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" and in the* 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, Draft 2017) *''*as "*built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure*.' 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: Hydrology and Hydrogeology, and Chapter 10: Air and Climate. Tourism and amenity resources, which are also considered material assets, are addressed in Chapter 5: Population and Human Health.

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. This chapter of the EIAR has been prepared in accordance with the requirements of the EIA legislation and guidance outlined in Chapter 1: Introduction.

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 Derrinlough Wind Farm Development.

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 junctions 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. A 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.

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 Knocknalough .

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 1.8 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 2.6 of Chapter 2 of the EIAR, and summarised below.

Transport Infrastructure Ireland

Transport Infrastructure Ireland (TII) responded to Scoping on the 19th December 2019 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, N52, 2018,

Offaly County Council

Two pre-planning meetings (29th of August 2018 and 6th March 2019) were held with the Planning Department of Offaly County Council in relation to the proposed development prior to the submission of the current planning application on this site. The meetings were attended by representatives of the Planning Department, Environmental/Water Services Department, Roads Department, MKO and Bord na Móna Powergen Ltd.

At the meetings, the proposed haul route, site entrances and the underpass of the N62 was outlined by MKO and Bord na Móna. Issues raised by Offaly 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 geometric requirements of the turbine delivery vehicles were assessed using Autocad and Autotrack with the assessment undertaken by Collett & Sons Ltd which is included as Appendix 14.1. The preliminary design and geometric assessments for the Proposed Development access junctions were prepared by Alan Lipscombe Traffic and Transport Ltd.

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 2019 traffic flows 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 development, known as Derrinlough Wind Farm, will be located on Clongawny and Drinagh Bogs which are part of the Boora bog group in Co. Offaly.

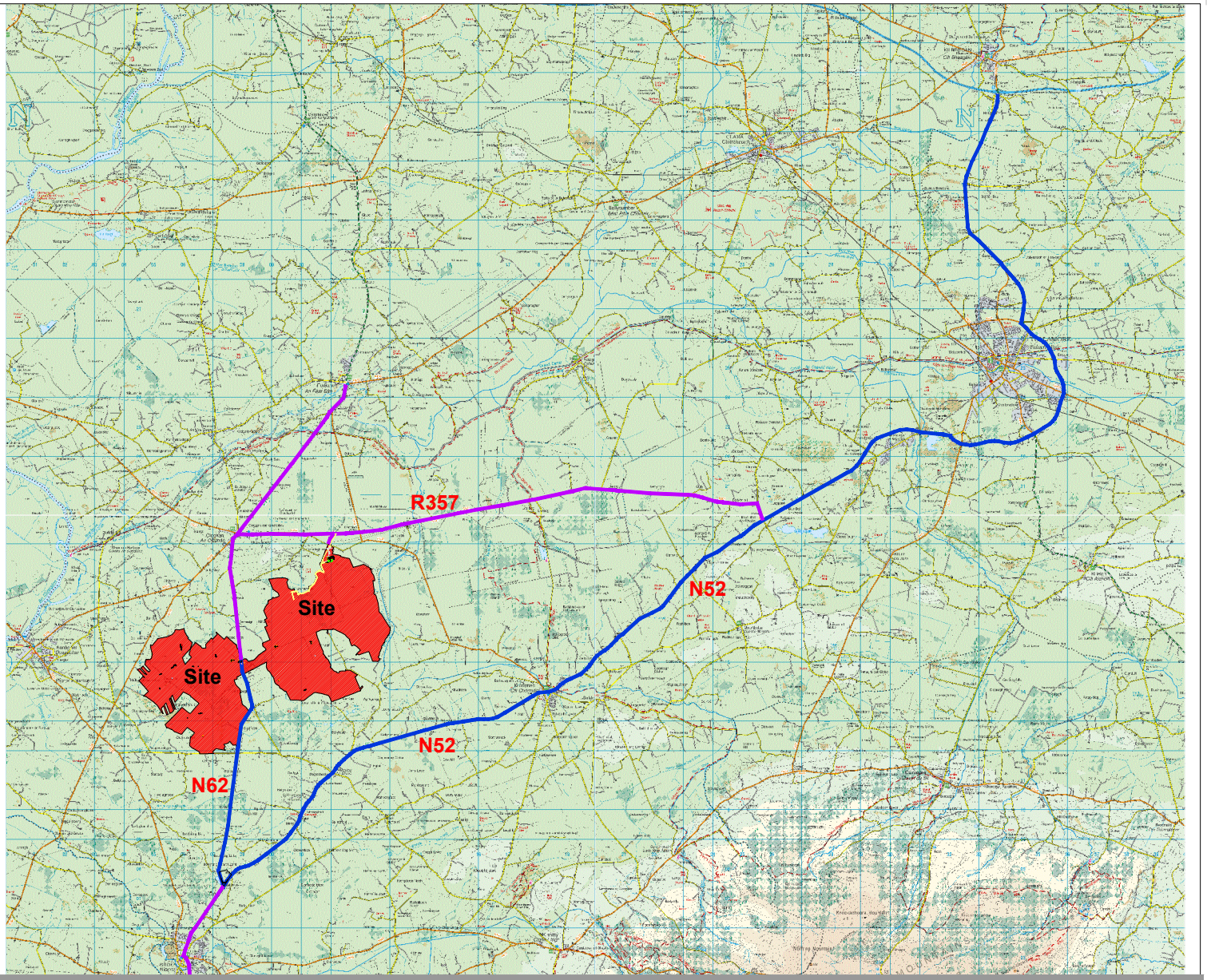
The closest settlements to the site are Cloghan which is located approximately 2km to the north and Fivealley which is located approximately 2.5km to the south. Other settlements and towns in the area include Banagher (c. 3km west), Ferbane (c. 6km north), Birr (c. 7km south-west) and Shannonbridge (c. 15km north-west). The site location is shown on Figure 1.1.

14.1.2.2 Proposed Abnormal Size Load Delivery Route

A detailed assessment of the transport route was made from a point at which the route turns off the M6 Motorway at Kilbeggan. The route is shown in Figure 14.1 and is discussed in detail in Section 14.1.8.

Turbine Haul Route

Additional delivery route for sub-station construction traffic



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14.1 Site location and delivery routes

PROJECT:	Derryinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	NTS
PROJECT NO: 7380	DATE: 05.11.19	DRAWN BY:	AL

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The route assessment is confined to the access route comprising of the turnoff from the M6 onto the N52 at Kilbeggan, before heading southbound on the N52 towards Tullamore for approximately 8km. The route then bypasses Tullamore on the N52 to the east and south for a further 8km before heading south west for a further 30 km on the N52, passing through the villages of Blue Ball and Kilcormac, in the direction of the town of Birr. The route then turns right onto the N62, using a temporary bypass of the existing junction (known as Kennedy's Cross), just to the north of Birr, heading due north for approximately 8km to the parts of the proposed site. The proposed access junctions are located approximately 200m north of the access to the existing Bord na Móna Briquette Factory, as shown in Figure 14.1 and 14.2a.

14.1.2.3 Proposed Construction Traffic Haul Route

The delivery route for general HGV construction traffic may vary depending on the location of quarries and the suppliers used for stone and other materials required to construct the proposed development. Based on the location of quarries in the vicinity of the Proposed Development and the fact that deliveries of stone comprise the majority of deliveries to from the site, it is estimated that the following proportion of concrete and general construction traffic will travel on the following links;

- N62 to from the north – 50%,
- N62 to from south – 50%
  - N52 to from Tullamore – 30%
  - N52 to from Birr – 20%.

For the purpose of this assessment it is assumed that deliveries of smaller component parts for the wind turbines, will travel to the site via Tullamore and the N52, followed by the N62 towards the site. In practice the delivery route for these component part could change but as the associated traffic volumes are low, as established in Section 14.1.4 of this EIAR, the impacts will be minimal regardless of the route selected. .

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

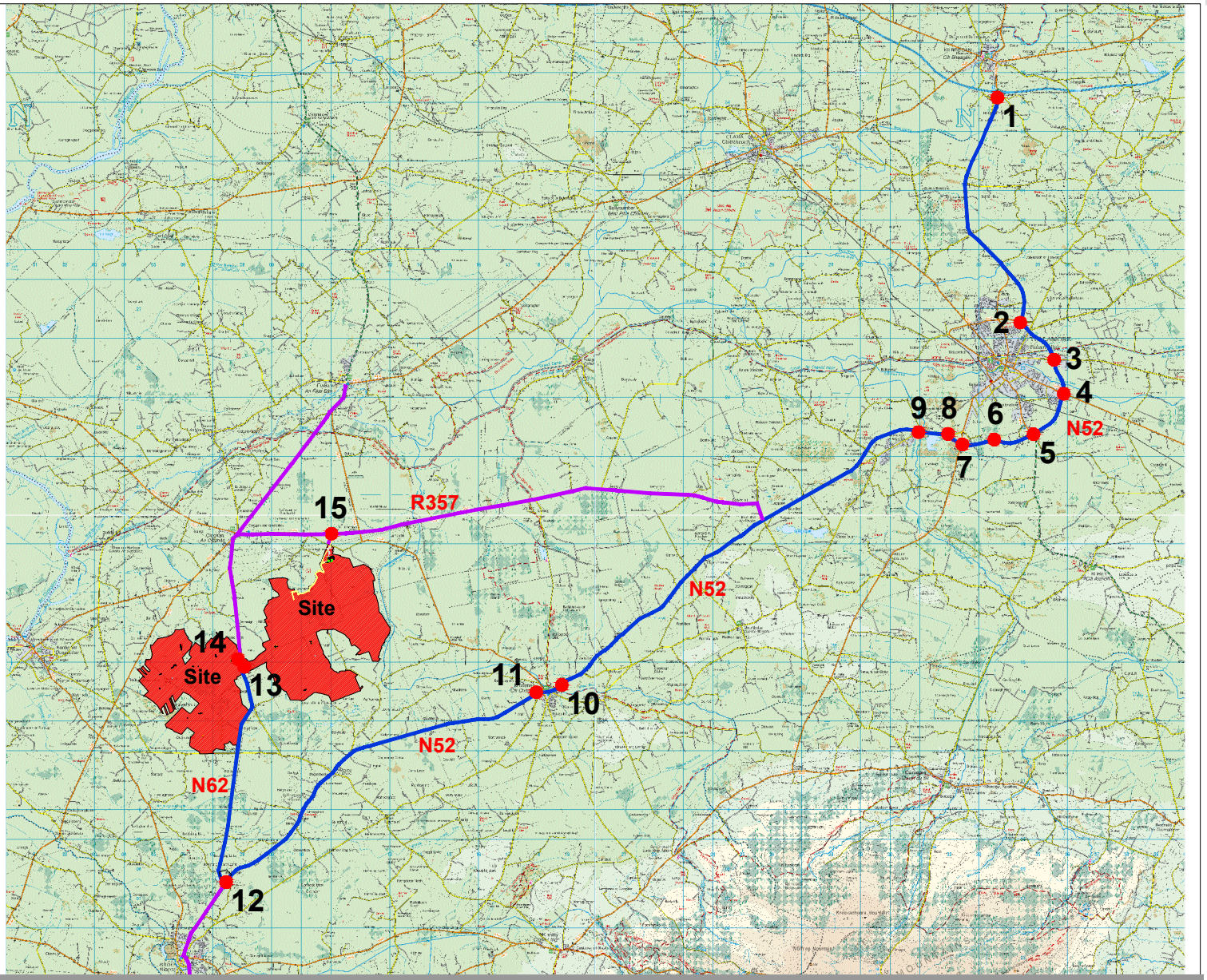
14.1.2.4 Site Entrances

Three entrances are proposed for the construction stage of the proposed development in order to transport turbine components, materials and equipment to the site. All are existing Bord na Móna machinery entrances which have been in use by the machinery involved in peat harvesting activities. The entrance locations are depicted on Figure 4.1 of this EIAR and can be described as follows:

- Existing entrance off the N62 to Drinagh Bog;
- Existing entrance off the N62 to Clongawny Bog; and
- Existing entrance off the R357 which connects Drinagh and Noggus Bog.

The main entrances for the construction phase of the proposed development are located along the N62. These two entrances will provide access east and west into Drinagh and Clongawny bogs, respectively and will be designed to facilitate both materials delivery to the site (stone, steel and concrete) as well as large oversize components such as turbine blades and tower sections. . Upgrade works will be required to these entrance locations in order to accommodate access and egress of turbine delivery and construction vehicles. Following the construction phase of the proposed development, the upgraded areas of these entrances will be closed by erecting fencing, however they may need to be reopened during the lifetime of the development should replacement blades or other abnormal loads be required to access the site.

