience an increase in traffic volumes passing through them, as discussed previously and as set out in Tables 14-15 to 14-18 above, the worst-case effect will be experienced during peak hours when, during peak construction periods, up to 70 workers (35 cars) will pass through it. It is noted that deliveries of materials to the site will take place during the day after the workers have arrived on site, and before they leave at the end of the day and will therefore not occur at the same time.

R584 access junction Capacity Test Results

The AM peak hour traffic flows through the N85 / R460 junction are shown for the years 2019 and 2024 in Figure 14-5a, with traffic flows generated by the Proposed Development during the AM peak

hour set out in Figure 14-5b. Year 2024 traffic flows with development generated traffic are also shown in Figure 14-5b.

The results of the capacity assessment, as set out in Table 14-22, show that additional car trips passing through the junction will have a slight effect on existing traffic at this location, with a maximum ratio of flow to capacity (RFC) at the junction forecast to be 12.0% for traffic turning right into the R460 during the AM peak hour without the Proposed Development traffic, increasing to 16.5% with the additional traffic generated by the Proposed Development in place. The maximum RFC at the junction is forecast to apply to traffic accessing the N85 from the R460, which is forecast to be 49.6% for the with development scenario. These are well within the acceptable limit of 85%.

Table 14-22 Junction capacity test results, N85/R460 junction, AM and PM peak hours, without and with construction staff, year 2024

Year	Location	Without development			With development		
AM peak hour		RFC	Queue (vehicles)	Delay (minutes)	RFC	Queue (vehicles)	Delay (minutes)
	From R460	48.7%	0.93	0.28	49.6%	0.95	0.29
	Right turn into R460	12.0%	0.18	0.12	16.5%	0.25	0.12

Effect on Junctions – During Operation

As discussed in Section 14.1.6 it is forecast that once operational, the Proposed Development will generate approximately 2 trips per day for maintenance purposes. It is therefore concluded that the Proposed Development will not have a significant effect on the local network once constructed.

Effect on Network of Grid Connection

The planning application includes a grid connection to the existing Slievecallan 110kV substation located approximately 2.0kms to the south of the southern boundary of the subject site, with the grid connection having a total length of approximately 7.1kms.

The proposed grid connection route is shown in Figure 4-16 of Chapter 4.

The cable route will travel south from the subject site for approximately 1.5km before crossing the R460. The route then travels west along the R460 for approximately 1.6kms. For this section the cable will be set within the curtilage of the R460 with a "Stop-and Go" traffic management system in place to retain alternate one-way traffic flow on the R460. On this section the grid connection will be installed by 2 teams, one operating at either end, with each team laying approximately 150 metres of cable per day, equating to a total of 300 metres per day. Traffic on the R460 will therefore experience minor delays on this section of the R460 for approximately 5 days.

The route then travels south for approximately 4 kms traveling through existing wind farm roads, forestry and agricultural land towards the Slievecallan 110kV substation. On this section the route will require to cross one forestry access road. Details of all water crossings are shown in Figure 4-21 of Chapter 4.

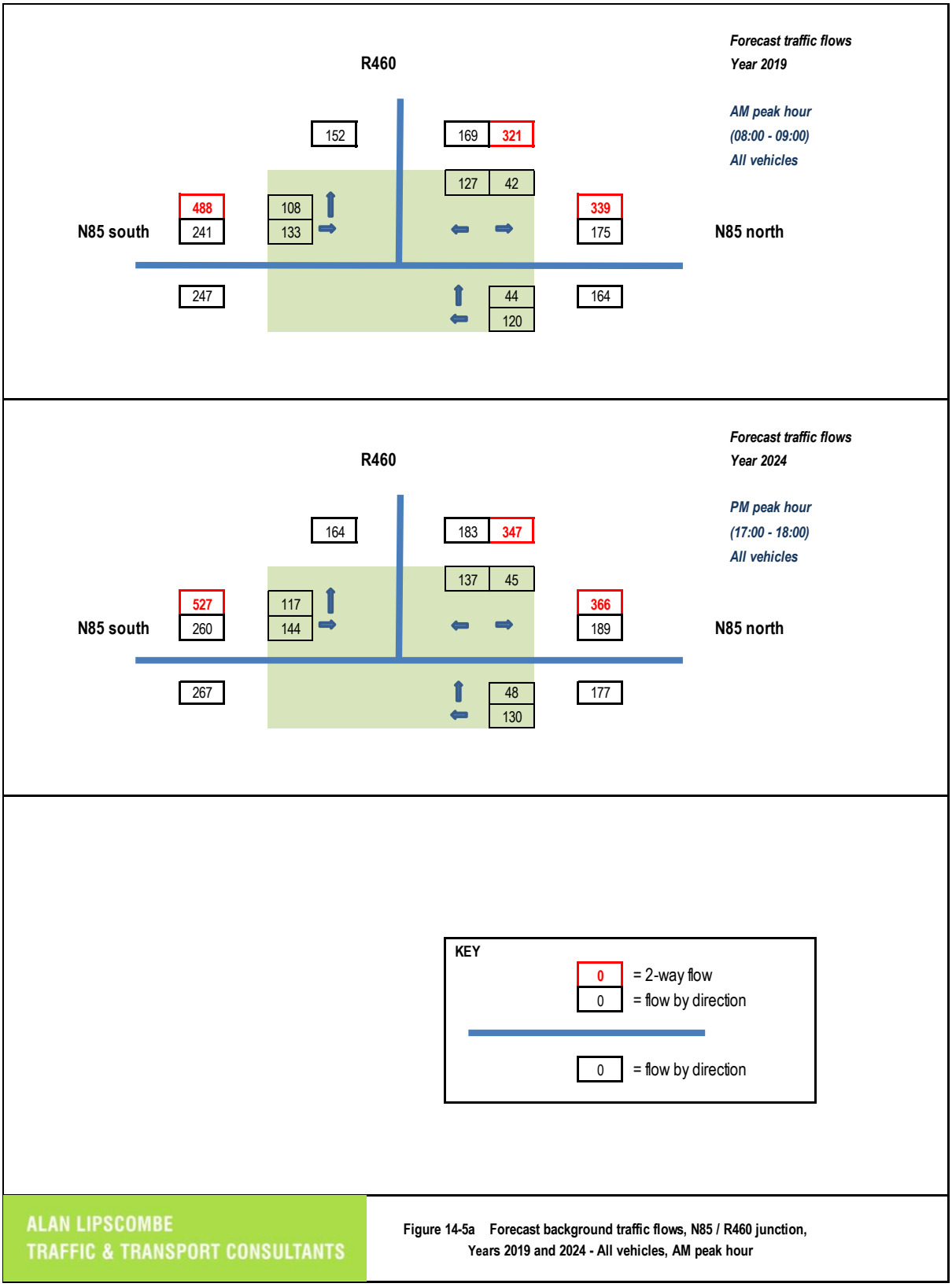

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Figure 14-5a Forecast background traffic flows, N85 / R460 junction, Years 2019 and 2024 - All vehicles, AM peak hour

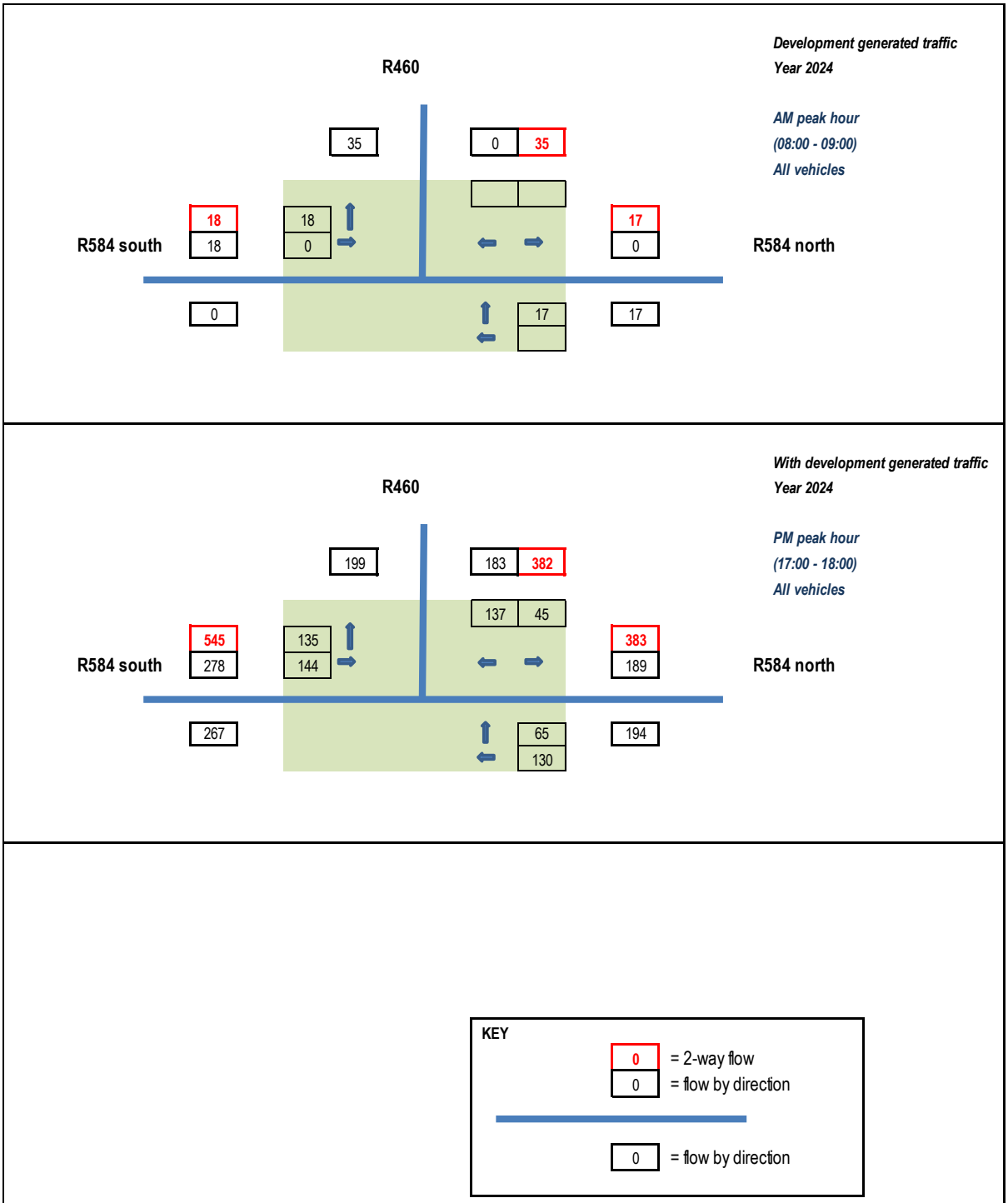

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Figure 14-5b Development generated traffic and with development traffic flows, N85 / R460 junction, Year 2024 - All vehicles, AM peak hour

The construction methodology of providing a cable route under and along local road networks is well established and accepted nationwide. There are in excess of 270 wind farms currently operational in Ireland and the majority of these are connected to the national grid via underground cable connections predominantly along the public road networks.

14.1.7 Traffic Management of Large Deliveries

The greatest effect on the road network will likely be experienced on the approximately 22 days/nights during which the 3 large loads comprising the tower sections, the blades and the nacelles are delivered to the site.

Traffic management measures are included in Section 14.1.10.6 and include the following:

- Identification of a delivery schedule,
- Details of the alterations required to the infrastructure identified in Section 14.1.8 of this report and any other minor alteration identified (hedge rows etc),
- A dry run of the route using vehicles with similar dimensions.

The transport of large components is challenging and can only be done following extensive route selection, route proofing and consultation with An Garda Síochána and the various local authorities. Turbine components are often transported at night when traffic is lightest and this is done in consultation with the road's authorities / An Garda Síochána and special permits are generally required.

In some cases, temporary accommodation works are required along the turbine delivery route (TDR) such as hedge or tree cutting, temporary relocation of powerlines/poles, lampposts, signage and minor road verge works. Any updates to the road will be carried out in advance of turbine deliveries and following consultation and agreement with the appropriate local authorities.

It is not anticipated that any sections of the local road network will be closed, although there may be delays to local traffic at various locations if the deliveries are made during daylight hours. During these periods, it may be appropriate to operate local diversions for through traffic. The effect of this stage may be minimised by the deliveries of the abnormally sized large loads taking place during the night. It is noted that it is proposed that all deliveries of abnormally sized loads will be made during night time hours, as is the norm for such deliveries.

14.1.8 Route Assessment

A route assessment was undertaken covering the proposed delivery route for the abnormal loads, with the route and assessment locations shown in Figure 14-2a. For these locations, preliminary road and junction alignments, based on land surveys or OS mapping, were supplied by the project team. A preliminary swept path analysis was then undertaken using Autotrack in order to establish the locations where the wind turbine transport vehicles will be accommodated, and the locations where some form of remedial measure may be required.

There are sections on the L1074, as indicated on Figure 14-2a, where the vertical alignment may require specialist transport vehicles and these sections will be further considered by the appointed transport company following the turbine procurement process. Accommodation works will be required at various locations on the national and regional road network between the port of arrival and Ennis. These will be limited to temporary measures including temporary local road widening, overruns of roundabout island and temporary relocation of some signs and street furniture.

In line with best practice, it is recommended to carry out a dry-run assessment prior to construction.

The assessment also presents the preliminary design of the proposed site access junction off the L6230-19, and the autotrack assessment for the appropriate vehicle types relevant to each access.

The locations discussed are as follows;

- Location 1 – N85 / R460 junction at Inagh
- Location 2 – Bend on R460
- Location 3 – R460 / L1074 junction
- Location 4 – Bend on L1074
- Location 5 – L1074 / L6230-19 junction
- Location 6 – L6230-19 forestry access road junction

Location 1 – N85 / R460 junction at Inagh

See Figures 14-6 and 14-7 and Plate 14-1

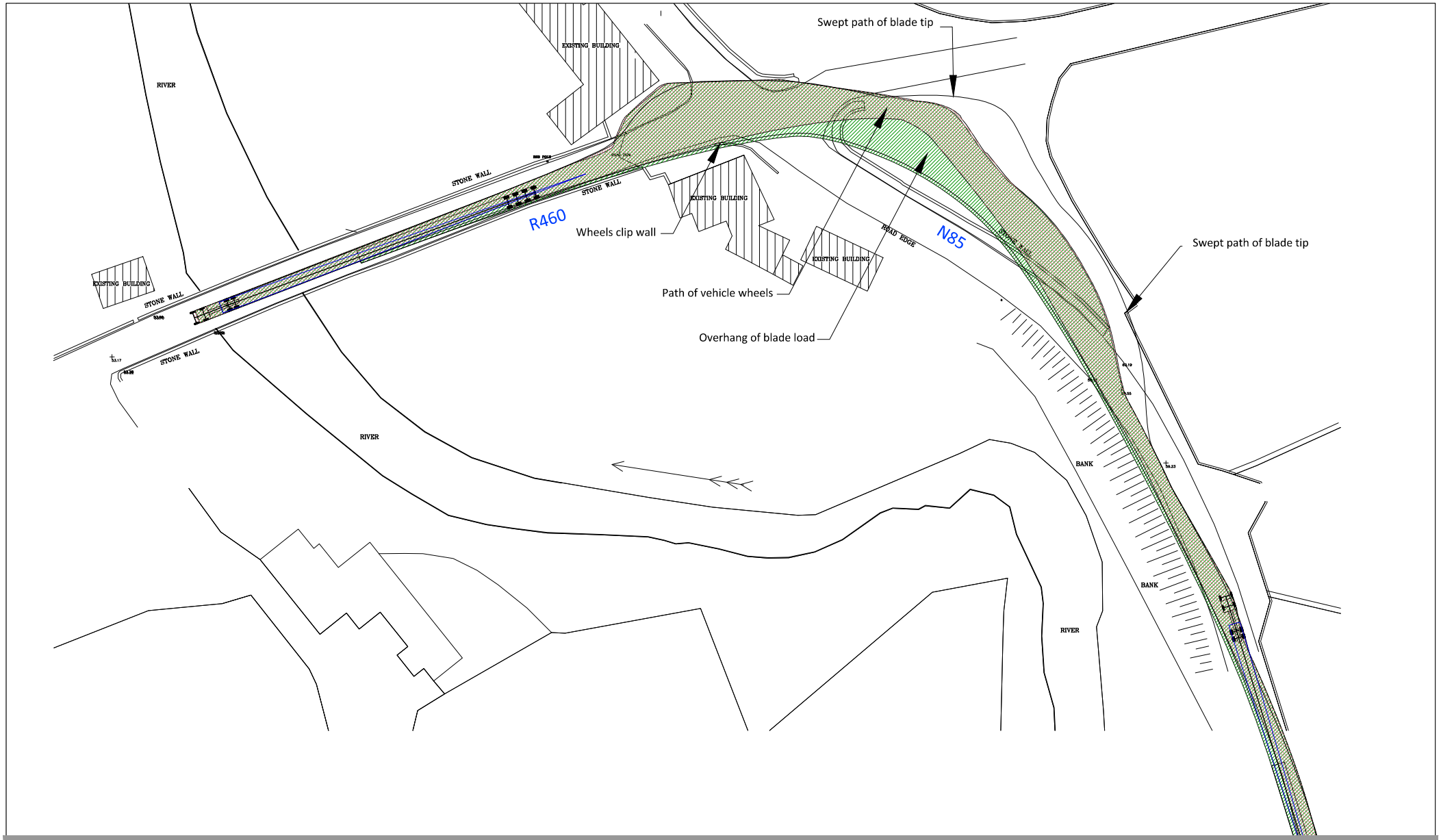
The swept path analysis undertaken for this location indicates that all available space between existing buildings will require to be utilised to accommodate the turning requirements of the blade vehicle. Minor temporary alterations will be required to the existing streetscape during the delivery of the abnormally sized loads.

Plate 14-1 Location 1 – N85 / R460 junction in Inagh – car park required for over-run of turbine vehicles

Location 2 – Bend on R460

See Figures 14-8 and 14-9

The swept path analysis undertaken for this location shows that the abnormally sized turbine vehicles will be accommodated at this location with minor impacts on sections of hedge (over-sail) and grass verges.



NOTES:

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Figure 14-6 Location 1 - N85 / R460 junction at Inagh, blade extended artic (75m)

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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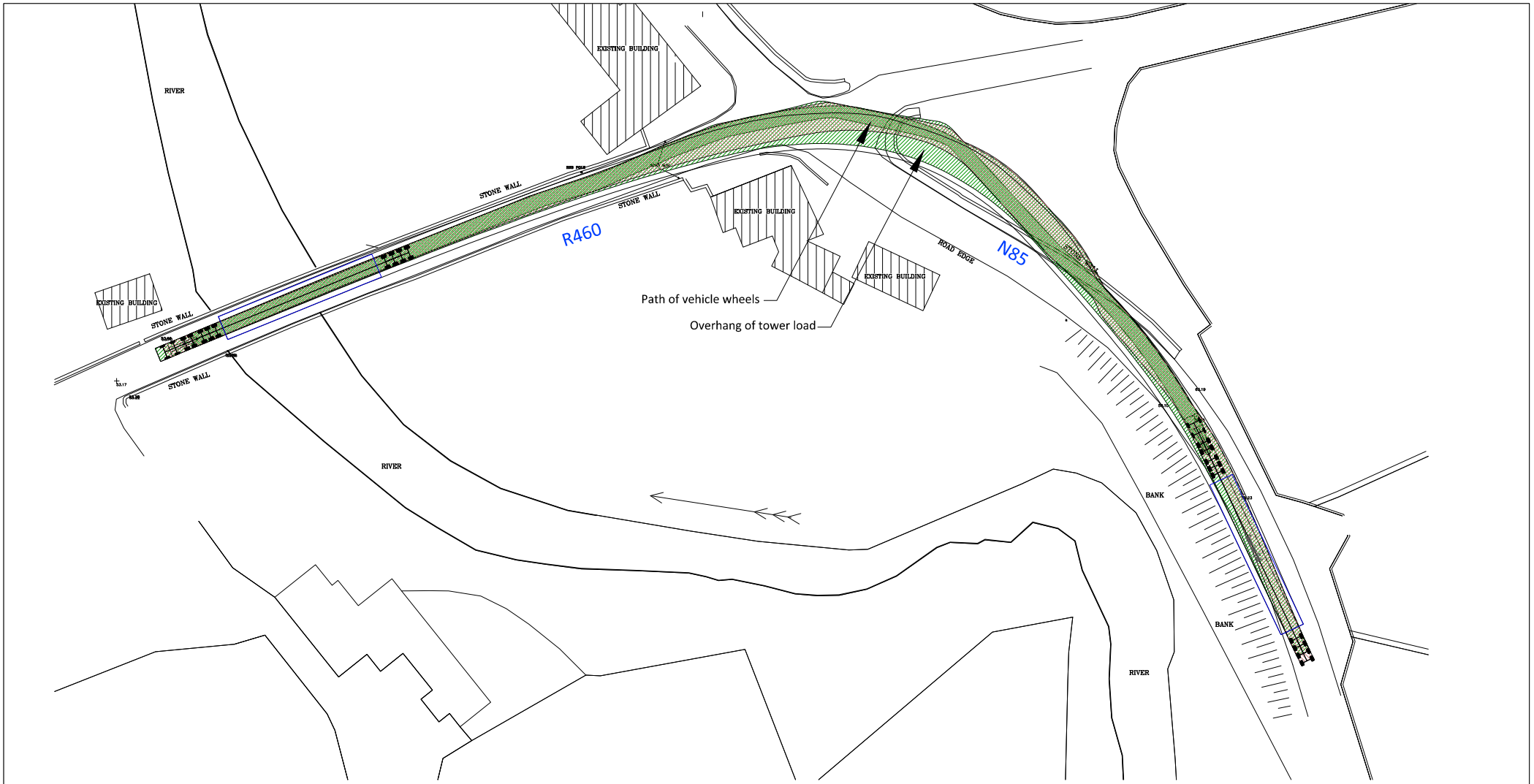

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Figure 14-7 Location 1 - N85 / R460 junction at Inagh, tower extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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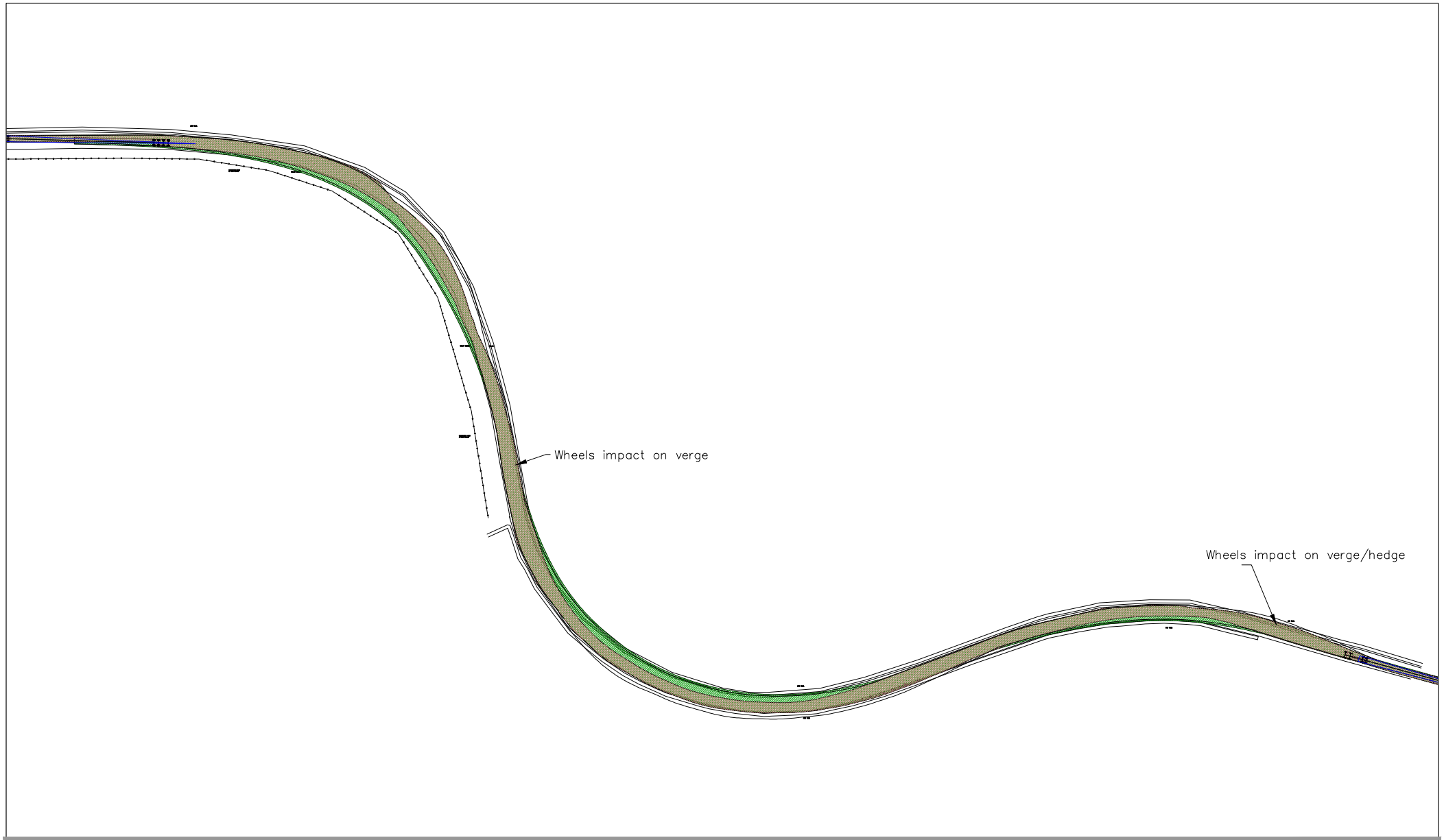