The access off the R357 will be used for delivery of substation components and materials required for the construction of the substation and grid connection works only and will not be used to provide access for turbine components. As such, this site entrance will have a comparatively low level of



Turbine Haul Route

Locations for assessment

Additional delivery route for sub-station construction traffic

NOTES:

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Figure 14.2a Route assessment location map

PROJECT:	Derryinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	NTS
PROJECT NO: 7380	DATE: 05.11.19	DRAWN BY:	AL

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construction traffic and associated material deliveries. Minor upgrade works will be required to this entrance location in order to accommodate access and egress of construction vehicles. This entrance will be upgraded after construction to provide permanent access to a proposed amenity car park. In addition, the existing machine pass off the L7009 Local Road will be upgraded to provide permanent access to the proposed substation and local access to the proposed amenity pathway during the operational phase. Further information on the proposed amenity elements associated with the proposed development are outlined in Chapter 4.

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.

A continuous traffic counter is maintained by TII on the N52 between Tullamore and Birr. Traffic data from this site together with a peak period classified turning count undertaken at the junction between the N52 and N62 (Kennedy's Cross) to the north of Birr (locations 1, 2 and 3 shown in Figure 14.2b) on Tuesday 8th October 2019, was used to provide background traffic volumes on the local public road network. A short period PM peak hour count was also undertaken on the R357, indicated as location 4 in Figure 14.2b.

For the peak period, count locations' daily flow profiles were applied to the short period traffic counts using the data from the continuous traffic counter site on the N52. This shows that the average annual daily traffic flow (AADT) is 11.32 times the flow observed during the evening peak hour period, as set out in Table 14.1.

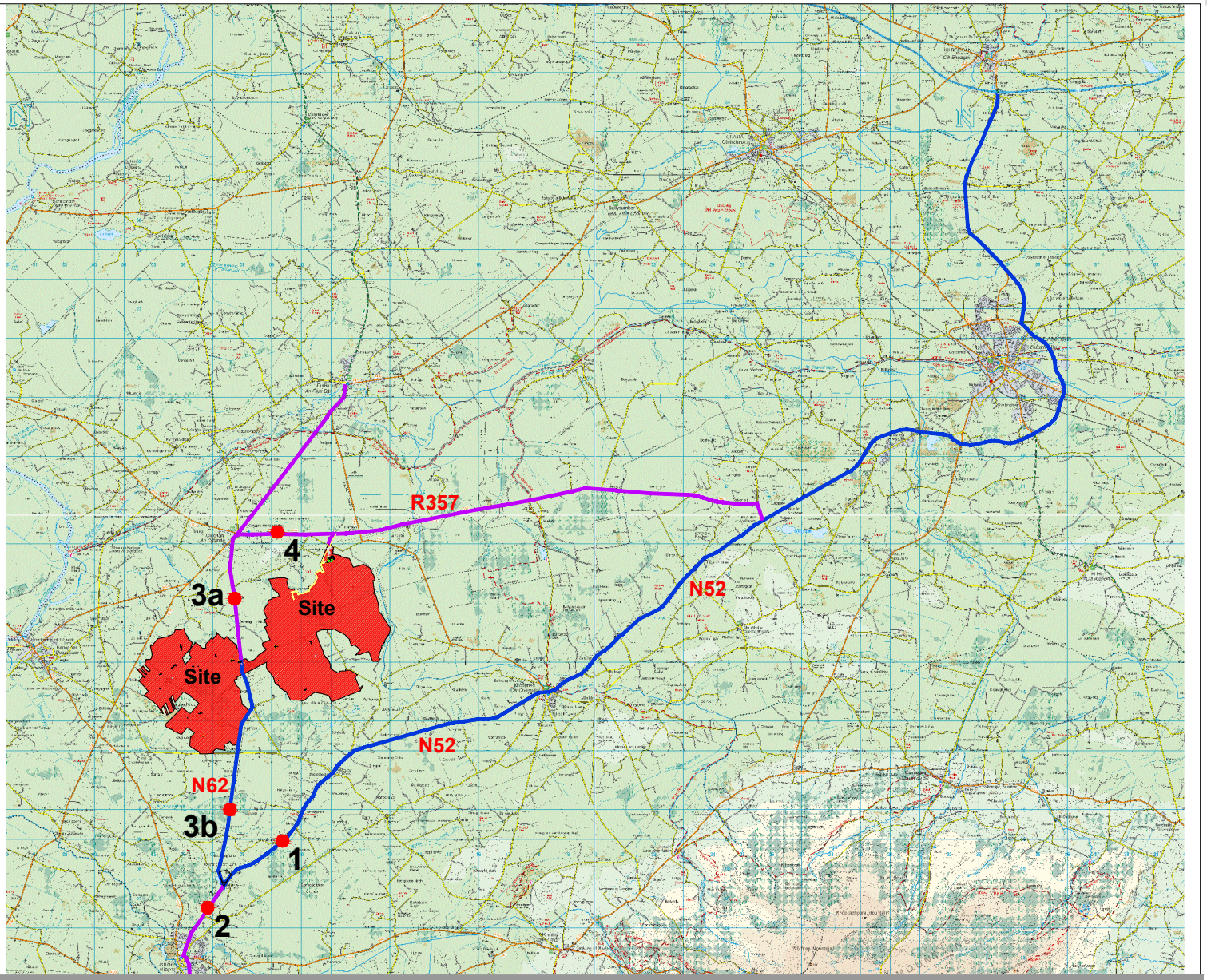
Base year 2019 traffic volumes for the four link locations shown in Figure 14.2b range from 2,264 vehicles per day on the R357 to 7,935 on the N52 between the Kennedy's Cross and Birr. There were 2,864 vehicles per day on the section of the N62 leading to the proposed site.

Table 14.1 Observed flow in PM peak hour, all day factor, Average all day flows, year 2019 (2-way vehicles)

Link	2-way flow	hour	All day factor	All day flow
1 N52 – Tullamore	459	17:00 – 18:00	11.32	5,196
2 N52 – Birr	701	17:00 – 18:00	11.32	7,935
3 N62 – Athlone	253	17:00 – 18:00	11.32	2,864
4 R357	200	17:00 – 18:00	11.32	2,264

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 2022.



Turbine Haul Route

Link count locations

Additional delivery route for sub-station construction traffic

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Figure 14.2b Link count locations

PROJECT:	Derryinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	NTS
PROJECT NO: 7380	DATE: 05.11.19	DRAWN BY:	AL

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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 14.2 and Table 14.5. Traffic volumes are forecast to increase during the period from 2019 (the observed traffic count year) to 2022 (the assumed construction year) by 3.6%, assuming a medium growth scenario. All day traffic flows, for the years 2019 and 2022, on the study area network are compared in Table 14.4.

It should be noted that while the assumed construction year of 2022 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 1.18% (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 14.2 TII Traffic Growth Annual Factors and Indices for County Offaly

Year	Lights – Annual Factor			Lights – Cumulative Index		
	Low	Medium	High	Low	Medium	High
2019	1.0103	1.0118	1.0152	1.010	1.012	1.015
2020	1.0103	1.0118	1.0152	1.021	1.024	1.031
2021	1.0103	1.0118	1.0152	1.031	1.036	1.046
2022	1.0103	1.0118	1.0152	1.042	1.048	1.062
2023	1.0103	1.0118	1.0152	1.053	1.060	1.078
2024	1.0103	1.0118	1.0152	1.063	1.073	1.095

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

Table 14.3 TII traffic growth rates by growth scenario

Period	New Factors		
	Low	Medium	High
2019 – 2022	1.031	1.036	1.046

Table 14.4 Average all day flows by location and year (2-way vehicles)

Link	2019	2022
1 N52 – Tullamore	5,196	5,383
2 N52 – Birr	7,935	8,221
3 N62 – Athlone	2,864	2,967
4 R357	2,264	2,346

The TII traffic count data recorded on the N52 and the peak period traffic count undertaken on the N62 was also used to determine the existing percentage of HGVs on the study area network. The observed percentage of HGVs was observed to vary from 7.2% on the N52, to 7.0% on the N62 approaching the site. Traffic volumes forecast on the study network for the year 2022 are shown by vehicle type in Table 14.5 .

Table 14.5 All day flows, percentage HGVs and flows by vehicle type, year 2022

Link	All day flow (vehs)	% HGV's	Vehicles		PCUs		
			HGVs	Cars / lgvs	HGVs	Cars / lgvs	Total
1 N52 – Tullamore	5,383	7.2%	388	4,995	930	4,995	5,925
2 N52 – Birr	8,221	7.2%	592	7,629	1,421	7,629	9,050
3 N62 – Athlone	2,967	11.0%	326	2,641	783	2,641	3,424
4 R357	2,346	7.2%	169	2,177	405	2,177	2,582

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 4.3 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 approximately 24 months (2 years). While this could increase to 30 months, 24 months was assumed for the purpose of this assessment in order to test the worst-case scenario. For assessment purposes a standard 255 working days per annum was adopted, with 510 working days assumed for the site preparation and ground works stage with the total numbers of deliveries made to the site during that period shown in Table 14.6.

During this construction phase, there will be two distinct types of days with respect to trip generation. A total of 21 days will be used to pour the 21 concrete wind turbine foundations. Foundations will likely be poured one per day, with an estimated 75 concrete loads required for each turbine foundation delivered to the site over a 12-hour period. This will result in just over 6 HGV trips to and from the site

per hour. On the remaining 489 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 43,510 two-way trips will be made to the site by trucks and large articulated HGVs, as set out in

Table 14., with the daily effect on the local road network shown in Table 14.7 and 14.8. The figures show that on the 21 days that concrete will be delivered to the site an additional 360 two-way PCUs will be added to the network (comprising 75 two-way HGV trips or 150 movements, with 2.4 PCUs per movement), as shown in Table 14.7. Similarly, on the 489 days when other materials will be delivered to the site, traffic volumes on the local network are forecast to increase by an average of 412 PCUs, as set out in Table 14.8.

Table 14.6 Stage 1 – Site preparation and groundworks – total movements

Material	Total no. Truck Loads	Truck type
Concrete	1,575	Trucks
Concrete blinding and steel	230	Large artic
Plant / fencing / compound set-up	50	Large artic
Crushed rock and sand	40,848	Large artic
Ducting / cabling	618	Large artic
Grid cable laying	53	Large artic
Cranes	11	Large artic
Substation components	79	Large artic
Refuelling / maintenance / misc	46	Large artic
Total	43,510	

Table 14.7 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	1,575	Truck	2.4	3,780	180.0	360.0
* Estimation based on 21 concrete pouring days						

Table 14.8 Stage 1 – Site preparation and groundworks – 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 blinding and steel	230	Truck	2.4	552	1.1	2.3
Plant / fencing / compound set-up	50	Large artic	2.4	120	0.2	0.5
Crushed rock and sand	40,848	Large artic	2.4	98,035	200.5	401.0
Ducting / cabling	618	Large artic	2.4	1,483	3.0	6.1
Grid cable laying	53	Large artic	2.4	127	0.3	0.5
Cranes	11	Large artic	2.4	26	0.1	0.1
Substation	79	Large artic	2.4	190	0.4	0.8
Refuelling / maintenance / misc	46	Large artic	2.4	110	0.2	0.5
Total	41,935			100,644	205.8	411.6
* Estimation based on ground work period of 489 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 14.9, which summarises that a total of 189 trips will be made to and from the site by extended artics, with a further 84 trips made by conventional large articulated HGVs.

Table 14.9 Stage 2 – Wind turbine plant – total movements

Material	Units	Quantity per Unit	Total Quantity	Quantity per Truck	Total Truck Loads	Truck type
Nacelle	21	1	21	1	21	Extended Artic
Blades	21	3	63	1	63	Extended Artic
Towers	21	5	105	1	105	Extended Artic
Sub total					***189***	
Transformer	21	1	21	1	21	Large Artic
Drive train and blade hub	21	1	21	1	21	Large Artic
Base and other deliveries	21	2	42	1	42	Large Artic
Sub total					***84***	
Total					**273**	

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 5 extended artic trips made by convoy to the site on 2 days per week, resulting in this stage taking approximately 38 days/nights spread over an assumed 19-week period. On a further two days per week, lasting for approximately 11 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 Table 14.10 and Table 14.11. In Table 14.10, a pcu equivalent value of 10 was allocated to each extended artic movement, resulting in an additional 100 PCUs on the study network on these 2 days per week, while an additional 14.4 PCUs are forecast to be on the network on two other days per week, as shown in

Table 14., during the turbine construction phase.