NOTES:

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Figure 14-8 Location 2 - Bends on R460, blade extended artic (75m)

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:2000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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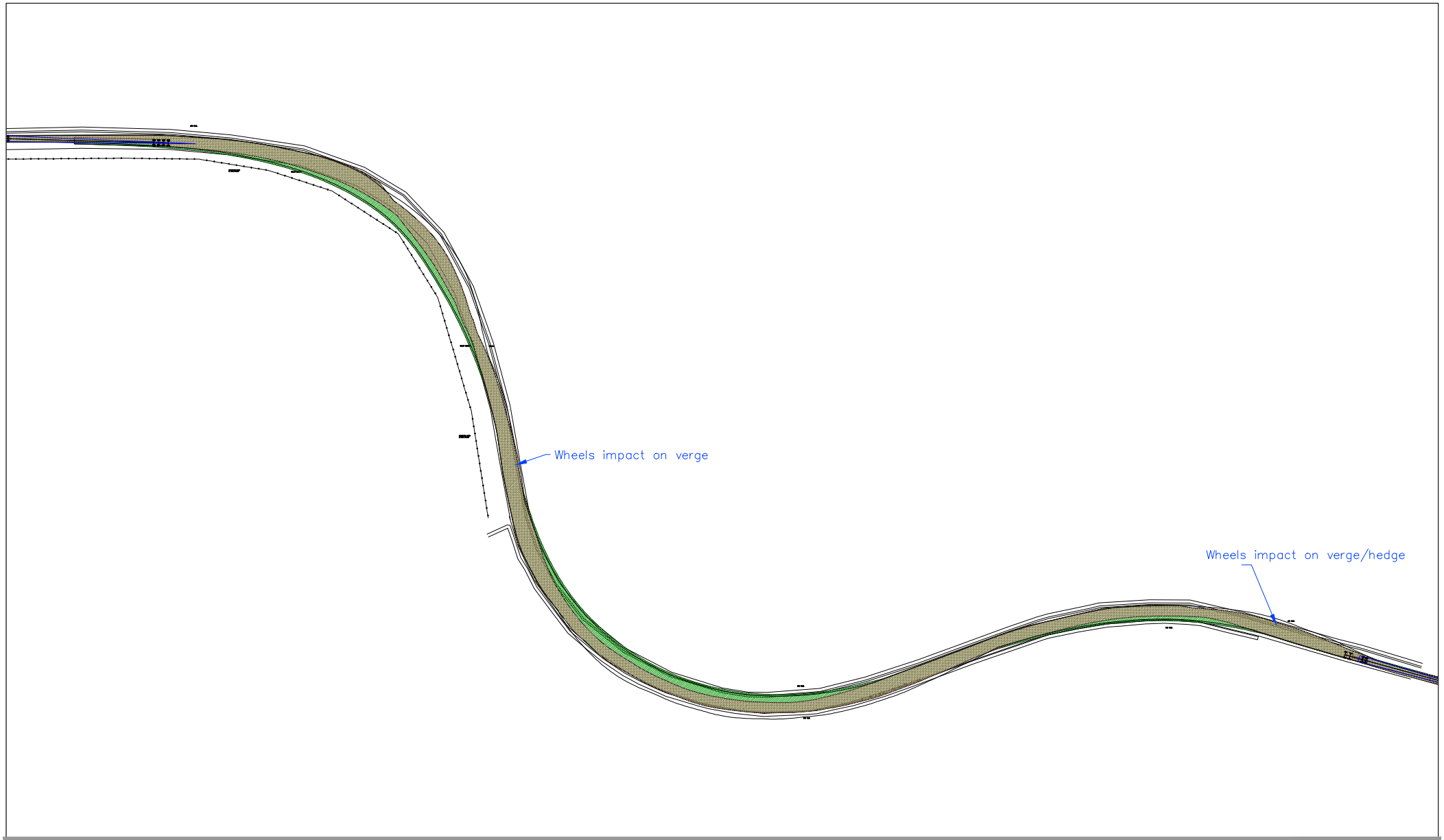

NOTES:

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Figure 14-9 Location 2 - Bends on R460, tower extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:2000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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Location 3 – R460 / L1074 junction

See Figures 14-10 and 14-11 and Plates 14-2, 14-3, 14-4 and 14-5

The preliminary swept path analysis indicates that the wind farm turbine vehicles will be able to negotiate this bend junction.

Plate 14-2 Location 3 – R460 / L1074 junction, looking east along R480 with L1074 STOP line on left

NOTES:

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Figure 14-10 Location 3 - R460 / L1074 junction, blade extended artic (75m)

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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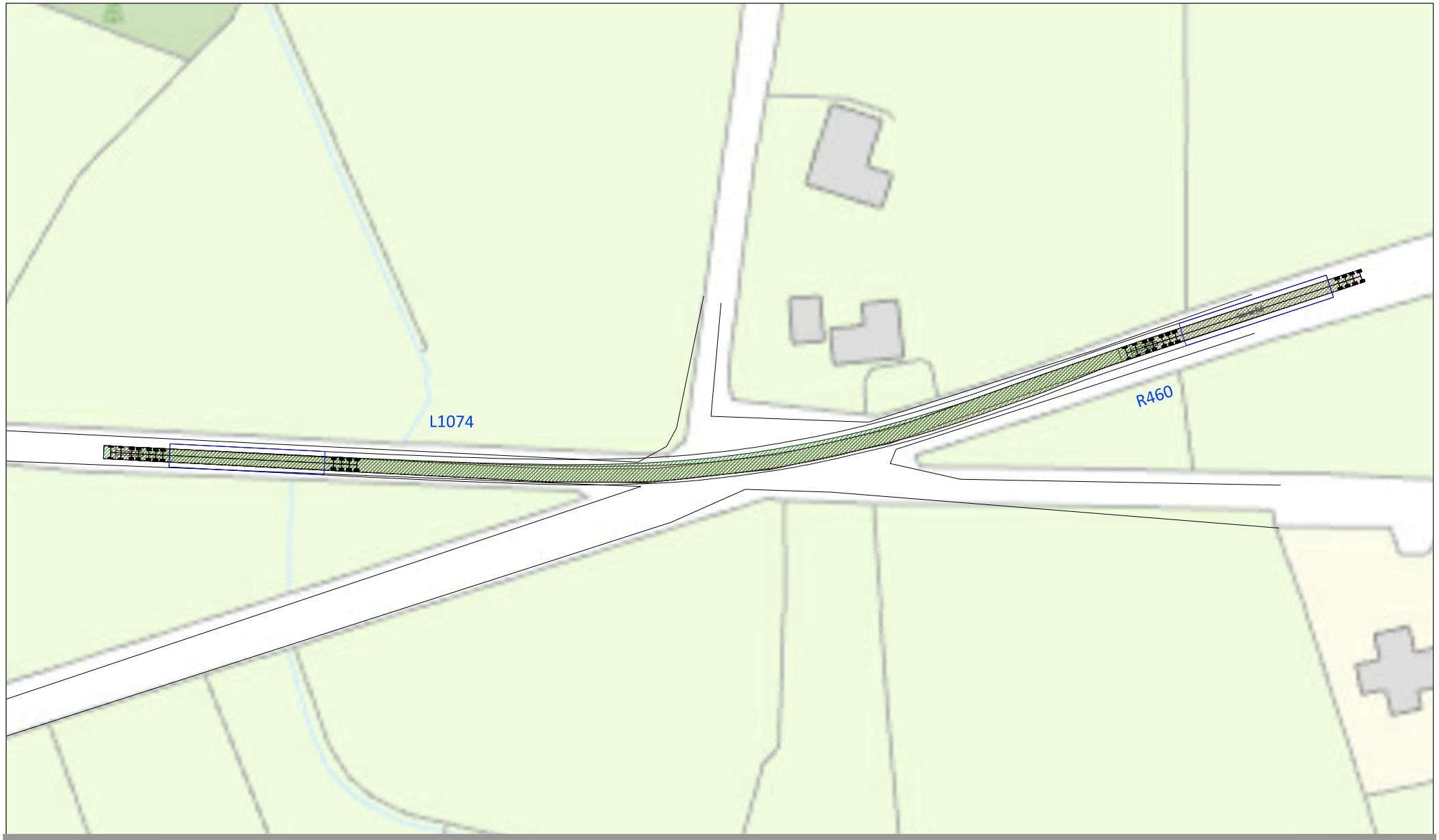

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Figure 14-11 Location 3 - R460 / L1074 junction, tower extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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Plate 14-3 Location 3 – Looking east along the L1074 towards the junction with the R460

Plate 14-4 Location 3 – Taken from the L1074 stop line looking west along the R460 at acute angle

Plate 14-5 Location 3 – Looking west along the L1074

Location 4 – Bend on L1074

See Figures 14-12 and 14-13 and Plate 14-6

The preliminary swept path analysis indicates that the wind farm blade vehicle will require to have a shortened wheel base with an extended blade overhang to the rear (increased from a standard 10m to 18m) in order to negotiate this location. Based on this a significant blade oversail into the field on the northern side of the L1074 will be required. The swept path for the blade and tower transporters are shown in Figures 14-12 and 14-13 respectively.

NOTES:

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Figure 14-12 Location 4 - Bend on L1074, blade extended artic (75m)

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 07.09.20	DRAWN BY:	AL

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NOTES:

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Figure 14-13 Location 4 - Bend on L1074, tower extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 07.04.21	DRAWN BY:	AL

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Plate 14-6 Location 4 – Left hand bend on the L1074

Location 5 – L1074 / L6230-19 junction

See Figures 14-14 to 14.17 and Plates 14-7, 14-8 and 14-9

The analyses shown in these figures indicate that temporary local road widening will be required at this junction in order to accommodate the wind turbine vehicles. Again, while there are options at this location to provide for the turning areas required, the option shown in Figures 14-14 to 14-17 is based on land take from the north western corner of the junction. For this option abnormally sized loads are required to drive on the L1074 past the L6230-19 and then reverse back into the local road that links into the L1074 from the north, The abnormally sized loads are then in a position to drive straight towards the access junction on the L6230-19.