Table 14.10 Stage 2 – Wind turbine plant, extended artics – total 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	5	Extended Artic	10	50.0	100.0

Material	Units	Truck Type	PCU Value	Total PCUs	2-way PCUs/ day
Total per turbine	9			90.0	180.0
Total per delivery day	5			50.0	100.0
*Estimation based on 5 abnormal sized loads being delivered per day on 2 days per week (total 189 loads will take 38 nights spread over 19 weeks)					

Table 14.11 Stage 2 - Wind turbine plant, normal artic HGVs - total 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	1	2.4	4.8
Total	3		14.4
*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 100-120 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 80 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 120 pcu movements (each trip is two way) will be added to the network during the groundworks stage of the development, reducing to 80 pcu trips during the turbine construction stage.

14.1.4.2 Development Trip Generation – During Operation

It is assumed that the wind farm will be unmanned once operational and will be remotely monitored. Traffic associated with the operational phase of the wind farm will be from the wind farm developers, Eirgrid personnel visiting the substation, 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 travellingto site at any one time. The impact on the network of these trips during the operational stage is discussed in Section 14.1.6.

Once operational the site will also attract visitors for amenity purposes, with those travelling by car using the carpark provided via the access off the R357. Based on existing Bord na Móna sites it is forecast that up to 40 car trips per day will be generated by this use.

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 blades up to 75m long have been considered for the purpose of this assessment.

The actual turbine to be installed on the site will be the subject of a competitive tender process, and could include turbines not amongst those originally considered as part of this assessment because they are not yet available on the market. Regardless of the make or model of the turbine eventually selected for installation on site, a detailed delivery assessment and program will be carried out by the turbine delivery company and a similar methodology will be adopted as set out here to ensure the findings of this assessment remain valid for whatever model of turbine is selected. Any references to the turbine dimensions in the text below must be considered in the context of the above and should not be construed as meaning it predetermines the dimensions of any wind turbine that could be used on the site.

The key dimensions are as follows:

Transport of Blades – Super Wing Carrier with blade

Total length	80.4 m
Length of blade	75.0 m
Inner radius	28.0 m

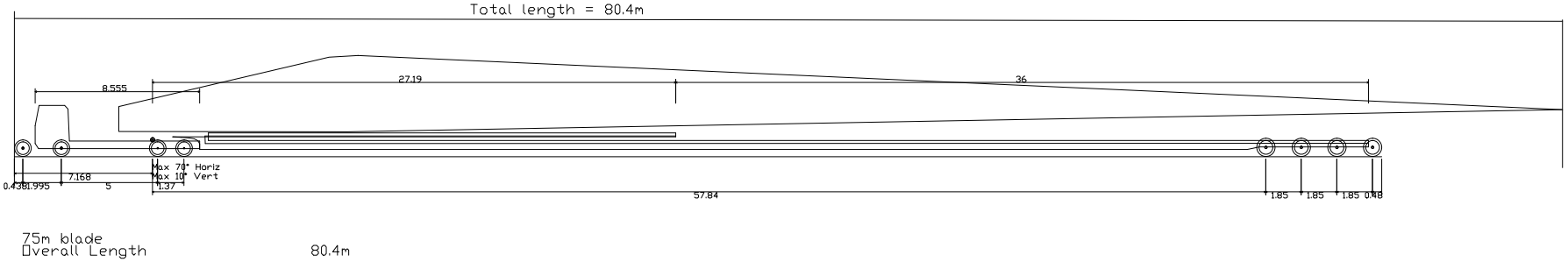
Transport of Tower – Using low-bed or drop deck trailers

Total length (with load)	49.6 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 and included as Appendix 14.1 are the blade and tower transporters. The geometry of the design vehicles are included as Figures 14.4 and 14.5.

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.



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

FIGURE 14.4 Design blade extended artic profile

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	NTS
PROJECT NO: 7380	DATE: 22.12.19	DRAWN BY:	AL

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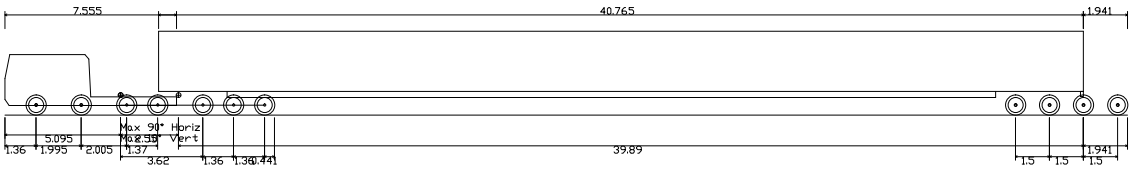

Tower	
Overall Length	49.476m
Overall Width	2.550m
Overall Body Height	3.695m
Min Body Ground Clearance	0.427m
Max Track Width	2.520m
Lock to Lock Time	6.00s
Wall to Wall Turning Radius	9.800m

NOTES:

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FIGURE 14.5 Design tower extended artic profile

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	NTS
PROJECT NO: 7380	DATE: 22.12.19	DRAWN BY:	AL

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14.1.6 Traffic Effects During Construction and During Operation

14.1.6.1 Traffic Effect 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.

Effect on Link Flows – During Construction

Background traffic volumes, as established previously and set out in Table 14.5, and development generated traffic volumes are shown for the typical construction day scenarios discussed in Section 14.1.4 are set out in Table 14.12 to 14.15, with the traffic effects summarised in Table 14.16 to 14.19. 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 21 days an additional 480 PCUs will travel on the study network. On these days, the percentage increase in traffic volumes experienced on the study network will be between 5.3% on the N52 in the direction of Birr and 14.0% increase on the N62 leading to the site.

During Stage 1 - Site Preparation and Groundworks

On average an additional 532 PCUs will travel on the local highway network resulting in a percentage increase in traffic volumes on the study network of between 5.9% on the N52 to / from Birr, 11.5% on the N62 leading to the site and 20.6% on the R357.

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

The additional 180 PCUs (made up of cars and large extended artics) will appear on the study network for 38 days. On the days this impact occurs, volumes will increase by 3.0% on the N52 from the direction of Tullamore, and by 5.3% on the N62 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 21 days on the delivery route 95 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 1.6% on the N52 in the direction of Tullamore, and 2.8% on the N62 approaching the site.

Table 14.12 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. N52 – Tullamore	4,995	930	5,925	120	360	480	5,115	1,290	6,406
2. N52 – Birr	7,629	1,421	9,050	120	360	480	7,749	1,781	9,530
3a. N62 - North of access	2,641	783	3,424	120	360	480	2,761	1,143	3,904
3b. N62 – South of access	2,641	783	3,424	120	360	480	2,761	1,143	3,904
4. R357	2,177	405	2,582	NA	NA	NA	NA	NA	NA

Table 14.13 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. N52 – Tullamore	4,995	930	5,925	120	412	532	5,115	1,342	6,458
2. N52 – Birr	7,629	1,421	9,050	120	412	532	7,749	1,833	9,582
3a. N62 - North of access	2,641	783	3,424	120	412	532	2,761	1,195	3,956
3b. N62 – South of access	2,641	783	3,424	120	412	532	2,761	1,195	3,956
4. R357	2,177	405	2,582	120	412	532	2,297	817	3,114

Table 14.14 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. N52 – Tullamore	4,995	930	5,925	80	100	180	5,075	1,030	6,106
2. N52 – Birr	7,629	1,421	9,050	NA	NA	NA	NA	NA	NA
3a. N62 - North of access	2,641	783	3,424	NA	NA	NA	NA	NA	NA

Link	Background PCUs			Development PCUs			Total PCUs (Background + Development)		
3b. N62 – South of access	2,641	783	3,424	80	100	180	2,721	883	3,604
4. R357	2,177	405	2,582	NA	NA	NA	NA	NA	NA

Table 14.15 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 N52 – Tullamore	4,995	930	5,925	80	15	95	5,075	945	6,021
2 N52 – Birr	7,629	1,421	9,050	NA	NA	NA	NA	NA	NA
3a N62 - North of access	2,641	783	3,424	NA	NA	NA	NA	NA	NA
3b N62 – South of access	2,641	783	3,424	80	15	95	2,721	798	3,519
4 R357	2,177	405	2,582	NA	NA	NA	NA	NA	NA

Table 14.16 Summary effect of development traffic during concrete pouring

Link	Background	Development	Total	% increase	Estimated No. of days
1. N52 – Tullamore	5,925	480	6,405	8.1%	6
2. N52 – Birr	9,050	480	9,530	5.3%	4
3a. N62 - North of access	3,424	480	3,904	14.0%	11
3b. N62 – South of access	3,424	480	3,904	14.0%	10
4. R357	2,582	NA	NA	NA	NA

Table 14.17 Summary effect of development traffic during site preparation and ground works

Link	Background	Development	Total	% increase	Estimated No. of days
1. N52 – Tullamore	5,925	532	6,457	9.0%	147

2. N52 – Birr	9,050	532	9,582	5.9%	98
3a. N62 - North of access	3,424	532	3,956	15.5%	245
3b. N62 – South of access	3,424	532	3,956	15.5%	245
4. R357	2,582	532	3,114	20.6%	7

Table 14.18 Summary effect of development traffic during turbine construction – extended artics (large turbine components)

Link	Background	Development	Total	% increase	Estimated No. of days
1. N52 – Tullamore	5,925	180	6,105	3.0%	38
2. N52 – Birr	9,050	NA	NA	NA	NA
3a. N62 - North of access	3,424	NA	NA	NA	NA
3b. N62 – South of access	3,424	180	3,604	5.3%	38
4. R357	2,582	NA	NA	NA	NA

Table 14.19 Summary effect of development traffic during turbine construction – other deliveries (small turbine components)

Link	Background	Development	Total	% increase	Estimated No. of days
1. N52 – Tullamore	5,925	95	6,020	1.6%	21
2. N52 – Birr	9,050	NA	NA	NA	NA
3a. N62 - North of access	3,424	NA	NA	NA	NA
3b. N62 – South of access	3,424	95	3,519	2.8%	21
4. R357	2,582	NA	NA	NA	NA

An assessment of the impact on link capacities in the study area was undertaken for the various construction stages as set out in Table 14.20, Table 14.21, and Table 14.22. The capacity for each link in the study area is shown in Table 14.. The capacities range from a daily flow of 11,600 vehicles on the N52 in the direction of Birr down to 5,000 on the R357 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 14.21 with the percentage capacity reached for each link and stage shown in Table 14.22. Based on this assessment the following points are noted;

- On the external network the N52 in the direction of Birr is the busiest road with the link capacity forecast to operate at 78% for the do-nothing scenario, increasing to a maximum of 82% during the 21 days that the concrete foundations will be poured.
- The N62 leading to the site is forecast to operate well within capacity for all scenarios, increasing from 40% for the do-nothing scenario to a maximum of 46% on the 21 days that the foundations will be poured.

Table 14.20 Carriageway widths, link type and link capacity

Link	Width (m)	Link type	Link capacity
1. N52 – Tullamore	7.0	Type 2 single	8,600
2. N52 – Birr	7.0	Type 1 single	11,600
3. N62 – Athlone	7.0	Type 2 single	8,600
4. R357	6.0	Type 3 single	5,000

Table 14.21 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. N52 – Tullamore	8,600	5,925	6,405	6,457	6,105	6,020
2. N52 – Birr	11,600	9,050	9,530	9,582	NA	NA
3a. N62 - North of access	8,600	3,424	3,904	3,956	NA	NA
3b. N62 – South of access	8,600	3,424	3,904	3,956	3,604	3,519
4. R357	5,000	2,582	NA	3,114	NA	NA

Table 14.22 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. N52 – Tullamore	8,600	69%	74%	75%	71%	70%

Link	Link capacity	Construction delivery stage				
2. N52 – Birr	11,600	78%	82%	83%	NA	NA
3a. N62 - North of access	8,600	40%	45%	46%	NA	NA
3b. N62 – South of access	8,600	40%	45%	46%	42%	41%
4. R357	5,000	52%	NA	62%	NA	NA

Substation Construction

It is estimated that an additional 400 HGV trips will be generated to and from the site during the construction of the substation, associated compound and grid connection works. It is assumed that the construction of the substation will take place at the same time as the site preparation and groundworks stage, as set out in Table 14.6 and Table 14.7, with traffic effects included in the assessment for that construction period.

N62 Underpass Construction

It is estimated that the construction of the underpass of the N62 proposed to provide local access within the site will take 4 weeks to construct. During this period the N62 will require to operate with one live traffic lane at this location with 2-way traffic flow maintained at all times by means of a "stop and go" traffic management system. The impact on traffic travelling on the N62 as result of the proposed "stop and go" system is estimated as follows. If it is assumed that 150 metres of road will be impacted, for those vehicles arriving on a green signal it is estimated that they will take up to 30 seconds to pass the works at a slow speed of 20km/h with a further 10 seconds required for traffic to clear when the direction of flow is changed. It is therefore estimated that the traffic stopped will be delayed for approximately 40 seconds. As a significant amount of traffic will arrive on a green signal aspect and will experience only a minor delay as traffic slows to pass the site, on average it is forecast that the average delay will be less than 40 seconds.

It is concluded that the works required to construct the underpass will have a negative but slight impact on the 2,970 daily vehicle trips on the N62, and that the effects will be temporary lasting for 20 days.

Effect on Link Flows – During Operation

Once the wind farm 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 study area junction most affected, the N52 / N62 junction, 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 Table 14.16 to 14.20 above, the worst-case effect will be experienced during peak hours when, during peak construction periods, up to 120 workers (60 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.

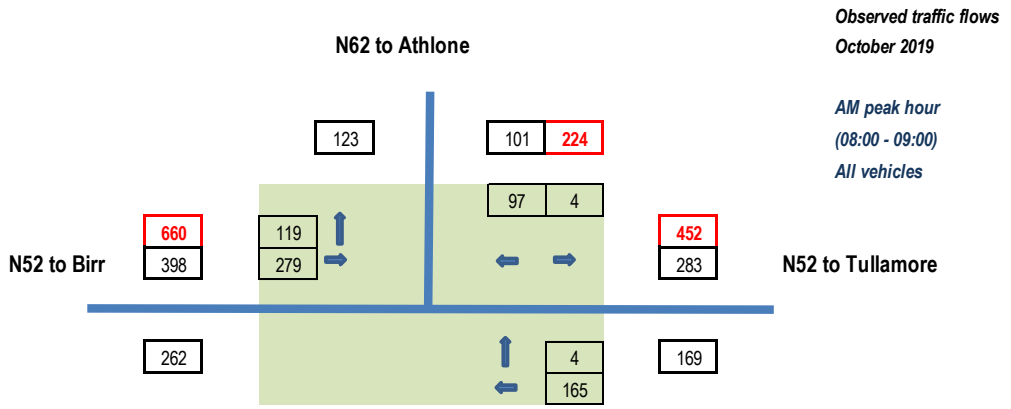
N52 / N62 junction Capacity Test Results

The AM and PM peak hour traffic flows through the N52 / N62 junction are shown for the year 2019 in Figure 14.3a, with background traffic flows for the assumed construction year of 2022 shown in Figure 14.3b. Traffic flows generated by the proposed development during the AM and PM peak hours are shown in Figure 14.3c while the year 2022traffic flows with development generated traffic are shown in Figure 14.3d.

The results of the capacity assessment, as set out in Table 14.23, show that additional car trips passing through the junction will have a slight effect, increasing the maximum ratio of flow to capacity (RFC) at the junction for the traffic movements impacted from 0.8% to 6.5% in the AM peak hour, and from 33.2% to 46.0% during the PM peak hour, which is within the acceptable limit of 85%.

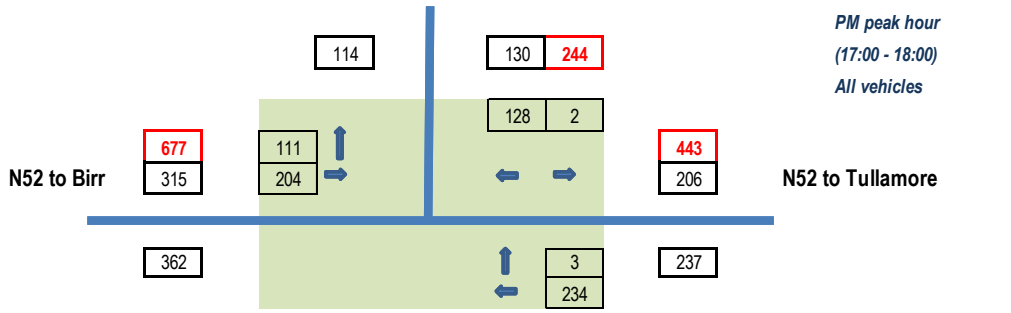
Table 14.23 Junction capacity test results, N52 / N62 junction, AM and PM peak hours, without and with construction staff, year 2022

Period	Location	Without construction traffic			With construction traffic		
AM		RFC	Queue (vehicles)	Delay (minutes)	RFC	Queue (vehicles)	Delay (minutes)
	From N62	26.0%	0.35	0.18	26.8%	0.36	0.19
	Right turn from N52	0.8%	0.01	0.10	6.5%	0.07	0.11
PM		RFC	Queue (vehicles)	Delay (minutes)	RFC	Queue (vehicles)	Delay (minutes)
	From N62	33.2%	0.49	0.20	46.0%	0.84	0.24



Observed traffic flows
October 2019

AM peak hour
(08:00 - 09:00)
All vehicles



Observed traffic flows
October 2019

PM peak hour
(17:00 - 18:00)
All vehicles

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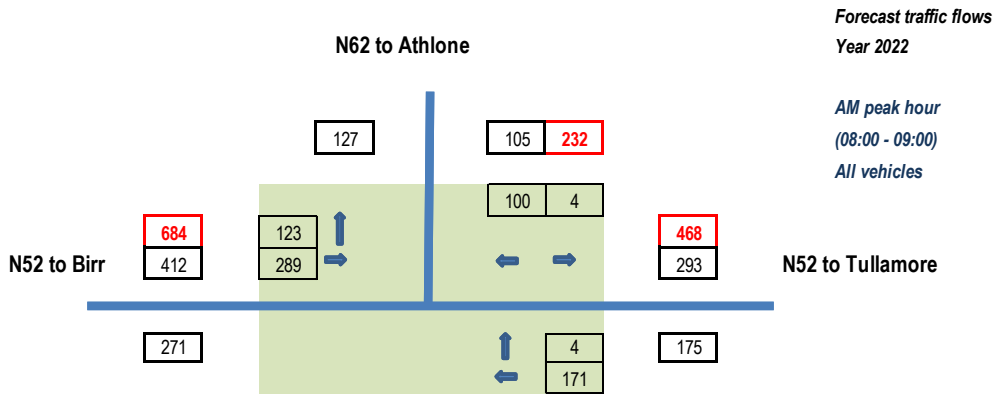
Figure 14.3a Observed traffic flows, AM & PM peak hours, N52 / N62 junction, October 2019 - All vehicles



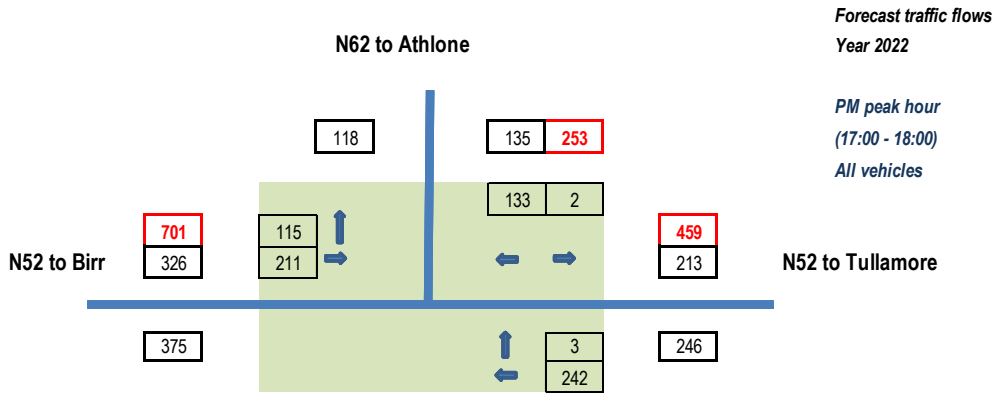


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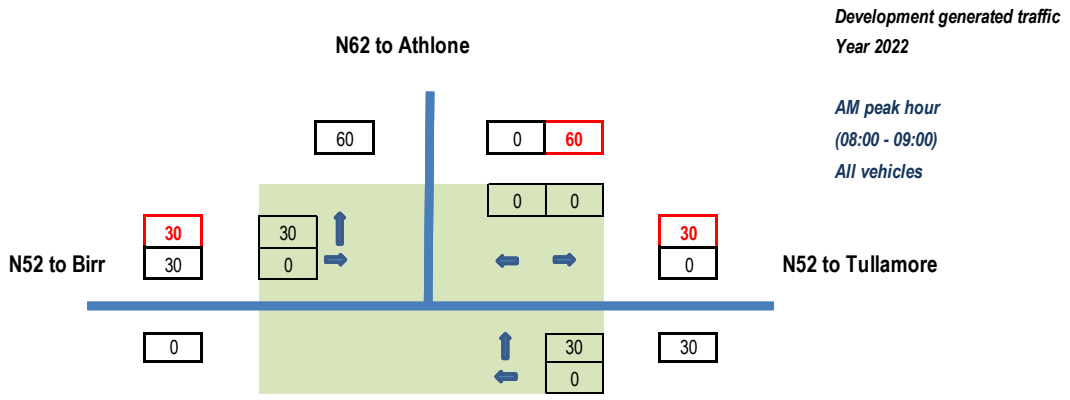
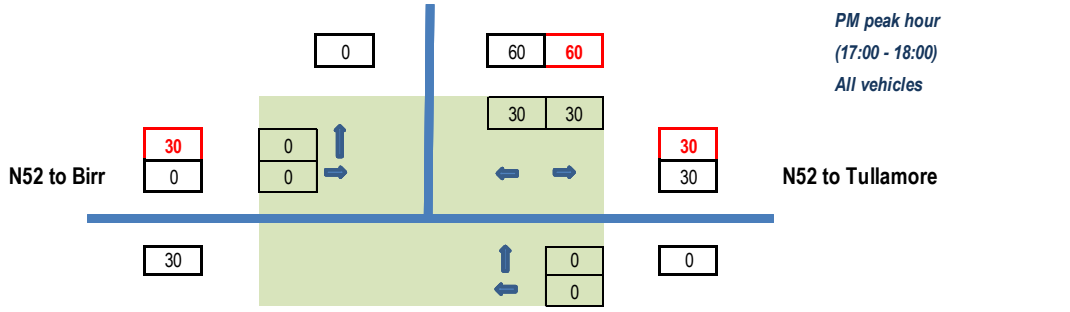
Figure 14.3b Forecast background traffic flows, AM & PM peak hours, N52 / N62 junction, October 2022 - All vehicles



Development generated traffic
Year 2022

AM peak hour
(08:00 - 09:00)
All vehicles



Development generated traffic
Year 2022

PM peak hour
(17:00 - 18:00)
All vehicles

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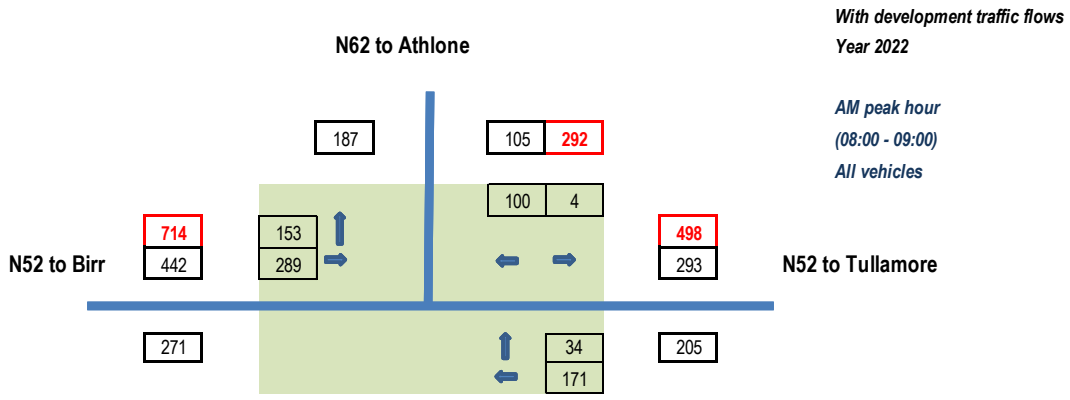
Figure 14.3c Development generated traffic flows, AM & PM peak hours, N52 / N62 junction, October 2022 - All vehicles



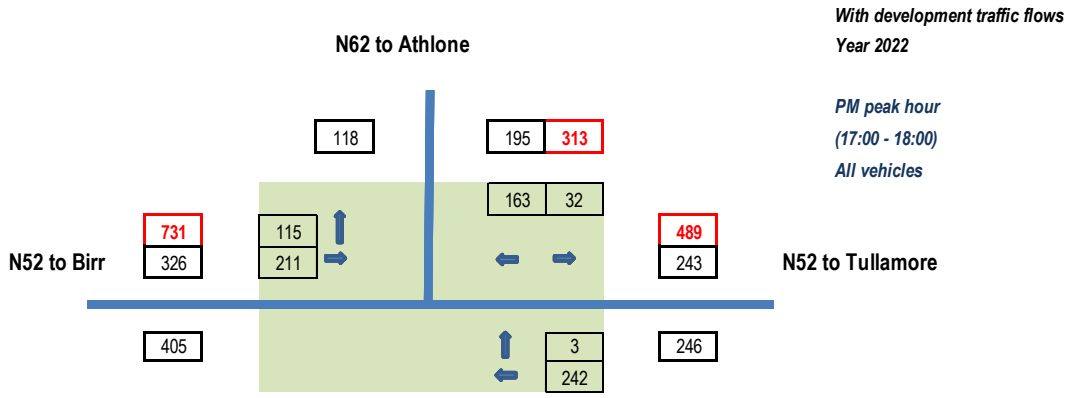


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Figure 14.3d With development traffic flows, AM & PM peak hours, N52 / N62 junction, October 2022 - All vehicles

Period	Location	Without construction traffic			With construction traffic		
	Right turn from N52	0.5%	0.01	0.10	0.5%	0.01	0.10

Effect on Junctions – During Operation

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

14.1.7 Traffic Management of Large Deliveries

The greatest effect on the road network will likely be experienced on the approximately 38 days during which the 5 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 13.1.8 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 roads 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. The preliminary route assessment discussed in this section,undertaken by Collett & Sons Ltd, indicates that the optimum route to the site would be via the M6, the N52 to Tullamore and towards Birr before turning northwards to the site on the N62. This route was therefore selected as the transport route for the abnormal loads. All locations along the route referred to in this section are highlighted in Figure 14.2a. For these locations, preliminary road and junction alignments, based on site surveys, 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.