Plate 14-7 Location 5 – Taken from the L6230-19 looking north toward junction with the L1074

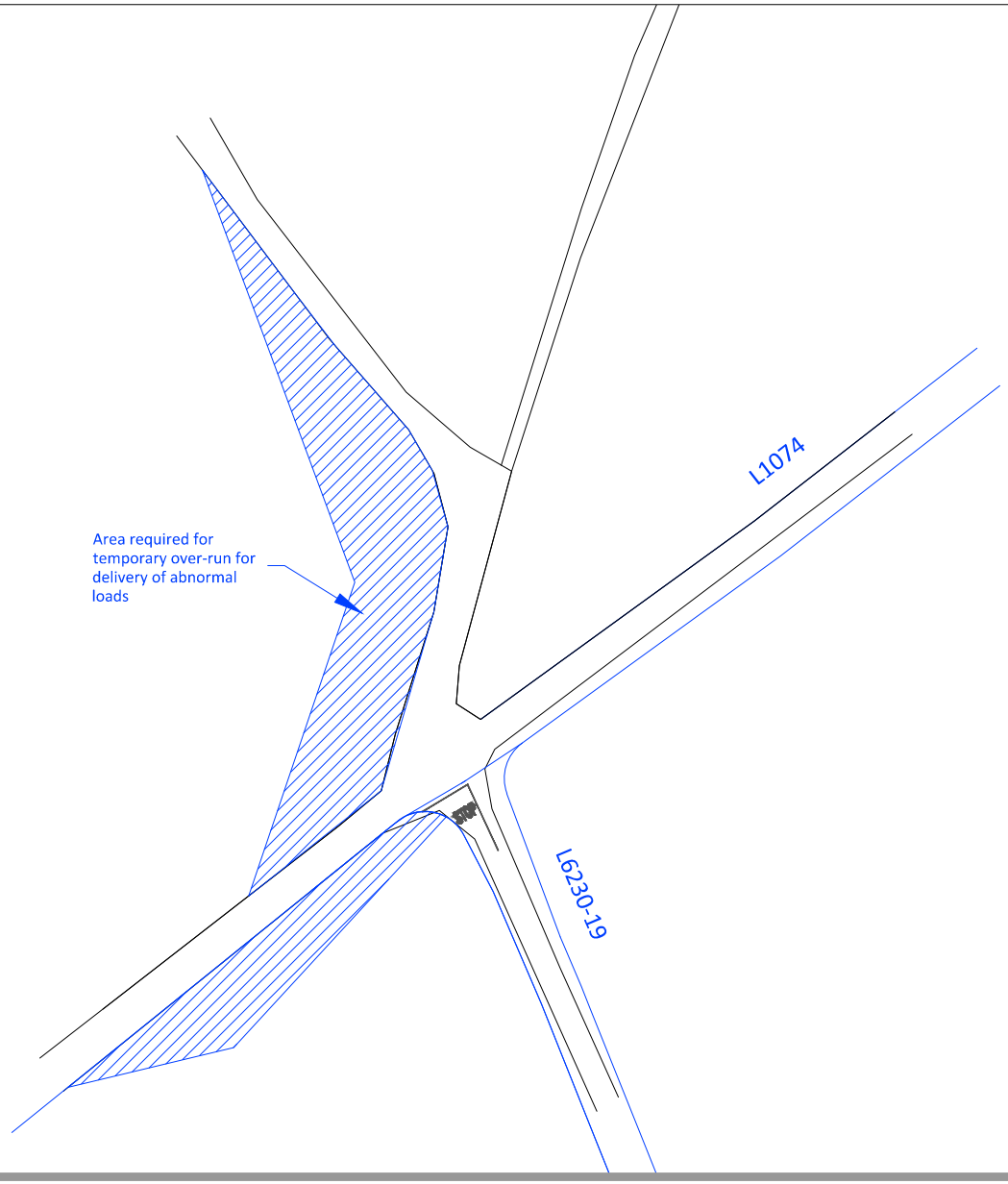
Plate 14-8 Location 5 – Taken from the L6230-19 looking east along the L1074

Junction radii for HGV movements are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060. Radii where no HGV movements are 6m.

Junction markings to be as per Figure 7.35 of the Traffic Signs Manual

- Centreline RM 001
- STOP line RRM 017
- STOP lettering M114.

Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.



NOTES:

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Figure 14-14 Location 5 - L1074 / L6230-19 junction, junction layout

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 10.03.21	DRAWN BY:	AL

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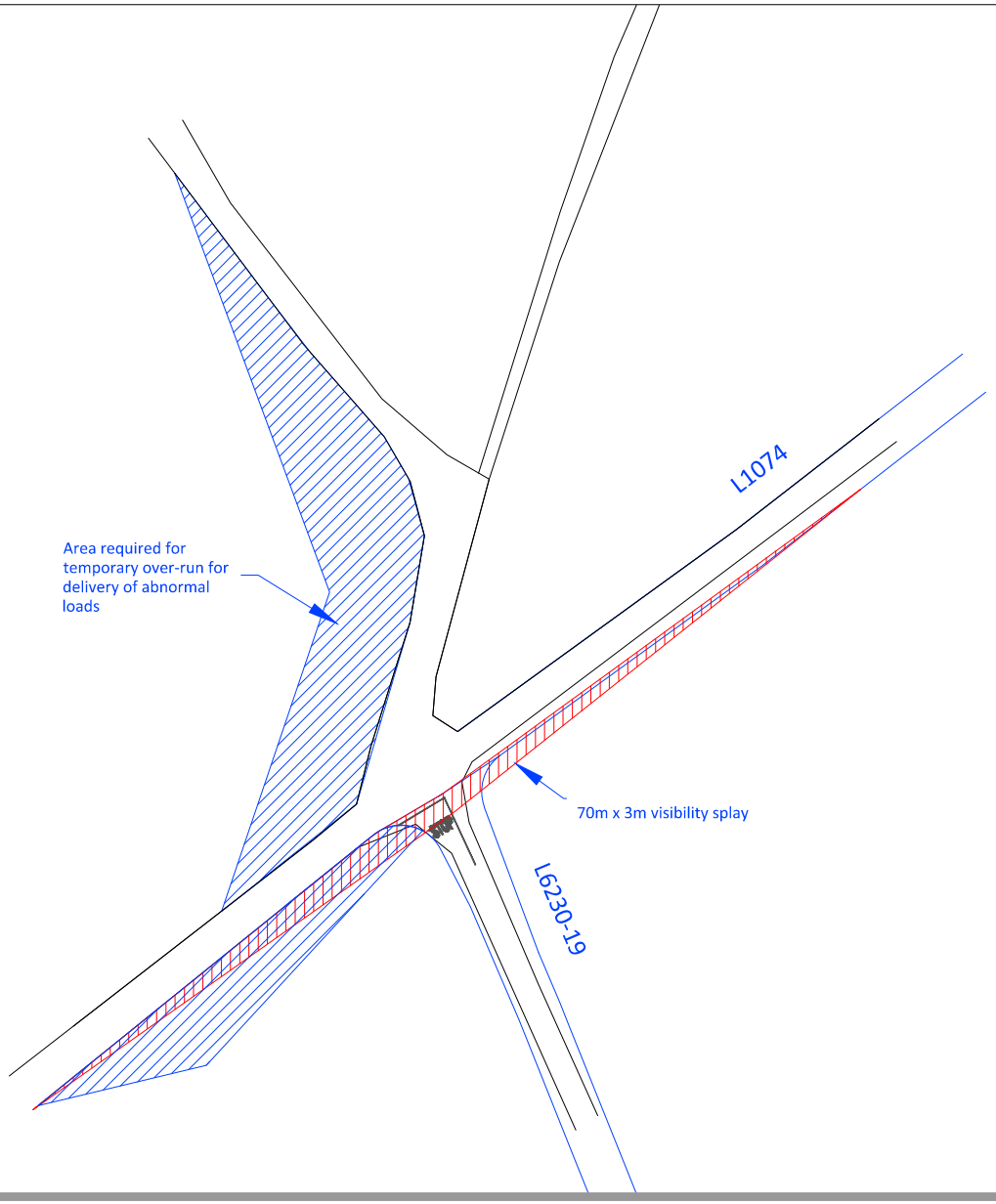
Junction radii for HGV movements are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060. Radii where no HGV movements are 6m.

Junction markings to be as per Figure 7.35 of the Traffic Signs Manual

- Centreline RM 001
- STOP line RRM 017
- STOP lettering M114.

Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-15 Location 5 - L1074 / L6230-19 junction, junction layout with visibility splay

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 12.08.21	DRAWN BY:	AL

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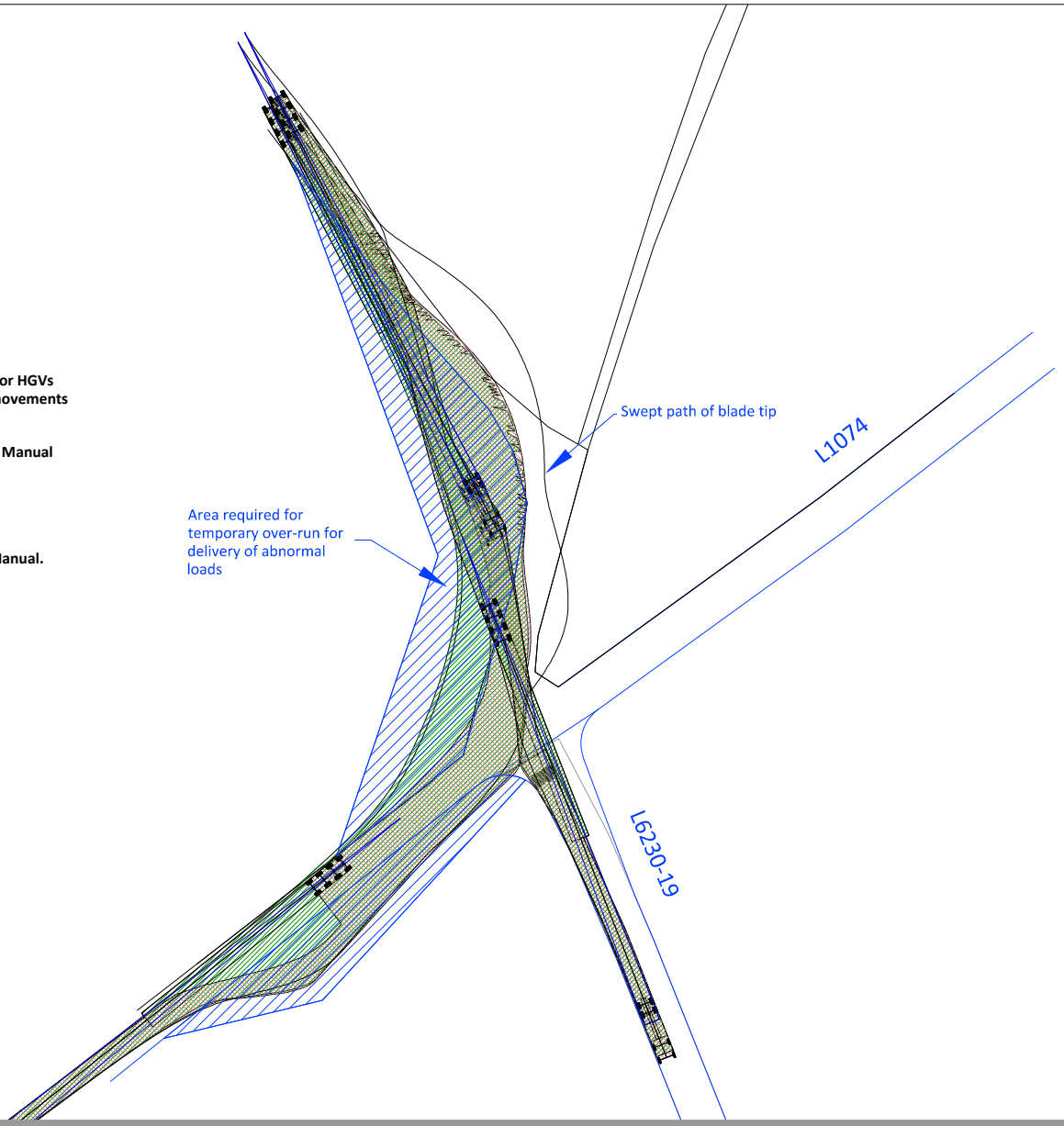
Junction radii for HGV movements are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060. Radii where no HGV movements are 6m.

Junction markings to be as per Figure 7.35 of the Traffic Signs Manual

- Centreline RM 001
- STOP line RRM 017
- STOP lettering M114.

Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-16 Location 5 - L1074 / L6230-19 junction, blade extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 10.03.21	DRAWN BY:	AL

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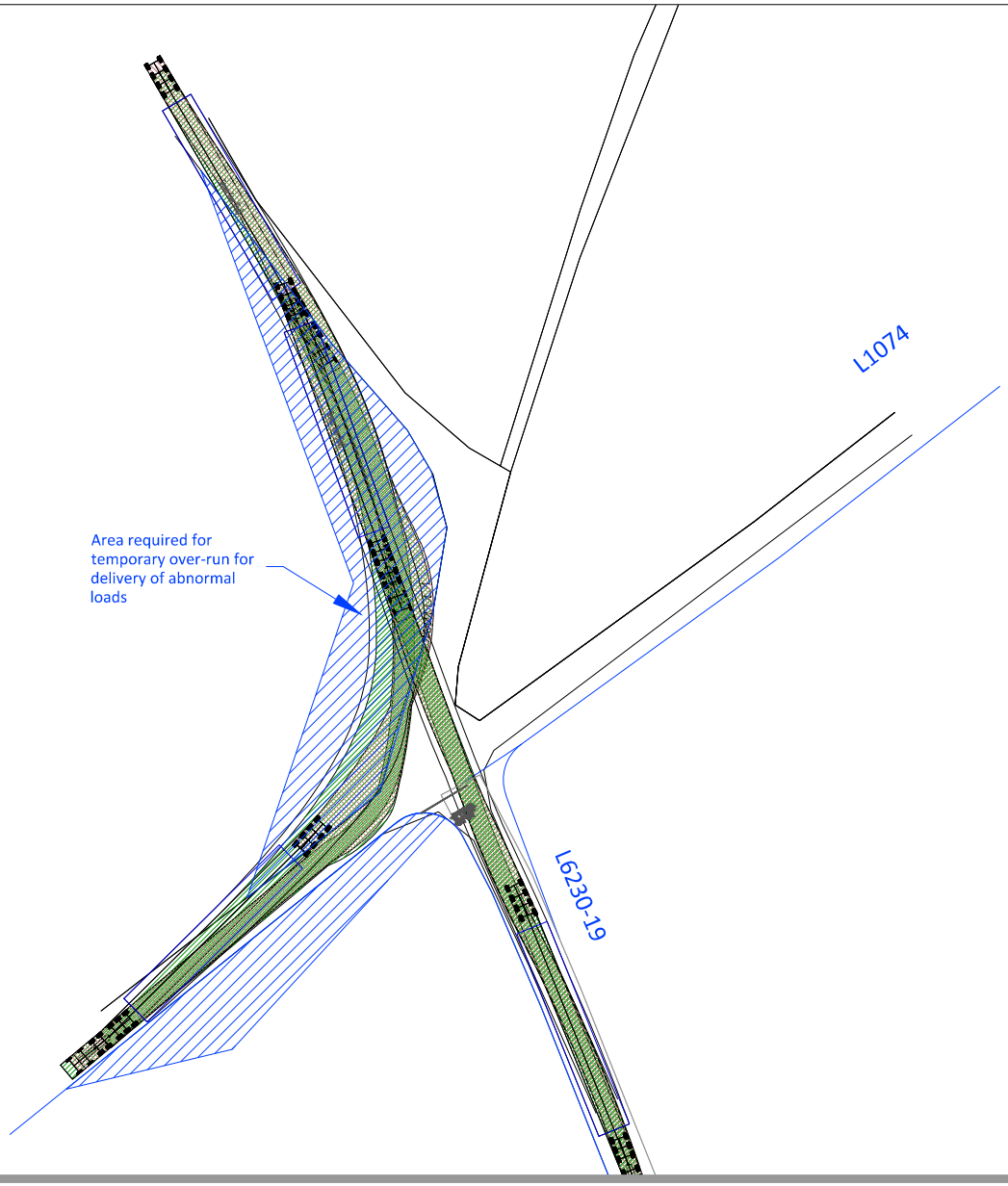

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-17 Location 5 - L1074 / L6230-19 junction, tower extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 10.03.21	DRAWN BY:	AL

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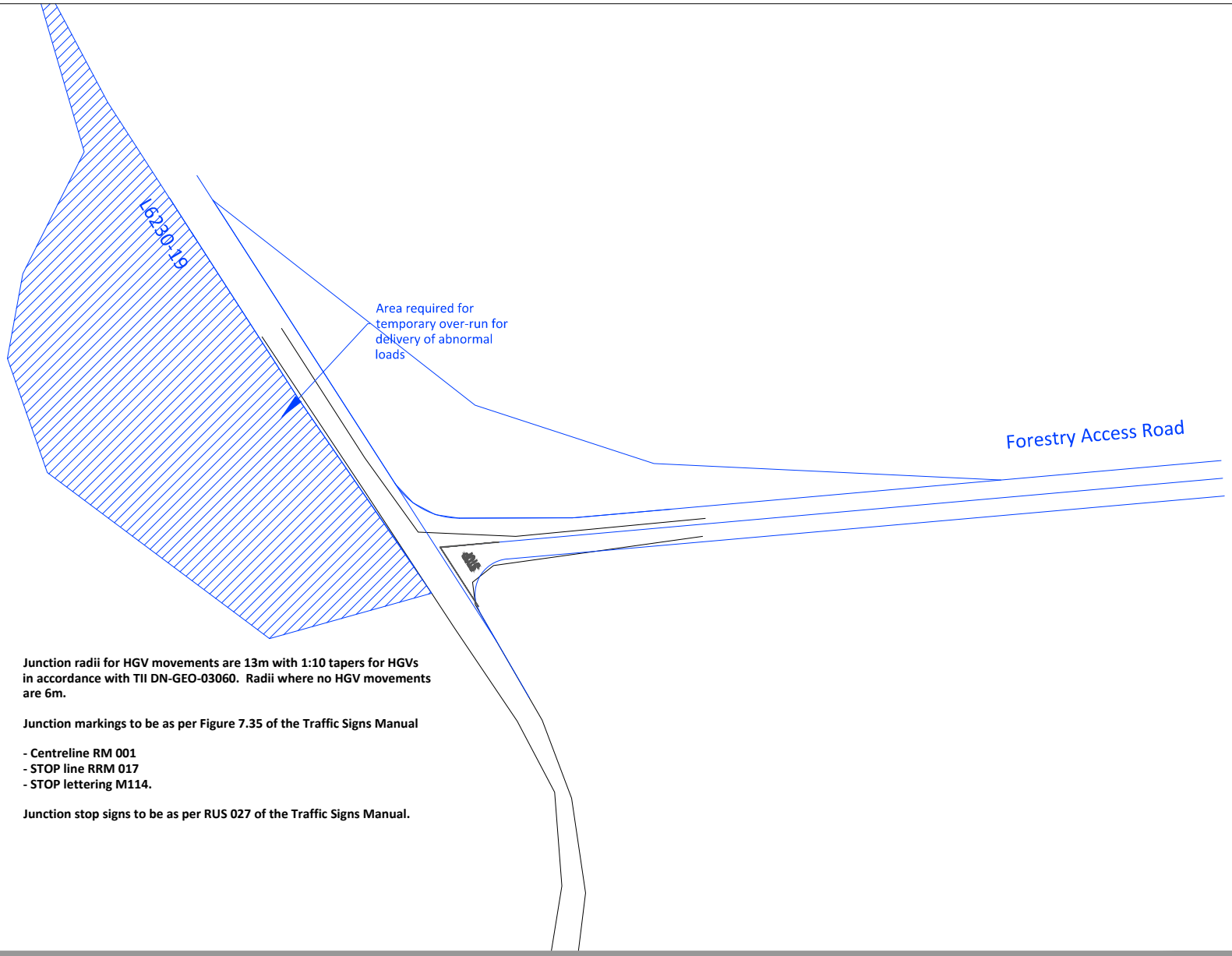
Plate 14-9 Location 5 – Taken from the L6230-19 looking west along the L1074

Location 6 – L6230-19 / forestry access road junction

See Figures 14-18 to 14-21 and Plates 14-10, 14-11 and 14-12

The proposed junction layout, including the temporary run-over area shown on the western side of the L6230-19, required for the delivery of the abnormally sized turbine vehicles, is shown in Figure 14-16. The proposed junction design is based on the HGV access guidance set out by TII and includes 13m junction radii. Visibility splays of 3m x 160m appropriate for the 80 km/h speed limit are shown in Figure 14-17. These visibility splay must be kept clear of all obstruction above 1.05m during both the construction and operation of the Proposed Development.

The visibility splays proposed for the site access junction on the L-6230-19 are shown in Figure 14-19. While it is understood the L6230-19 is designated an 80 kmph speed limit, due to the local nature of the L-6230-19 and the bend in the road located just to the south of the access junction it is clear that actual speeds at the location of the access junction are significantly lower than 80 km/h. This is confirmed from the results of a speed survey undertaken over a 24 hour period on Thursday 17th June by Traffinomics Surveys Ltd, which shows 85th percentile speeds of 48.24 km/h and 44.78 km/h for northbound and southbound directions respectively. While the TII guidelines DN-GEO-03060 Geometric Design of Junctions do not provide recommendations for such conditions (70 km/h and greater conditions are considered only) the former NRA document TD41-42 considered rural conditions for lower design speeds, with 70m splays recommended for a design speed of 50 km/h. Based on the observed design speeds set out above, it is therefore recommended that 3m X 70m visibility splays are provided, as shown in Figure 14-19. The speed survey data collected by Traffinomics Surveys Ltd is included as Appendix 14-1. It is noted that the proposed junction and visibility splays are not yet in place, so existing sightlines may be obstructed by existing boundaries. The swept path analysis set out in Figures 14-18 to 14-21 shows that the proposed layout will accommodate all vehicles requiring access to the site.



Junction radii for HGV movements are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060. Radii where no HGV movements are 6m.

Junction markings to be as per Figure 7.35 of the Traffic Signs Manual

- Centreline RM 001
- STOP line RRM 017
- STOP lettering M114.

Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.

NOTES:

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Figure 14-18 L6230-19 / forestry access road junction, junction layout

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 10.03.21	DRAWN BY:	AL

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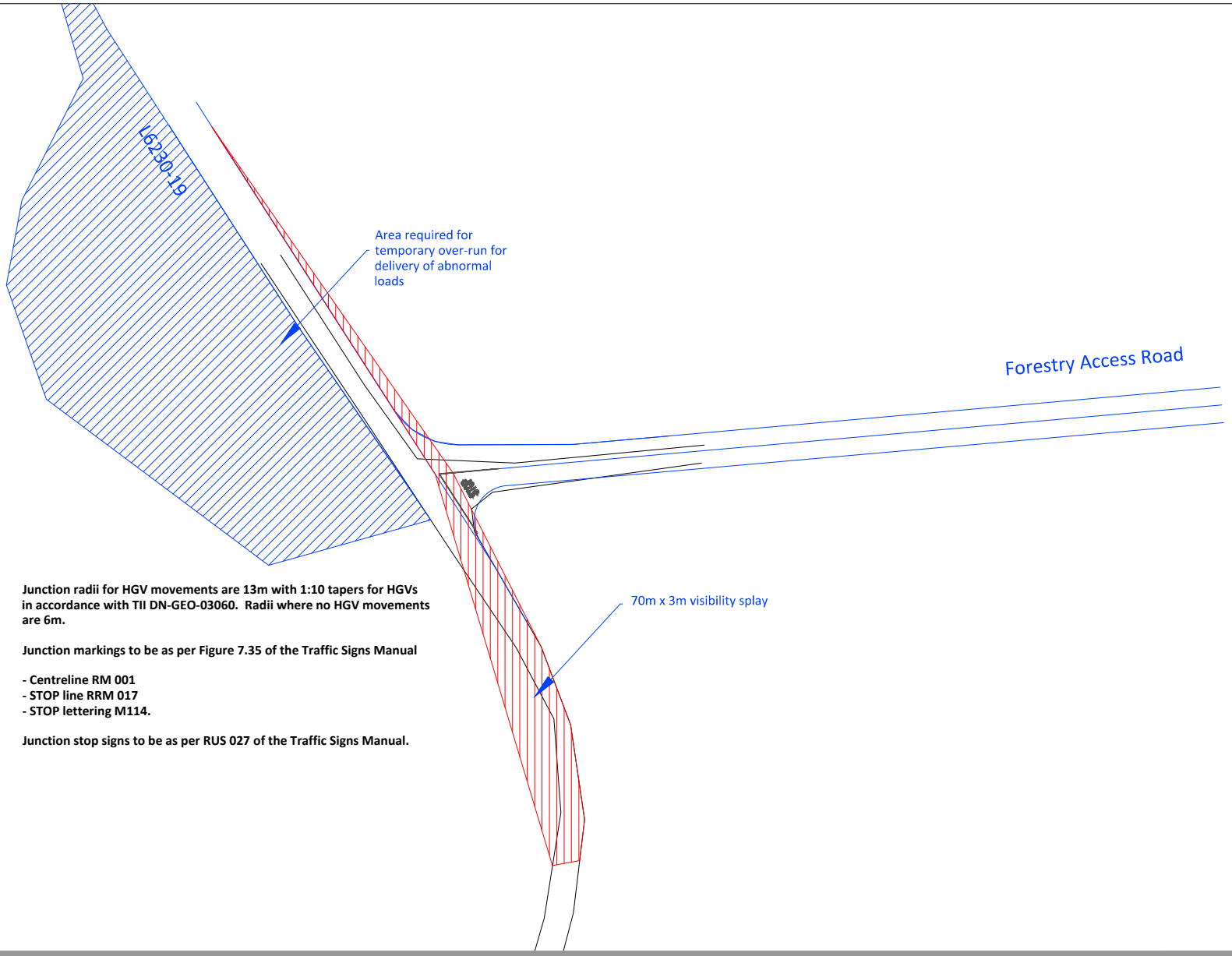

NOTES:

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Figure 14.19 Location 6 - L6230-19 / forestry access road junction, junction layout with visibility splay

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 12.08.21	DRAWN BY:	AL

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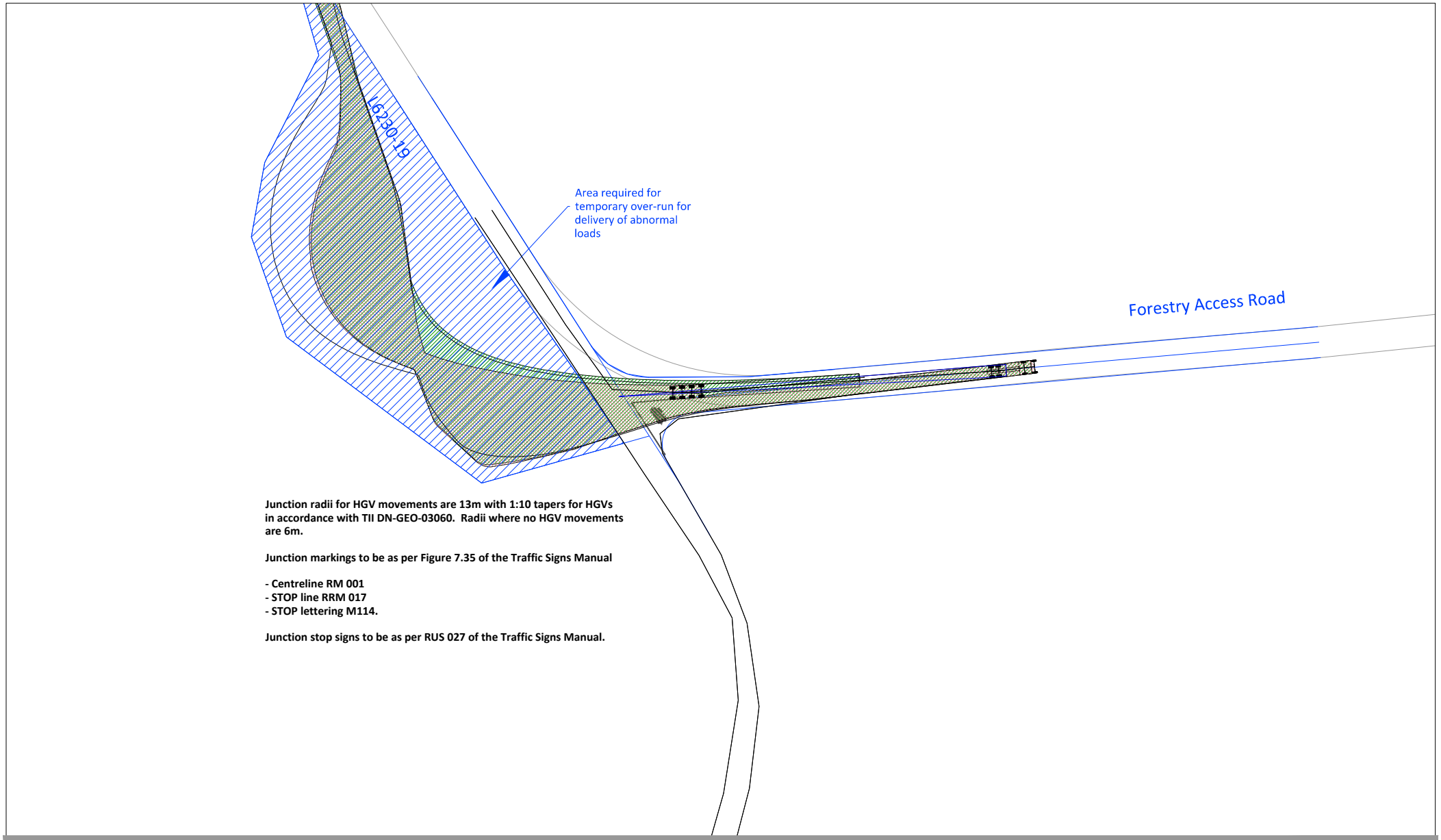

Junction radii for HGV movements are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060. Radii where no HGV movements are 6m.

Junction markings to be as per Figure 7.35 of the Traffic Signs Manual

- Centreline RM 001
- STOP line RRM 017
- STOP lettering M114.

Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.

NOTES:

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Figure 14-20 L6230-19 / forestry access road junction, blade extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 10.03.21	DRAWN BY:	AL

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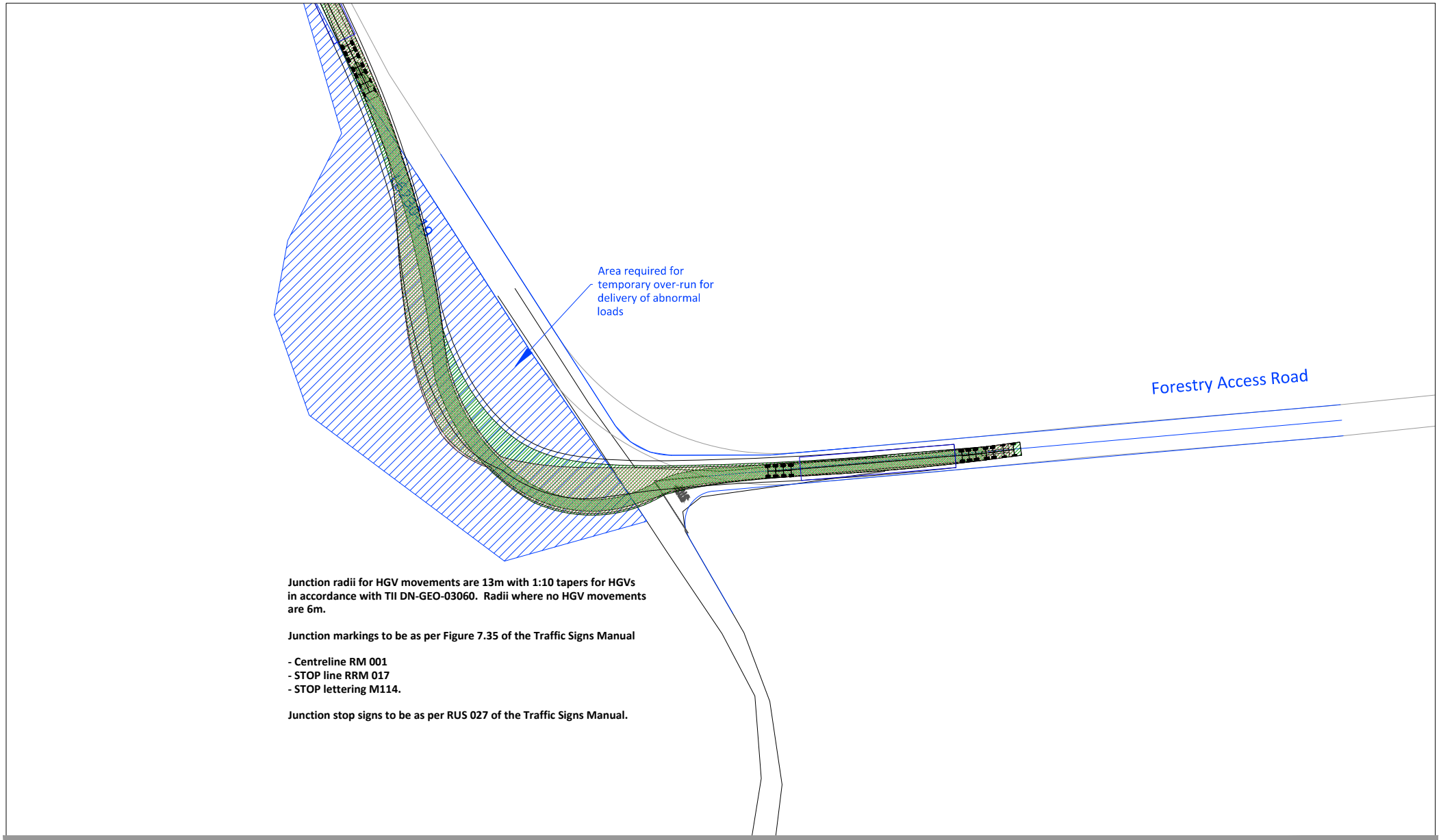

Junction radii for HGV movements are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060. Radii where no HGV movements are 6m.

Junction markings to be as per Figure 7.35 of the Traffic Signs Manual

- Centreline RM 001
- STOP line RRM 017
- STOP lettering M114.

Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-21 L6230-19 / forestry access road junction, tower extended artic

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	1:1000
PROJECT NO: 8950	DATE: 17.09.20	DRAWN BY:	AL

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Plate 14-10 Location 6 – Taken from existing forestry access looking south along the L6230-19

Plate 14-11 Location 6 – Taken from existing forestry access looking north along the L6230-19

Plate 14-12 Location 6 – Existing forestry access off the L6230-19

14.1.9 Provision for Sustainable Modes of Travel

14.1.9.1 Walking and Cycling

The provision for these modes is not relevant during the construction stage of the development and travel distances will likely exclude any employees walking or cycling to work.

14.1.9.2 Public Transport

There are no public transport services that currently pass the site although mini-buses may be considered for transporting construction staff to and from the site in order to minimise traffic generation and parking demand on site.

14.1.10 Likely and Significant Effects and Associated Mitigation Measures

14.1.10.1 "Do Nothing" Scenario

If the Proposed Development were not to proceed, no changes would be made to the current land-use practice of forestry and the site would continue to be managed under the existing commercial forestry arrangements.

There would also be no additional traffic generated or accommodation works carried out on the local road network and therefore no direct or indirect effects on roads and traffic.

14.1.10.2 Construction Phase

During the 8 days when the concrete foundations are poured the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from between +1.8% on the N85 to the west of the Claureen Roundabout, to +6.0% on the N85 passing through Inagh, to +5.8% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +36.3% on the L1074 approaching the site. It is forecast that the direct effect will be temporary and will be slight.

During the remaining 247 days for the site preparation and ground works when deliveries to the site will take place, the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from between +0.5% on the N85 to the west of the Claureen Roundabout, to +1.5 on the N85 passing through Inagh, to +1.5% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +9.2% on the L1074 approaching the site. On these days, the direct effect will be temporary and will be slight.

During the 8 days of the turbine construction stage when general materials are delivered to the site, the delivery of construction materials will result in a negative impact on the surrounding road network, increasing traffic levels ranging from +0.3% on the N85 to the west of the Claureen Roundabout, to +0.9 on the N85 passing through Inagh, to +0.9% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +5.7% on the L1074 approaching the site. The direct effect during this period will be temporary and will be slight.

During the 22 days when the various component parts of the wind turbine plant are delivered to the site using extended articulated HGVs, the effect of the additional traffic on these days will be moderate due to the size of vehicles involved, resulting in increased traffic volumes of between +0.5% on the N85 to the west of the Claureen Roundabout, to +1.5 on the N85 passing through Inagh, to +1.5% on the R460 to the west of Inagh. On these days traffic flows are forecast to increase by +9.4% on the L1074 approaching the site.

While deliveries on the short section of the L-6230 from the junction with the L-1074 to the site access (300m) will be managed in order that 2 HGVs do not meet, it is likely that the Traffic Management Plan will require HGVs leaving the site on the busiest construction days (i.e. the 8 days when the concrete foundations are poured) to return to their plant via a short detour through Miltown Malbay followed by either the R460 back to Inagh, or the R474 to Ennis, and therefore avoid HGV movements travelling to and from the site meeting each other, as shown in the Figure 4-22. While there are informal passing locations on the L-1074 the applicant will discuss any opportunities for providing formal passing locations on the route with the Road Section of Clare County Council.