The assessment also presents the preliminary design of the proposed site access junctions (two off the N62 for abnormal loads and general construction traffic, and one off the R357 for substation traffic), and the autotrack assessments for the appropriate vehicle types relevant to each access.

The locations discussed are as follows;

- Location 1 – Exit from Junction 5 of the M6 onto the N52
- Location 2 – N52 Ardan Roundabout with R420,
- Location 3 – N52 Cappancur Roundabout with L2025,
- Location 4 – N52 Cloncollog Roundabout with R420,
- Location 5 – N52 Clonminch Roundabout with R443 and N80,
- Location 6 – N52 Distillery Roundabout,
- Location 7 – N52 Ballard Roundabout with R421,
- Location 8 – N52 Charleville Roundabout with R421,
- Location 9 – N52 Mucklagh Roundabout with L6009,
- Location 10 – N52 Kilcormac east – right hand bend,
- Location 11 – N52 Kilcormac west – left hand bend,
- Location 12 – N52 / N62 Kennedy's Cross junction,
- Location 13 – Access junction 1 to eastern site on N62,
- Location 14 – Access junction 2 to western site on N62,
- Location 15 – Access junction 3 on R357.

14.1.8.1 Access to the Wind Farm site via N52, N62 and R357

The following text summarises the findings of the swept path analysis for Locations 1 to 12 undertaken by Collett & Sons Ltd and included as Appendix 14.1. The preliminary design and autotrack assessments for the three site access junctions, situated at locations 13, 14 and 15 were prepared by Alan Lipscombe Traffic and Transport Ltd.

Location 1 – Exit from Junction 5 of the M6 onto the N52

See Drawing No 324740-100B1.1

The swept path analysis undertaken for this location indicates that an area of the centre island of the roundabout will be required to be levelled and surfaced in order to accommodate the 75m blade transporter. The temporary removal of some road signs will also be required while the deliveries of the abnormally long loads are being made to the Proposed Development site.

Location 2 – Ardan Roundabout with R420

See Drawing No 324740-110B1.1

Similarly, the swept path analysis undertaken for this location also shows that an area of the centre island of the roundabout will require to be levelled and surfaced in order to accommodate the 75m blade transporter. The temporary removal of some road signs will also be required.

Location 3 – N52 Cappancur Roundabout with L2025

See Drawing No 324740-120B1.1

It is proposed that abnormal loads will negotiate this roundabout contra-flow in order to minimise the impact on the roundabout centre island. A strip of the centre island will be required to facilitate the abnormal loads and the temporary removal of some road signs will also be required.

Location 4 – N52 Cloncollog Roundabout with R420

See Drawing No 324740-130B1.1

As for location 3 it is proposed that abnormal loads will negotiate this roundabout contra-flow. A strip of the centre island will be required to facilitate the abnormal loads and the temporary removal of some road signs will also be required at this location.

Location 5 – N52 Clonminch Roundabout with R443 and N80

See Drawing No 324740-140B1.1

A strip of the centre island will be required to facilitate the abnormal loads and the temporary removal of some road signs will be required at this location.

Location 6– N52 Distillery Roundabout

See Drawing No 324740-150B1.1

A narrow strip of road widening on the southern carriageway of the approach to the roundabout and a section of the centre island will be required to facilitate the abnormal loads during the delivery stage. The temporary removal of some road signs will also be required at this location.

Location 7 – N52 Ballard Roundabout with R421

See Drawing No 324740-160B1.1

As for location 6 a narrow strip of road widening on the southern carriageway of the approach to the roundabout and a section of the centre island will be required to facilitate the abnormal loads during the delivery stage. The temporary removal of some road signs will also be required at this location.

Location 8 – N52 Charleville Roundabout with R421

See Drawing No 324740-170B1.1

In order for the abnormal sized vehicles to negotiate this roundabout a significant section of the centre island will require to be temporarily levelled and surfaced.

Location 9 – N52 Mucklagh Roundabout with L6009

See Drawing No 324740-180B1.1

While it is proposed that wheels of the abnormal load transporters will over-run onto the footpaths on the southern side of the roundabout in order to minimise the impact on the roundabout, a significant section of the centre island will require to be temporarily levelled and surfaced for this delivery stage. Some existing signs will also require to be removed on the delivery days/nights.

Location 10 – N52 Kilcormac east – right hand bend

See Drawing No 324740-190B1.1

While the swept path analysis shows that the abnormal loads will be accommodated at this location temporary parking restrictions will be required on the proposed delivery days / nights to permit these vehicles to negotiate this location.

Location 11 – N52 Kilcormac west – left hand bend

See Drawing No 324740-200B1.1

As for location 10, temporary parking restrictions will be required at this location on the proposed delivery days / nights.

Location 12 – N52 / N62 Kennedy's Cross

See Drawing No 324740-210B1.1

The swept path analyses undertaken by Collett & Sons Ltd. is based on the delivery route bypassing the existing Kennedy's Cross junction to the east, with the area of land required to accommodate the largest turbine vehicles highlighted.

Locations 13 and 14 – Site access junction to east (Access junction 1) and west (Access junction 2) off the N62

The temporary works required to accommodate the wind farm turbine vehicles, together with the junction layouts proposed for the general site clearance and construction stages are shown for the east and west sites off the N62 in Figures 14.6 to 14.17. The figures confirm that the junction layouts proposed for the delivery stage will accommodate all wind farm transport vehicles. Visibility splays of 3m x 215m, which will require to be kept clear of all obstructions above 1.05m, are shown in Figures 14.7 and 14.13 for the eastern and western junctions respectively.

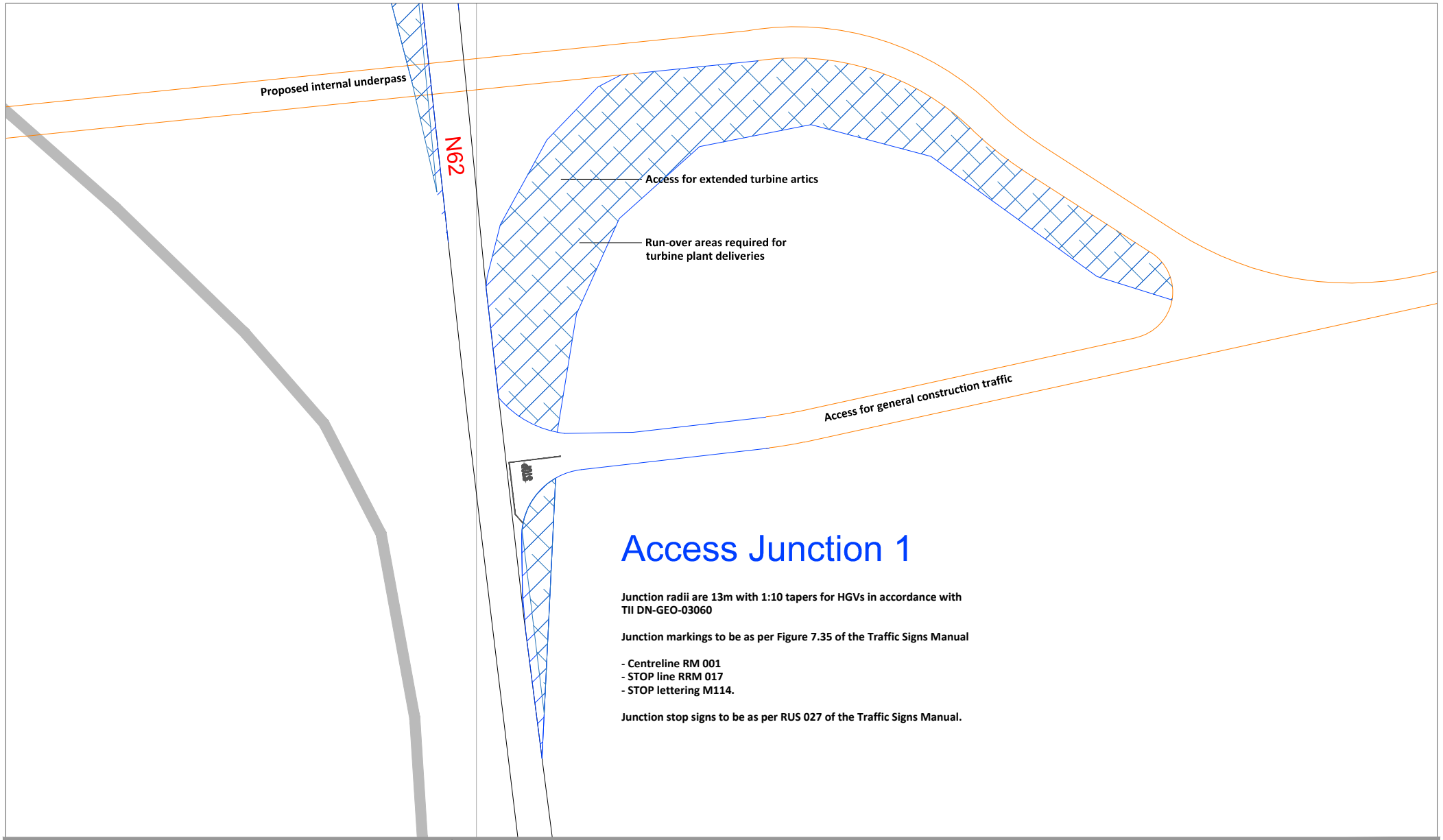
Location 15 – Access junction 3 - site access for sub-station traffic off the R357

The proposed junction layout, visibility splays and autotrack assessments for deliveries approaching from the west and east are shown for the proposed improved junction in Figures 14.18 to 14.21. The figures confirm that the junction layout proposed for the delivery stage will accommodate all vehicles requiring access to the site at this location. Visibility splays of 3m x 160m, which will require to be kept clear of all obstructions above 1.05m, are shown in Figure 14.19.

This access, together with the local L7009 Stonestown Road will also provide access to the site for amenity trips during the operational stage. The L7009 Stonestown Road will also provide operational access to the substation.

Existing Derrinlough Briquette Factory Entrance on the N62

It is proposed that the existing access junction on the N62 that serves the Bord na Mona Briquette factory will be used during the operation stage for maintenance staff visits to the site only. There will be no deliveries made via this access during the construction stage and it will be not be available for amenity trips during the operational stage.