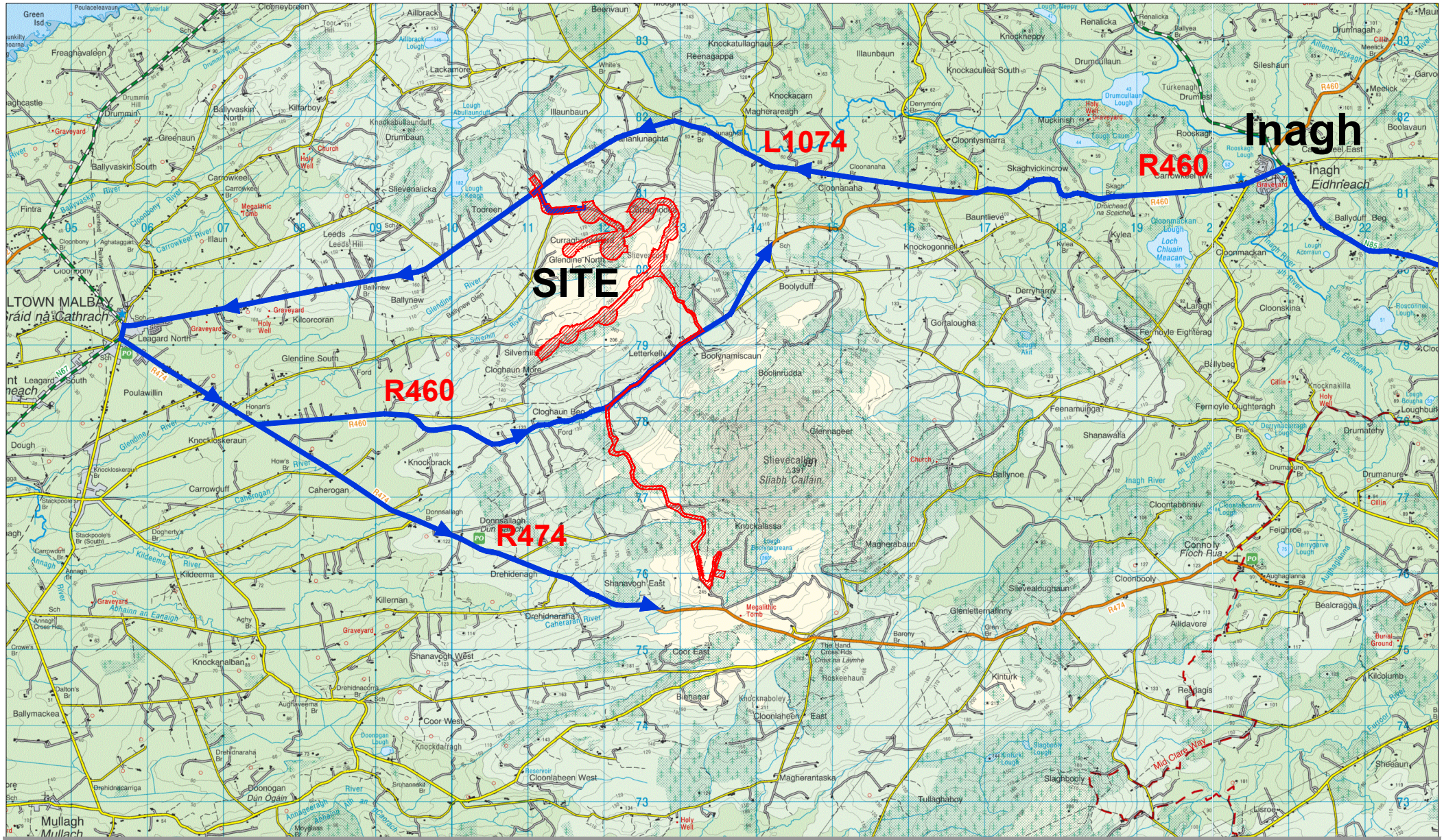
The direct effect will be temporary and may be reduced to slight if the delivery of the large plant is done at night, as is proposed.

14.1.10.3 Operational Phase

The primary access for maintenance trips during the operational stage will be the main site access off the L6230-19, indicated as Location 6 in Figure 14-2a. An existing road to the southwest will also facilitate come car / lgv trips. During the operational phase the direct effect on the surrounding local highway network will be neutral and long term given that there will be approximately two maintenance staff travelling to site at any one time, resulting in typically two visits to the site on any one day made by a car or light goods vehicle.

14.1.10.4 Decommissioning Phase

The design life of the proposed renewable energy development is 30 years. If the site is decommissioned, cranes will disassemble each turbine tower and all equipment.



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14-22 Potential direction of travel for HGVs accessing and exiting site on busy construction days

PROJECT:	Slieveacurry Renewable Energy Development		
CLIENT:	North Clare Renewable Energy	SCALE:	NTS
PROJECT NO: 8950	DATE: 10.11.21	DRAWN BY:	AL

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All turbine infrastructure including turbine components will be separated and removed off-site for re-use, recycling and waste disposal. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. It is proposed to leave the access roads and hardstanding areas in situ at the decommissioning stage. Leaving the turbine foundations, access tracks and hardstanding areas in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration. Any impact and consequential effect that occurs during the decommissioning phase are similar to that which occur during the construction phase, be it of less impact. The mitigation measures prescribed for the construction phase of the Proposed Development will be implemented during the decommissioning phase thereby minimising any potential impacts.

14.1.10.5 Cumulative Effects

The developments considered as part of the cumulative effect assessment are described in Section 2.7 of this EIAR. In this regard in order to assess overall cumulative effects on traffic the Proposed Development is considered in the context of other developments as detailed below:

- Other Wind Farms
- Forestry and Replanting
- Existing site infrastructure

The development or activities that were considered to have potential cumulative impacts with the proposed wind farm development in terms of traffic impacts are summarised in Table 14-23.

14.1.10.5.1 *Other Wind Farms*

A detailed assessment of other wind farm developments at varying stages in the planning process (from pre-planning to operational), is set out in Section 2.7 of this EIAR, with an assessment of the potential cumulative traffic effects with the proposed subject wind farm assessed on the following;

- Project status (proposed to operational)
- Degree of overlap with the Proposed Development delivery highway network (low to high)
- Traffic volumes (low to high)

The development or activities that were considered to have potential cumulative impacts with the Proposed Development in terms of traffic impacts are summarised in Table 14-23.

All other wind farm developments located within a 20km radius and shown in Chapter 2, Figure 2-5 are also listed in Table 14-23.

The majority of the wind farm developments listed are either already constructed, or are being constructed, and will therefore not have cumulative impacts with the construction phase of the Proposed Development. For the one wind farm development under appeal with ABP, Coor West Wind Farm, based on the extent of the overlap of the haul routes with the Proposed Development, it is considered that the potential for cumulative traffic related effects are slight. For the one permitted wind farm development, Crossmore Wind Farm, the one with a planning application pending, Cahermurphy Two, based on the extent of the overlap of the haul routes with the Proposed Development, it is considered that the potential for cumulative traffic related effects are imperceptible to slight. The potential for cumulative impacts will be avoided by ensuring that the construction phases for all 3 developments do not overlap through careful scheduling of deliveries to each site. It is worth noting that An Garda Síochána will only allow one development at a time for oversized loads.

Reference was also made in the preparation of this assessment to other planning applications as set out in Chapter 2.

Table 14-23 Summary of projects considered in cumulative assessment and potential for cumulative traffic effects with proposed Slieveacurry Renewable Energy Development

No.	Project	Status	Degree of overlap of highway network (none/ low / medium / high)	Traffic volumes (low / medium / high)	Potential cumulative traffic effects
1	Slievecallan Wind Farm (29 turbines)	Existing	Not relevant	Not relevant	Included in background traffic levels
2	Coor West Wind Farm (4 turbines)	Under appeal with ABP	Medium	Medium	Slight
3	Boolitiagh Wind Farm (19 turbines)	Existing	Not relevant	Not relevant	Included in background traffic levels
4	Glenmore Wind Farm (12 turbines)	Existing	Not relevant	Not relevant	Included in background traffic levels
5	Cahermurphy Wind Farm (4 turbines)	Permitted, 3 out of 4 turbines constructed	Low	Low	None, 4th turbine will be constructed before subject development
6	Boolynagleragh Wind Farm (16 turbines)	Existing	Not relevant	Not relevant	Included in background traffic levels
7	Crossmore Wind Farm (7 turbines)	Permitted	Low	Medium	Imperceptible / Slight
8	Letteragh Wind Farm (6 turbines)	Existing	Not relevant	Not relevant	Included in background traffic levels
9	Kiltumper Wind Farm (2 turbines)	Existing	Not relevant	Not relevant	Included in background traffic levels
10	Cahermurphy Two Wind Farm (10 turbines)	Application pending	Low	Medium	Imperceptible / Slight

14.1.10.5.2 Forestry and Replanting

The Proposed Development site is used for commercial forestry. Regular felling operations will continue in conjunction with the Proposed Development. It is noted that traffic movements relating to this activity did possibly contribute to background traffic levels, but there may be cumulative traffic effects between forestry operations locally and the Proposed Development during time periods that tree

felling takes place and in particular if this occurs during the construction phase. During the operational phase, which is when most of the forestry operations will be occurring i.e., over the 30-year life of the project, the effects will be imperceptible as the Proposed Development generates very low traffic numbers for the majority of its lifetime.

If it is assumed that tree felling takes place in coups of 20 hectares at a time, generating approximately 200 HGV movements over 10 working days (or 20 HGV movements daily) the cumulative impact on these days is forecast to be slight even if it occurs during the construction phase of the Proposed Development.

14.1.10.6 Mitigation Measures

This section summarises the mitigation measures to minimise the effects of the Proposed Development during both the construction and operational stages.

Mitigation by Design

Mitigation by design measures includes the following;

- Selection of the most appropriate delivery route to transport the wind turbine components, requiring the minimum remedial works to accommodate the vehicles as set out in Section 14.1.8.
- Construction of temporary improvements to the local highway network at locations identified in Section 14.1.8.
- Use of on-site borrow pits to produce materials to minimise deliveries to site during construction.

Mitigation Measures During the Construction Stage

The successful completion of this development will require significant coordination and planning and it is therefore recommended that the following comprehensive set of mitigation measures will be put in place before and during the construction stage of the project in order to minimise the effects of the additional traffic generated by the proposed renewable energy development.

Delivery of abnormal sized loads

The following are the main points to note for these deliveries which will take place after peak evening traffic:

- The delivery of turbine components is a specialist transport operation with the transportation of components carried out at night when traffic is at its lightest and the impact minimised.
- The deliveries will be made in consultation with the Local Authority and An Garda Síochána.
- It is estimated that 64 abnormal sized loads will be delivered to the site, comprising 22 convoys of 3, undertaken over 22 separate nights.
- These nights will be spread out over an approximate period of 11 weeks and will be agreed in advance with the relevant authorities
- In order to manage each of the travelling convoys, for each convoy there will be two police escort vehicles that will stop traffic at the front and rear of the convoy of 3 vehicles.
- There will also be two escort vehicles provided by the haulage company for each convoy.

Other traffic management measures

A **Traffic Management Plan (TMP)** is included in Appendix 14-2. A detailed **TMP** will be provided specifying details relating to traffic management and included in the CEMP prior to the commencement of the construction phase of the Proposed Development. The TMP will be agreed with the local authority and An Garda Síochána prior to construction works commencing on site. The detailed TMP will include the following:

- **Traffic Management Coordinator** – a competent Traffic Management Co-ordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management.
- **Delivery Programme** – a programme of deliveries will be submitted to the County Council in advance of deliveries of turbine components to site. Liaison with the relevant local authorities and Transport Infrastructure Ireland (TII) will be carried out where required regarding requirements such as delivery timetabling. The programme will ensure that deliveries are scheduled in order to minimise the demand on the local network and minimise the pressure on the access to the site.
- **Information to locals** – Locals in the area will be informed of any upcoming traffic related matters e.g., temporary lane/road closures (where required) or delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided.
- **A Pre and Post Construction Condition Survey** – Where required by the local authority, a pre-condition survey of roads associated with the Proposed Development can be carried out immediately prior to construction commencement to record an accurate condition of the road at the time. A post construction survey will be carried out after works are completed to ensure that any remediation works are carried out to a satisfactory standard. Where required the timing of these surveys will be agreed with the local authority. All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.
- **Liaison with the relevant local authority** - Liaison with the County Council and An Garda Síochána, will be carried out during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. Once the surveys have been carried out and "prior to commencement" status of the relevant roads established, (in compliance with the provisions of the CEMP), the Roads section will be informed of the relevant names and contact numbers for the Project Developer/Contractor Site Manager as well as the Site Environmental Manager.
- **Implementation of temporary alterations to road network at critical junctions** – at locations highlighted in section 14.1.8. In addition, in order to minimise the impact on the existing environment during turbine component deliveries the option of blade adaptor trailers will also be used where deemed practicable. Any alterations required will require prior discussion and agreement with the Municipal District Office.
- **Identification of delivery routes** – These routes will be agreed with the County Council and adhered to by all contractors.
- **Delivery times of large turbine components** - The management plan will include the option to deliver the large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage.
- **Travel plan for construction workers** – While the assessment above has assumed the worst case in that construction workers will drive to the site, the construction company will be required to provide a travel plan for construction staff, which will include the identification of routes to / from the site and identification of an area for parking.
- **Road Opening Licence** – Roads works associated with the grid connection cabling will be undertaken in line with the requirements of a road opening licence as agreed with Clare County Council.