NOTES:

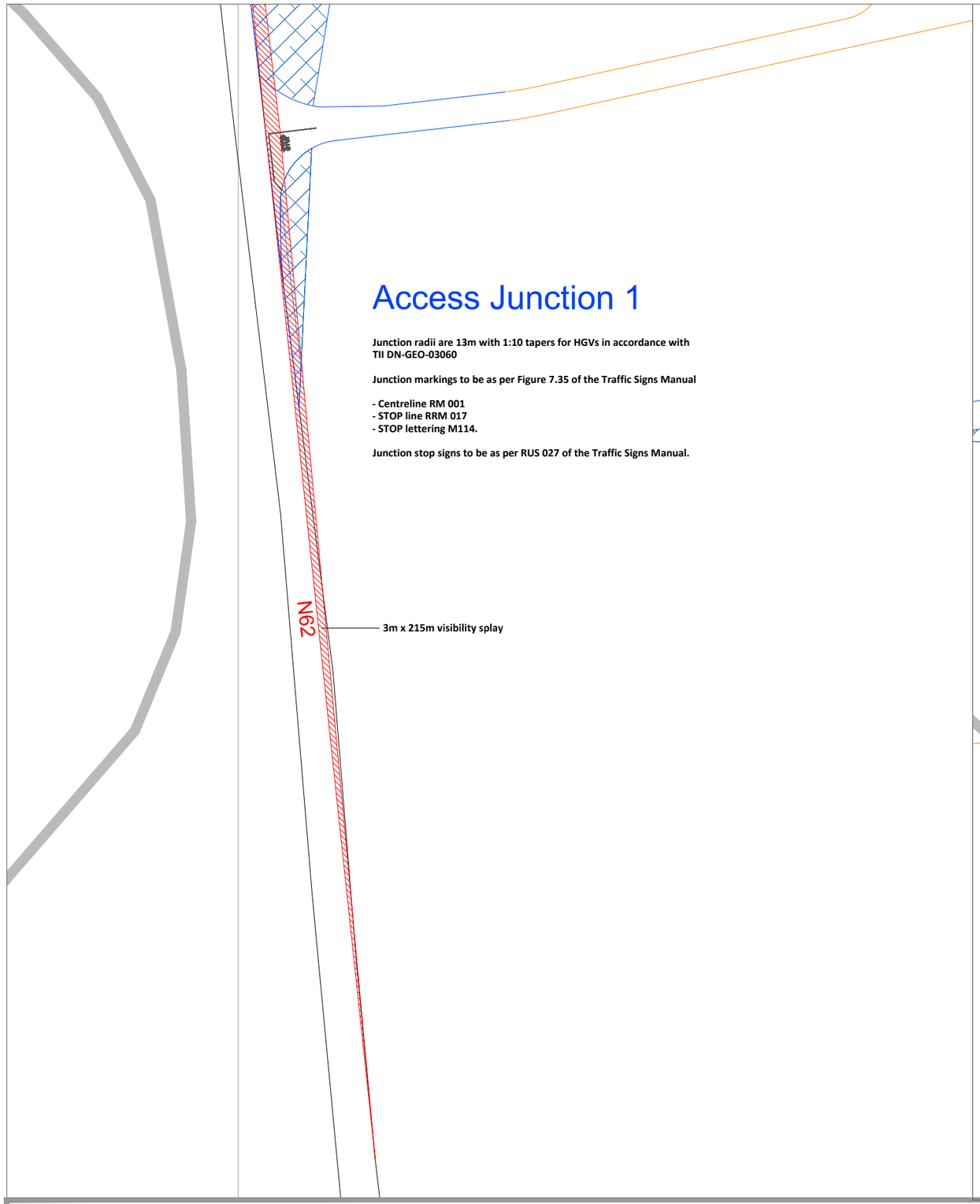
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

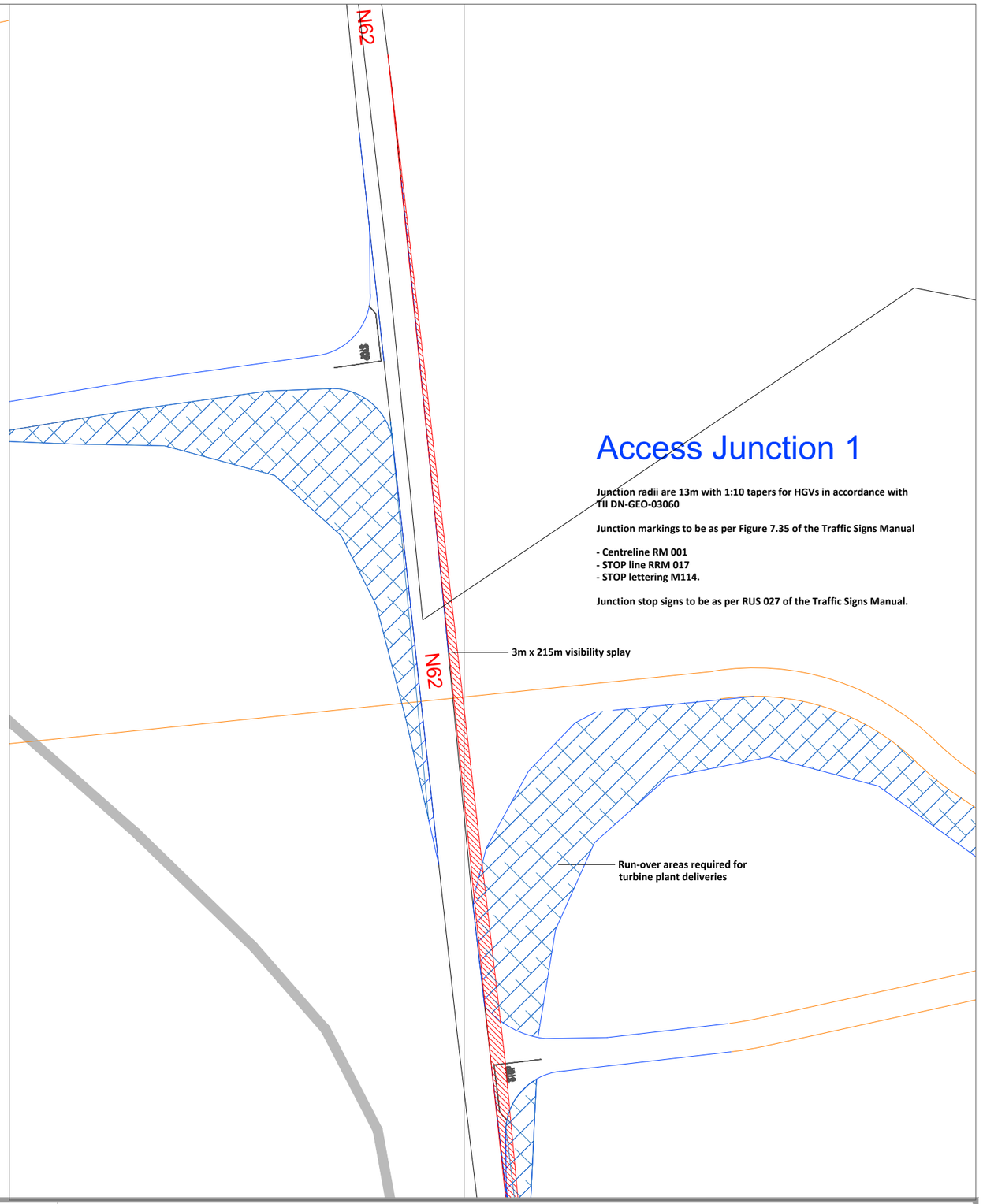
Base mapping provided by MKO

Figure 14.6 Access Junction 1 - N62 - Turbine artics and general construction traffic access to eastern site, proposed layout

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS





NOTES:

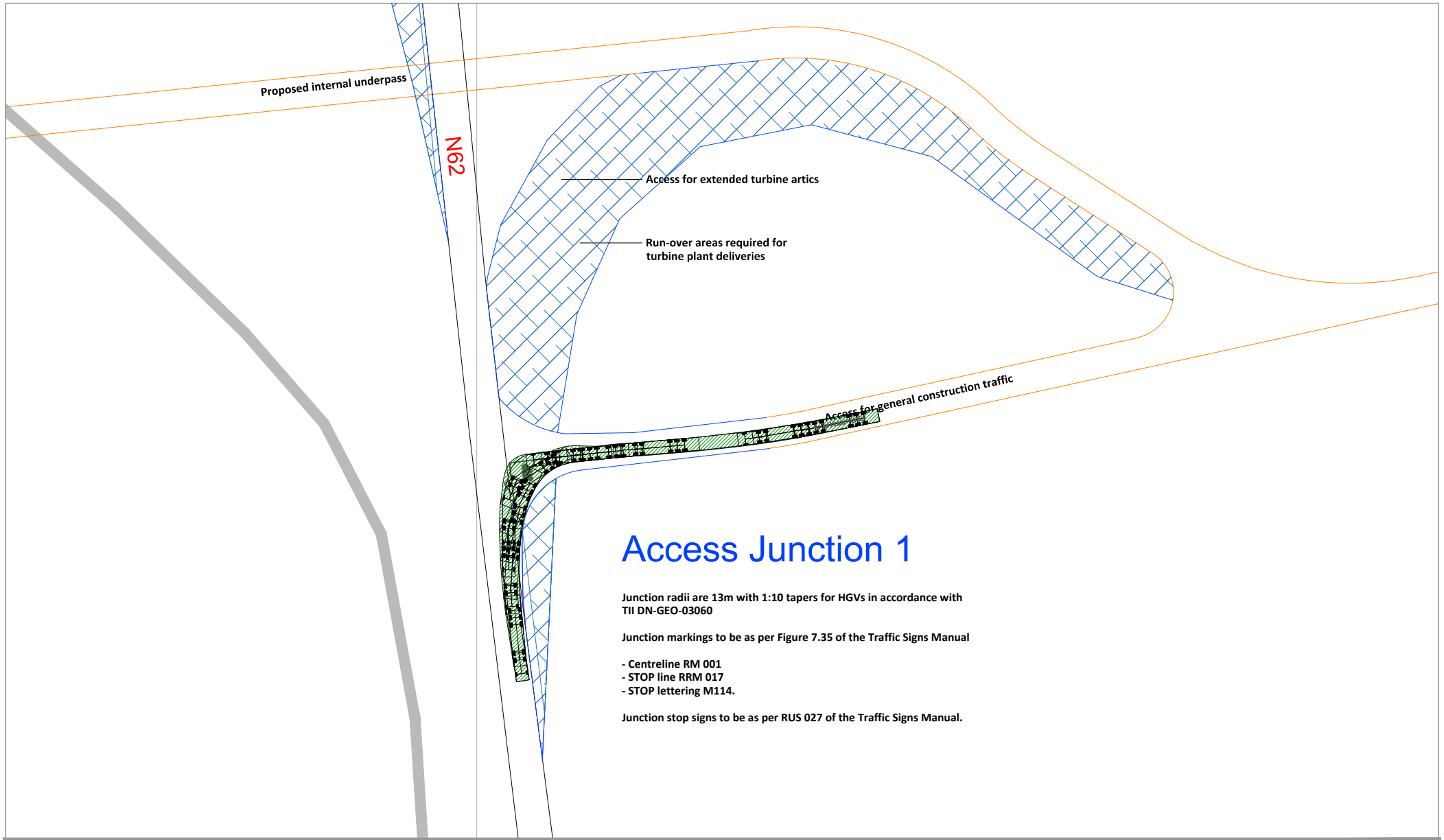
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.7 Access Junction 1 - N62 - Turbine artics and general construction traffic access to eastern site, proposed layout and visibility splays

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

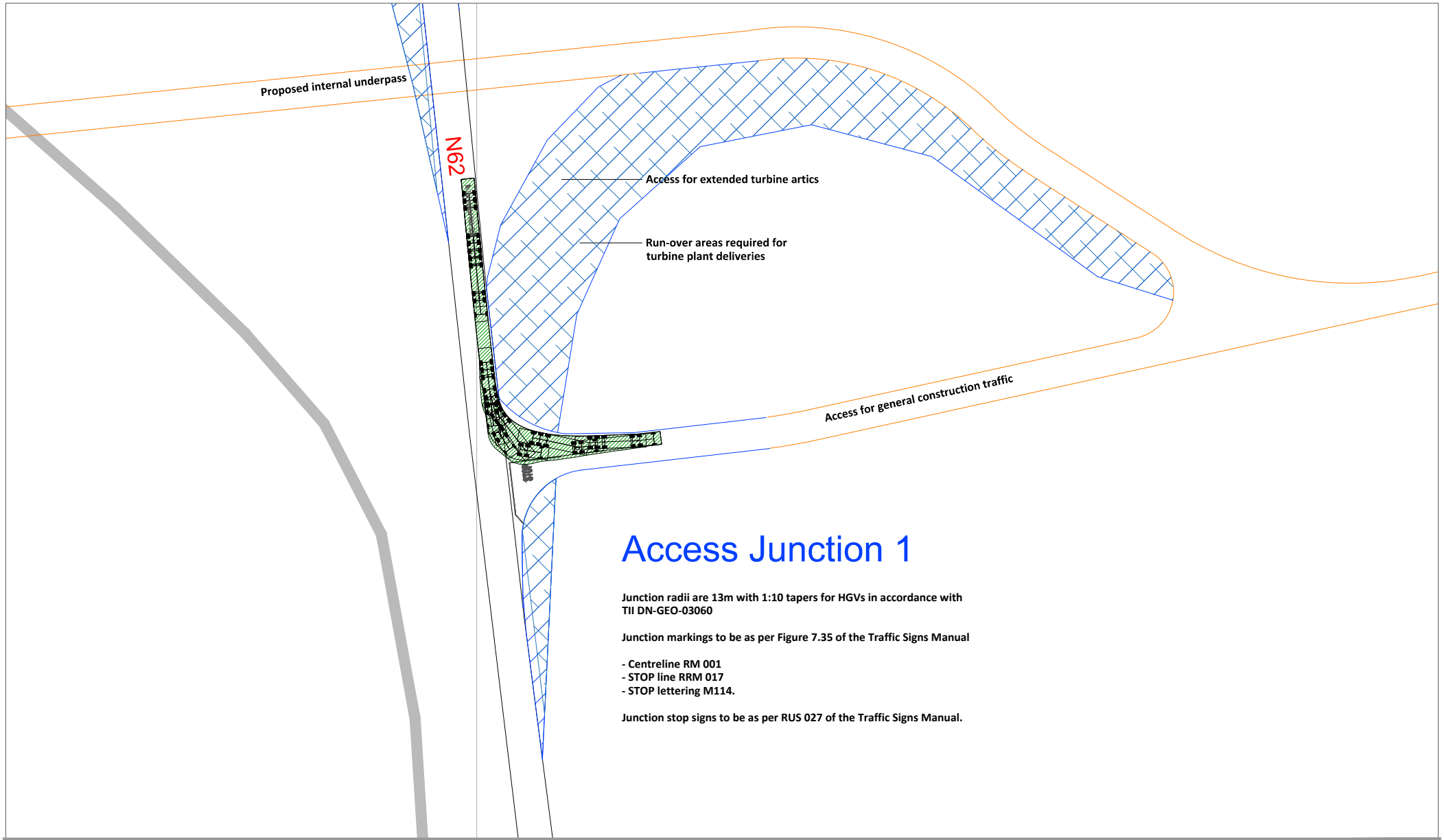
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.8 Access Junction 1 - N62 - Turbine artics and general construction traffic access to eastern site, autotrack assessment for large standard artic HGVs to/from south