- **Drainage** - The Applicant will engage with the Municipal District Engineers Office and agree any necessary additions or changes to the existing surface drainage infrastructure (temporary or otherwise) prior to the commencement of any construction activities on site.
- **Additional measures** - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required. These are set out in the CEMP which is contained in Appendix 4-3.
- **Re-instatement works** - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

Mitigation Measures During Operational Stage

Due to the very low volumes of traffic forecast to be generated during this stage no mitigation measures are required.

Mitigation Measures During Decommissioning Stage

In the event that the Proposed Development is decommissioned after the 30 years of operation, a decommissioning plan, including material recycling / disposal and traffic management plan will then be prepared for agreement with the local authority. This plan will contain similar mitigation measures to those implemented during the construction phase.

14.1.10.7 Residual Impacts

Construction Stage

During the 12 month construction stage of the Proposed Development, it is forecast that the additional traffic that will appear on the delivery route indicated in Figure 14-2a will have a slight, negative and temporary impact on existing road users, which will be minimised with the implementation of the mitigation measures included in the proposed traffic management plan.

Operational Stage

As the traffic impact of the optimised development will be imperceptible during the operational stage, there will be no residual impacts during this stage.

Decommissioning Stage

As stated above, in the event that the proposed renewable energy development is decommissioned a decommissioning plan will be prepared and implemented in order to minimise the residual impacts during this stage.

14.2 Telecommunications and Aviation

14.2.1 Introduction

This section of the EIAR assesses the likely significant effects of the Proposed Development on telecommunications and aviation. Section 14.2.3 describes the way in which wind turbines can potentially interfere with telecommunications signals or aviation activities. Section 14.2.4 presents details on how such effects will be avoided, with the likely significant effects assessed (and mitigation measures proposed) in Section 14.2.5.

14.2.1.1 Statement of Authority

This section of the EIAR has been prepared by Eoin O'Sullivan and reviewed by Michael Watson, both of MKO. Eoin is an experienced geo-environmental scientist and has over ten years' experience in the design, implementation and interpretation of all phases of geo-environmental and geotechnical site investigations. Eoin has also got extensive experience in the preparation of material assets assessments and reports for EIAs, particularly relating to wind energy. Eoin has also experience in completing PPC Permit Applications and in the preparation of Environmental Impact Statements/Environmental Impact Assessment Reports for renewable energy projects, quarries and a number of non-hazardous landfill sites and anaerobic digesters for both public and private clients. Eoin is also proficient in undertaking detailed quantitative risk assessments for the protection of controlled waters and human health. Eoin holds an MSc in Environmental Engineering and is a Chartered Member of the Chartered Institute of Water and Environmental Management (CWEM) and Chartered Environmentalist (CEnv) with the Society of Environment. Michael has over 19 years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

14.2.2 Methodology and Guidance

This section of the EIAR has been prepared in line with the guidance set out by:

- '*Guidelines on the Information to be contained in Environmental Impact Statements*' (EPA, 2002).
- *'Advice Notes for Preparing Environmental Impact Statements – Draft September 2015'* (EPA, 2015).
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements'* (EPA, 2003).
- '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports DRAFT"* (EPA, 2017).

This section of the assessment focuses particularly on the scoping and consultation exercise conducted with telecommunications operators and aviation authorities. Scoping was carried out in line with the above EPA guidelines, and the '*Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2012), which provides a recommended list of telecommunications operators for consultation.

A full description of the scoping and consultation exercise is provided in Section 2.5 of Chapter 2 of this EIAR. Consultation with the telecommunications operators and aviation bodies informed the constraints mapping process, which in turn informed the layout of the Proposed Development, as described in Chapter 3, Section 3.3.6 of the EIAR.

The assessment of likely significant effects on material assets uses the standard methodology and classification of impacts as presented in Section 1.7.2 of Chapter 1 of this EIAR. The full project description, including proposed turbine locations and elevations, is provided in Chapter 4.

14.2.3 Background

14.2.3.1 Broadcast Communications

Wind turbines, like all large structures, have the potential to interfere with broadcast signals, by acting as a physical barrier or causing a degree of scattering to microwave links. The most significant effect at a domestic level relates to a possible flicker effect caused by the moving rotor, affecting, for example,

radio signals. The most significant potential effect occurs where the renewable energy development is directly in line with the transmitter radio path.

14.2.3.2 Domestic Receivers

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

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

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

14.2.3.3 Other Signal Types

Wind turbines have the potential to affect other signal types used for communication and navigational systems, for example tower-to-tower microwave communication links, and airborne and ground radar systems. Interference with radar systems occurs when wind turbines are located close to an airport or directly in line with the instrument landing approach. The nearest such operational airport to the Proposed Development site is Shannon Airport, located approximately 30 kilometres southeast of the site, and therefore outside the range at which such issues would be expected.

14.2.4 Preventing Electromagnetic Interference

14.2.4.1 National Guidelines

The '*Wind Energy Development Guidelines for Planning Authorities'* (Department of the Environment, Heritage and Local Government, 2006) state that interference with broadcast communications can be overcome by the installation of deflectors or repeaters where required. Developers are advised to contact individual local and national broadcasters and mobile phone operators to inform them of proposals to develop wind farms. This consultation has been carried out by MKO as part of the assessment of the Proposed Development as summarised below; full details are provided in Section 2.5 in Chapter 2 of this EIAR.

14.2.4.2 Scoping and Consultation

As part of the EIAR scoping and consultation exercise, MKO contacted the relevant national and regional broadcasters, fixed and mobile telephone operators, aviation authorities and other relevant consultees. Consultation was also carried out with ComReg in order to identify any other additional licensed operators in the vicinity of the proposed site to be contacted, who may not have been on the list of main operators.

The responses received from the telecommunications and aviation consultees are summarised below in Table 14-24 .

Table 14-24 Telecommunications and Aviation Scoping Responses

Consultee	Response	Potential for Interference Following Consultation Exercise
Airspeed	Received 21st February 2020 and 23rd June 2020	No
Broadcasting Authority of Ireland	Received 24th February 2020	No
BT Communications Ireland	Received 21st February 2020	No
ComReg (Commission for Communications Regulation)	Received 21st February 2020	No
Department of Defence	Received 12th March 2020	DoD noted no issues with the Proposed Development, however they issued observations as discussed below in Section 14.2.4.2.3
Eir	Received 25th February 2020	No
BBnet (EOBO)	No response received to date	No response received to date
ESB Telecoms	Received 6th March 2020	No
Irish Aviation Authority	Received 10th March 2020	IAA noted no issues with the Proposed Development, however they issued observations as discussed below in Section 14.2.4.2.3
Imagine Group	Received 21st February 2020	No
Lighthouse Networks Ltd	Received 24th February 2020	No
Ripplecom	Initial response received on the 28th February 2020	No
RTE Transmission Network (2rn)	Received 21st February 2020	No
Shannon Airport	No response received to date	No response received to date
Tetra Ireland Communications (emergency services)	Received 2nd March 2020	No
Towercom	Received 11th March 2020	No
Three Ireland Ltd	Received 21st February 2020	No
Viatel	Received 28th February 2020	No

Consultee	Response	Potential for Interference Following Consultation Exercise
Virgin Media	Received 24th February 2020	No
Vodafone Ireland	Received 25th February 2020	No

The scoping responses from the telecommunications and aviation consultees are described below. Relevant copies of scoping responses are provided in Appendix 2-1.

14.2.4.2.1 Telephone and Broadband Operators

The consultees that responded to scoping, operate links either outside the Proposed Development site, and therefore are not subject to any interference risk, or do not operate any links in the area.

14.2.4.2.2 Aviation

As noted in Table 14-24 above, scoping responses were received from the following aviation consultees:

- Department of Defence
- Irish Aviation Authority

Pertinent information has been summarised below, however the scoping responses should be referenced to for further detail:

Department of Defence

In March 2020, a scoping response was received from the Department of Defence (DoD) which set out lighting requirements for turbines, as follows:

1. *Single turbines or turbines delineating corners of a wind farm should be illuminated by high intensity obstacle strobe lights (Red).*
2. *Obstruction lighting elsewhere in a wind farm will be of a pattern that will allow the hazard be identified and avoided by aircraft in flight.*
3. *Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment. Obstruction lighting fitted to obstacles must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum specifically at or near 850 nanometres (NM) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light. Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment.*

Irish Aviation Authority

In March 2020, a scoping response was received from the Irish Aviation Authority (IAA). The requirements of the IAA include the following:

1. *Agree an aeronautical obstacle warning light scheme for the wind farm development.*
2. *Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.*
3. *Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection.*

The nearest operational airport to the Proposed Development site is Shannon Airport, located approximately 30 kilometres southeast of the site, and therefore outside the range at which such issues would be expected.

In response to the lighting requirements requested by the DoD and IAA the turbines will be marked on maps, lit at night and entered into aircraft navigation databases and therefore can be avoided during flight.

14.2.5 Likely Significant Effects and Associated Mitigation Measures

14.2.5.1 'Do-Nothing' Scenario

If the Proposed Development were not to proceed, there would be no change to existing telecommunications and aviation operations in the area.

14.2.5.2 Construction Phase

The potential for electromagnetic interference from wind turbines occurs only during the operational phase of the development. There are no electromagnetic interference impacts associated with the construction phase of the Proposed Development, and therefore no mitigation required.

14.2.5.3 Operational Phase

14.2.5.3.1 *Telecommunications*

Pre-Mitigation Impact

Consultation regarding the potential for electromagnetic interference from the Proposed Development was carried out with the relevant national and regional broadcasters, fixed line and mobile telephone operators and other operators, which confirmed that no turbines are proposed within the areas requested to be left clear of turbines.

Mitigation Measures

In the event of interference occurring to telecommunications, the Department of the Environment, Heritage and Local Government *'Wind Farm Planning Guidelines'* (2006) acknowledge that '*electromagnetic interference can be overcome'* by the use of divertor relay links out of line with the wind farm.

Residual Impact

The Proposed Development will have no residual impact on the telecommunications signals of any other operator, due to distance from or absence of any links in the area.

Significance of Effects

There will be no significant effect on telecommunications from the Proposed Development.

14.2.5.3.2 *Aviation*

Pre-Mitigation Impact

The scoping response of the DoD and IAA has requested that standard lighting requirements be used at the proposed renewable energy development.

Mitigation Measures

The scoping response from the DoD and IAA set out lighting requirements for turbines as detailed above. These requirements will be complied with for the Proposed Development and any further details will be agreed in advance of construction with the DoD and IAA. The coordinates and elevations for built turbines will be supplied to the IAA, as is standard practice for wind farm developments.

Residual Impact

The Proposed Development will have no residual impact on aviation as all lighting requirements will be met by the applicant.

Significance of Effects

There will be no significant effect on aviation operations due to the Proposed Development.

14.2.5.4 Cumulative Effect

Chapter 2, Section 2.6 of this EIAR describes the methodology used in compiling the list of projects considered in the assessment of cumulative effects, and provides a description of each project, including current status. Although, there is one operational wind farm and one wind farm planning application within 5 kilometres of the Proposed Development (i.e. the operational Slievecallan Wind Farm and the proposed Coor West Wind Farm which is under appeal with An Bord Pleanála), there will be no cumulative impacts relating to the Proposed Development and surrounding projects in relation to Telecommunications or Aviation.

During the development of any large project that holds the potential to effect telecoms or Aviation, the Developer is responsible for engaging with all relevant Telecoms Operators and Aviation Authorities to ensure that the proposals will not interfere with television or radio signals by acting as a physical barrier. In the event of any potential impact, the Developer for each individual project is responsible for ensuring that the necessary mitigation measures are in place. It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative impact from the Proposed Development and other developments in the area.