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

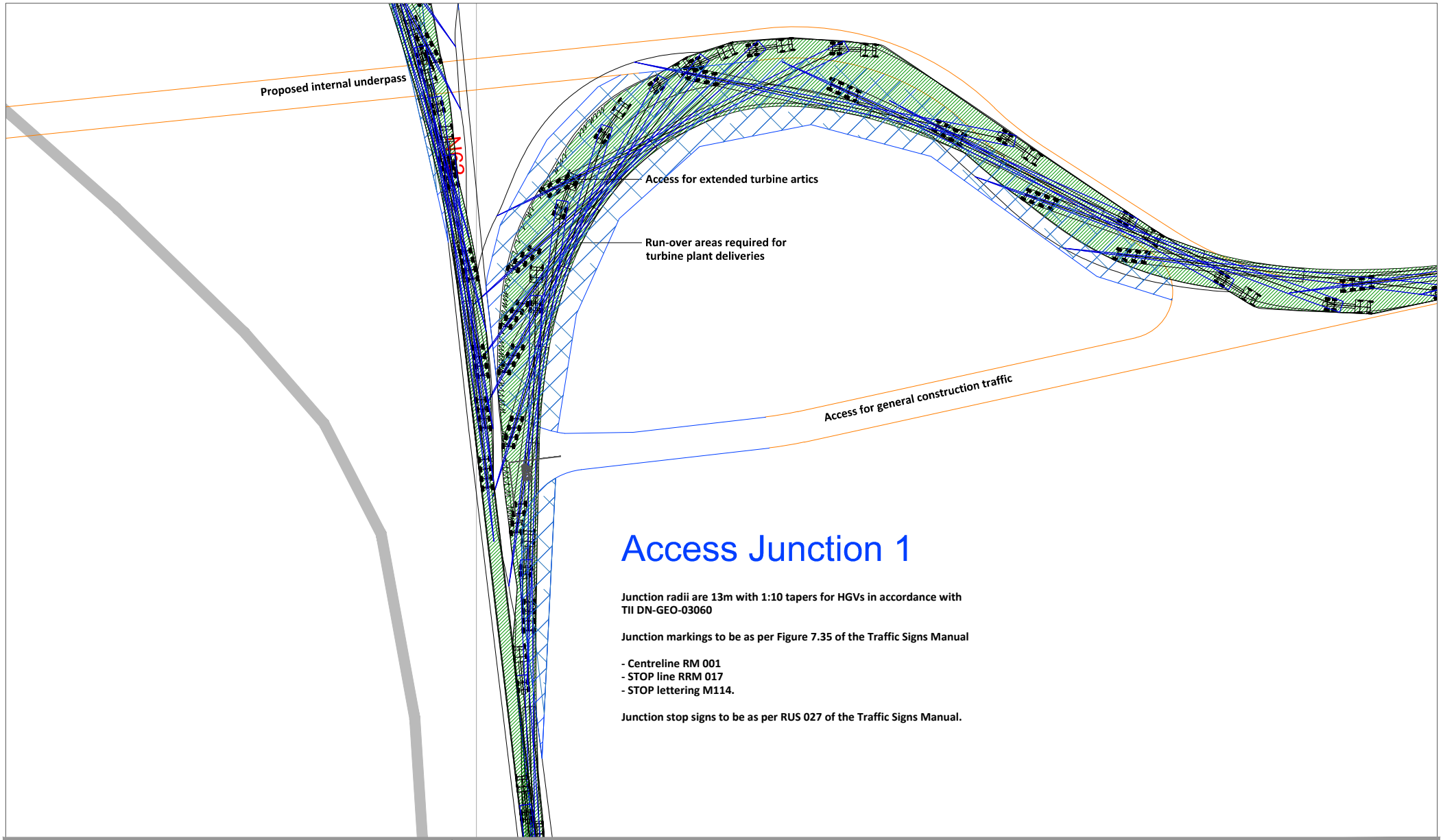
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.9 Access Junction 1 - N62 - Turbine artics and general construction traffic access to eastern site, autotrack assessment for large standard artic HGVs to/from north

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

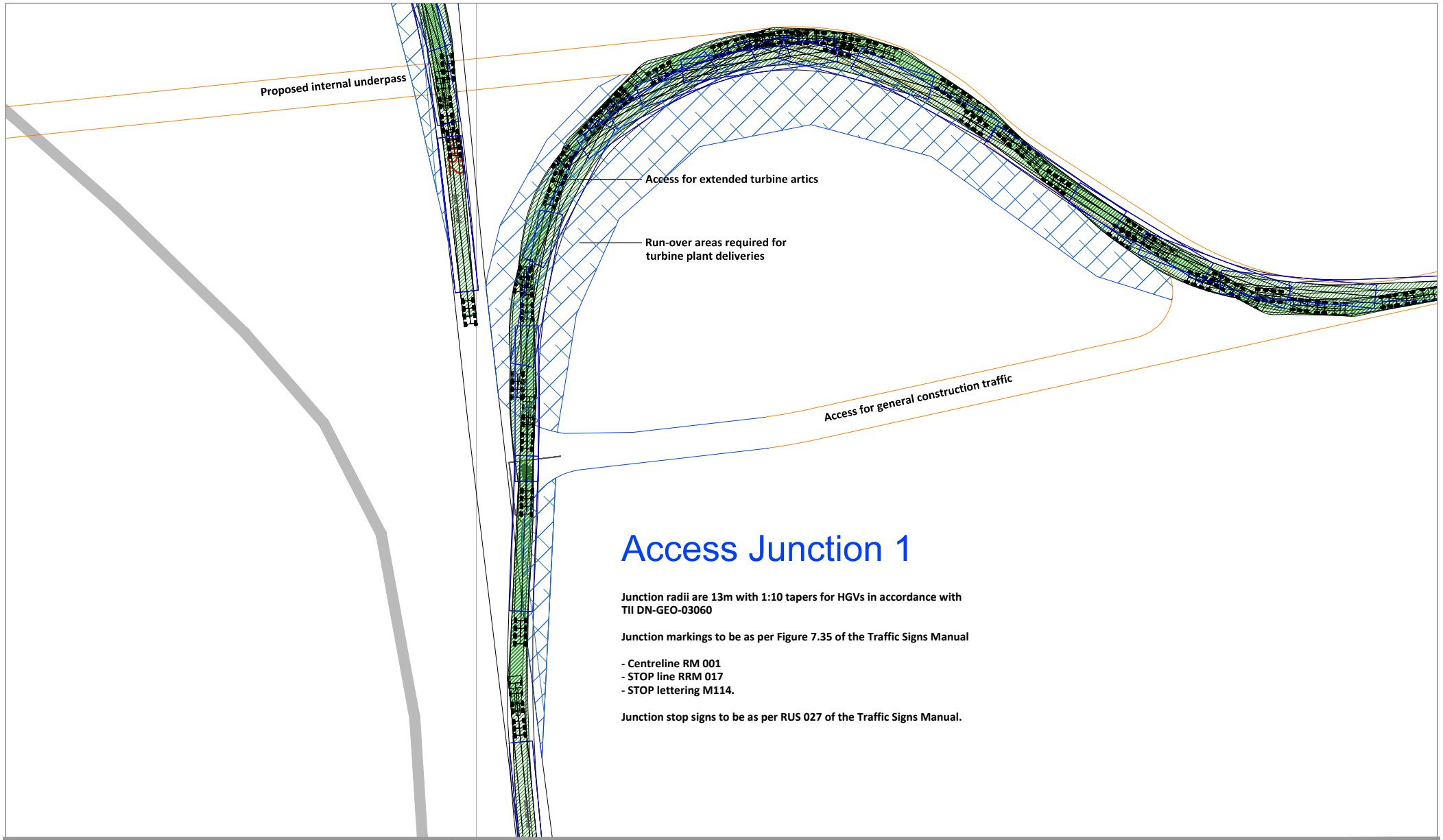
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.10 Access Junction 1 - N62 - Turbine artics and general construction traffic access to eastern site, autotrack assessment for blade extended artic

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.11 Access Junction 1 - N62 - Turbine artics and general construction traffic access to eastern site, autotrack assessment for tower extended artic

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

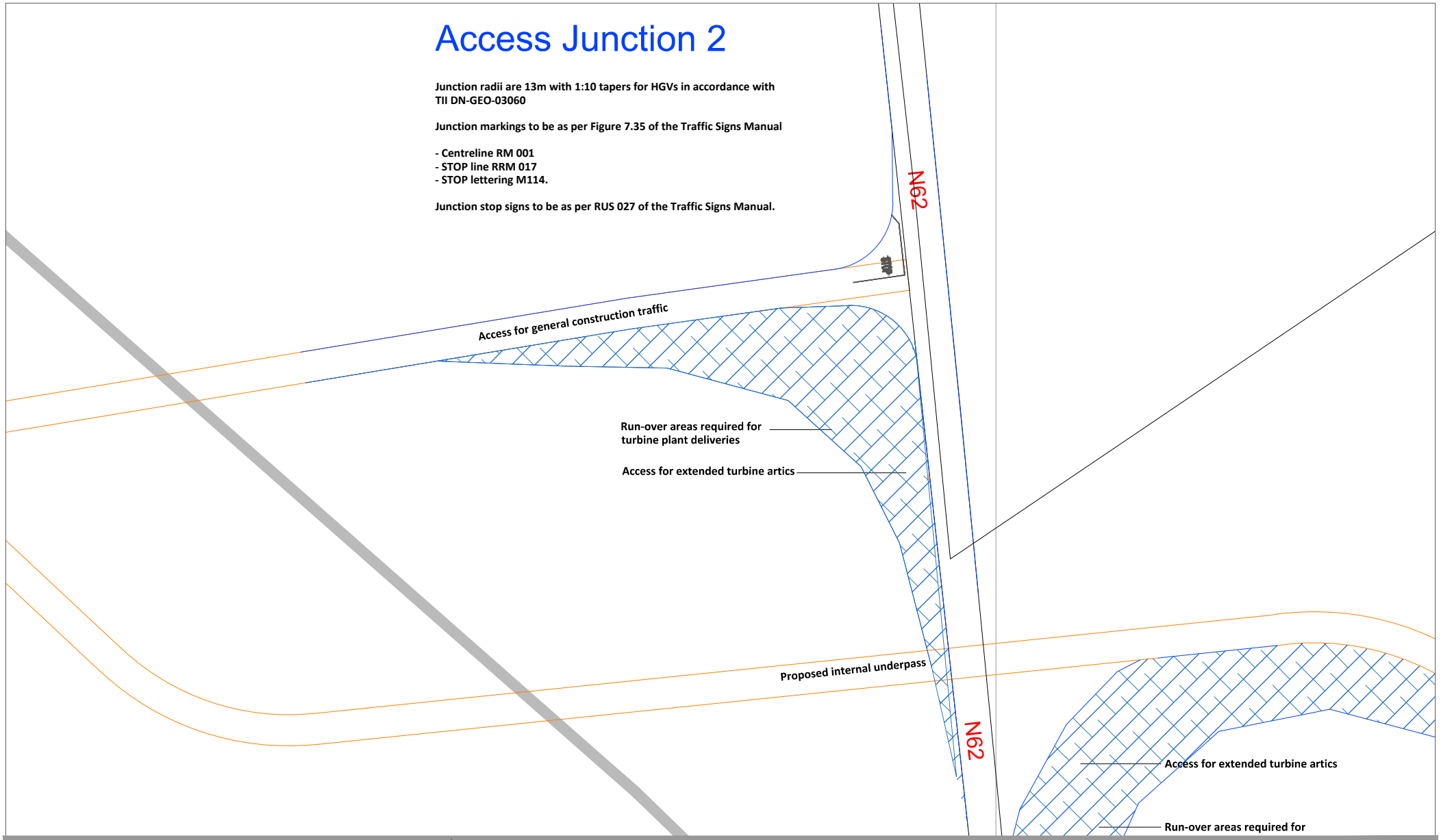
Access Junction 2

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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:

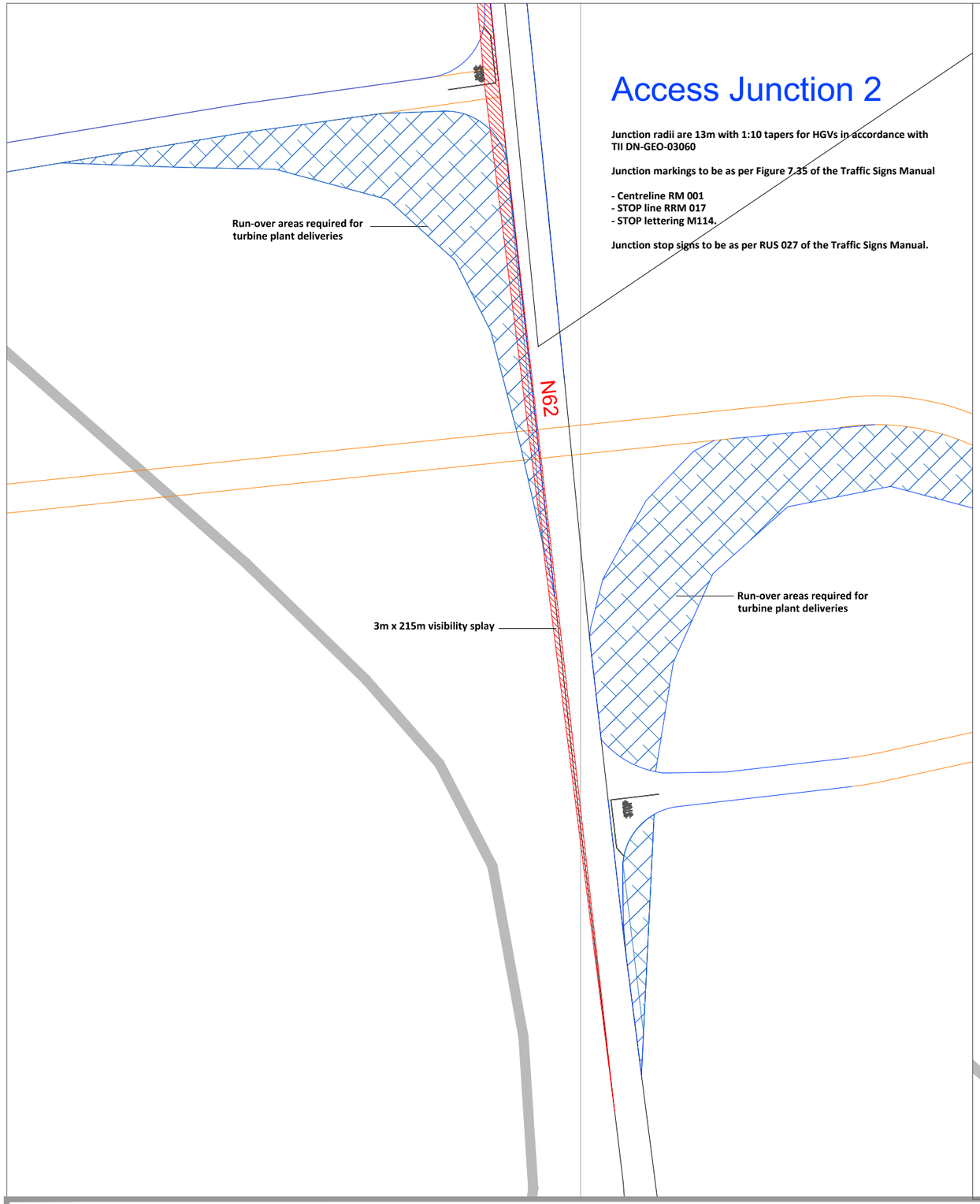
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

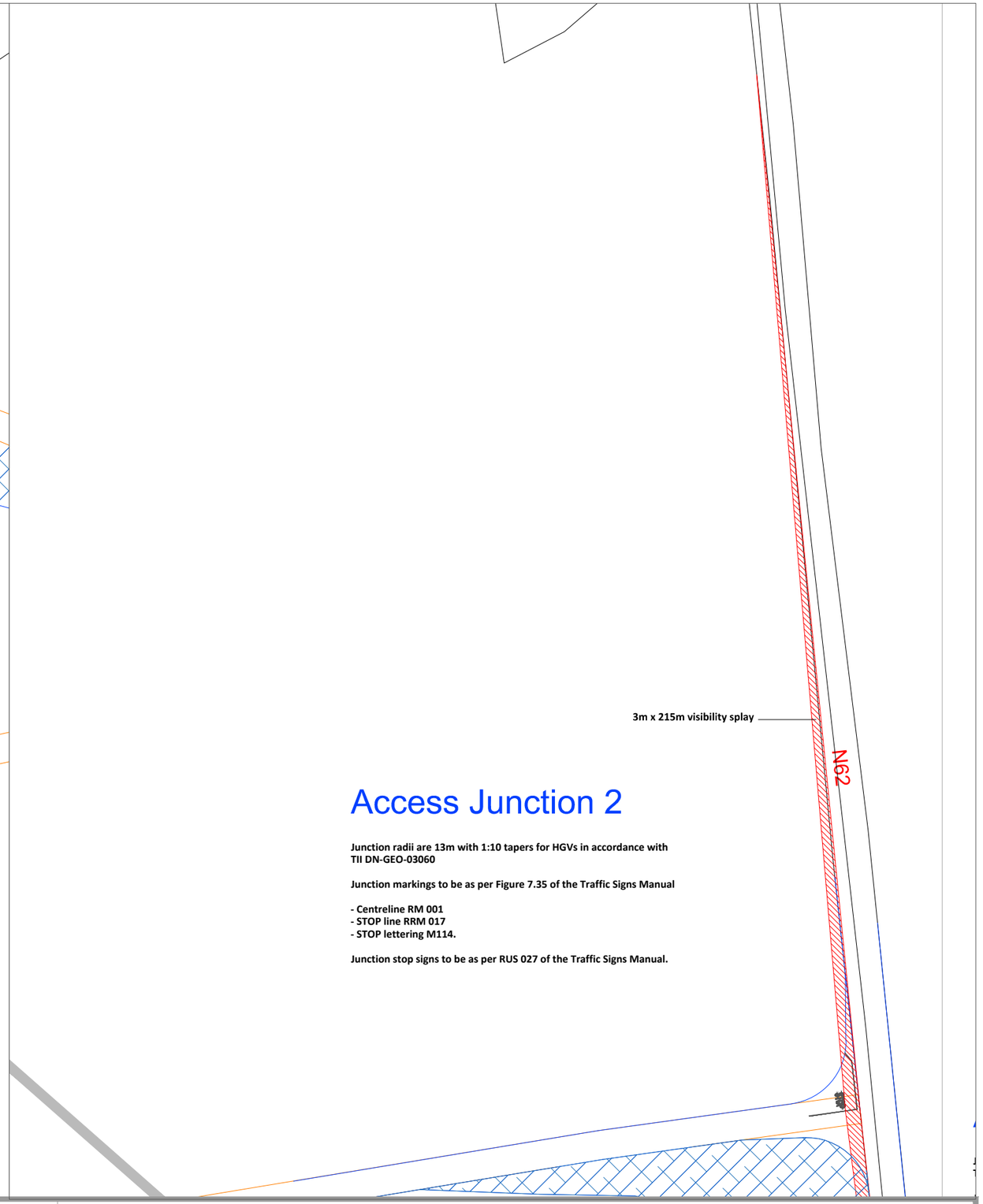
Base mapping provided by MKO

Figure 14.12 Access Junction 2 - N62 - Turbine artics and general construction traffic access to western site, proposed layout

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS





NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.13 Access Junction 2 - N62 - Turbine artics and general construction traffic access to western site, proposed layout and visibility splays

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

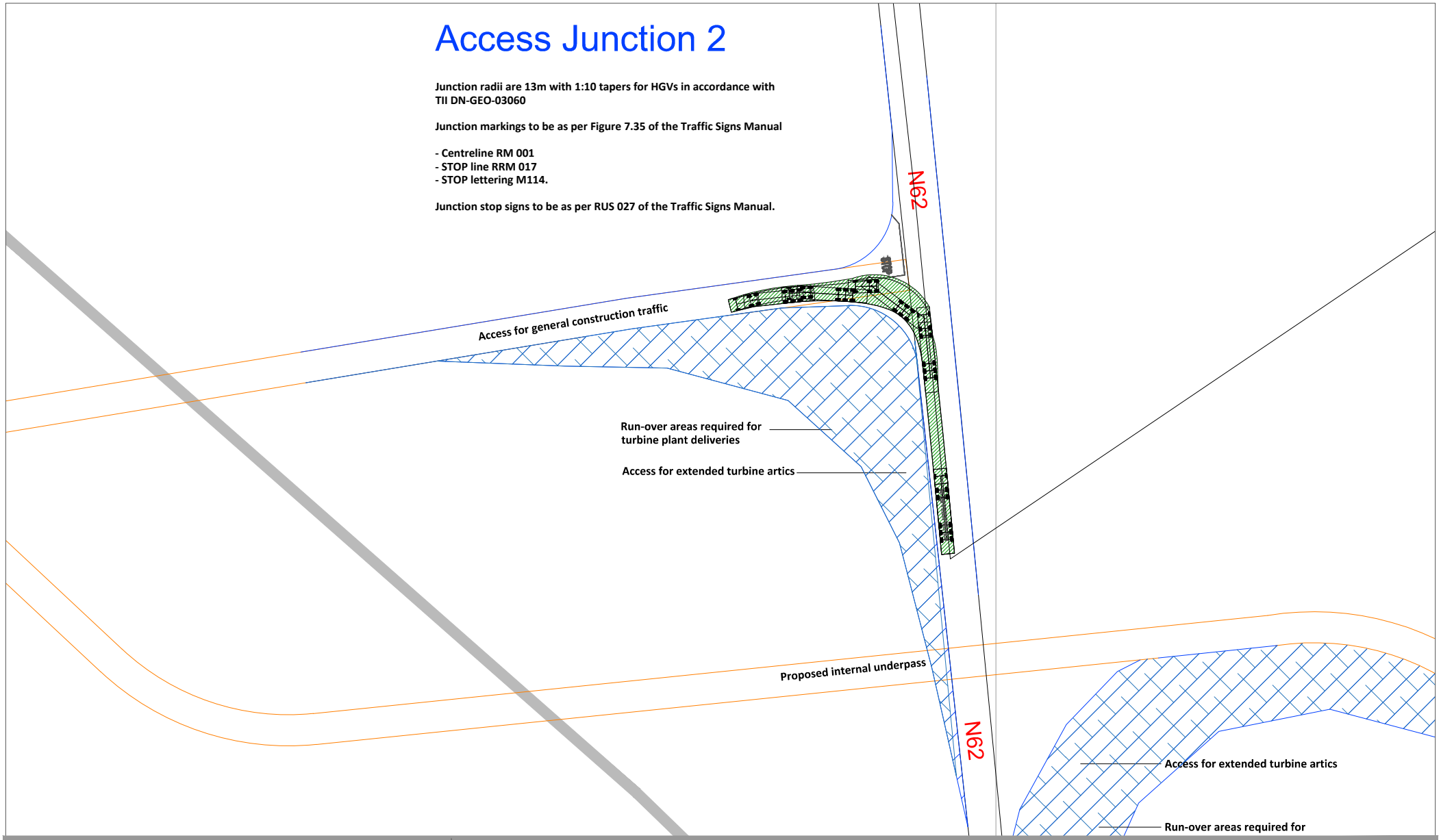
Access Junction 2

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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:

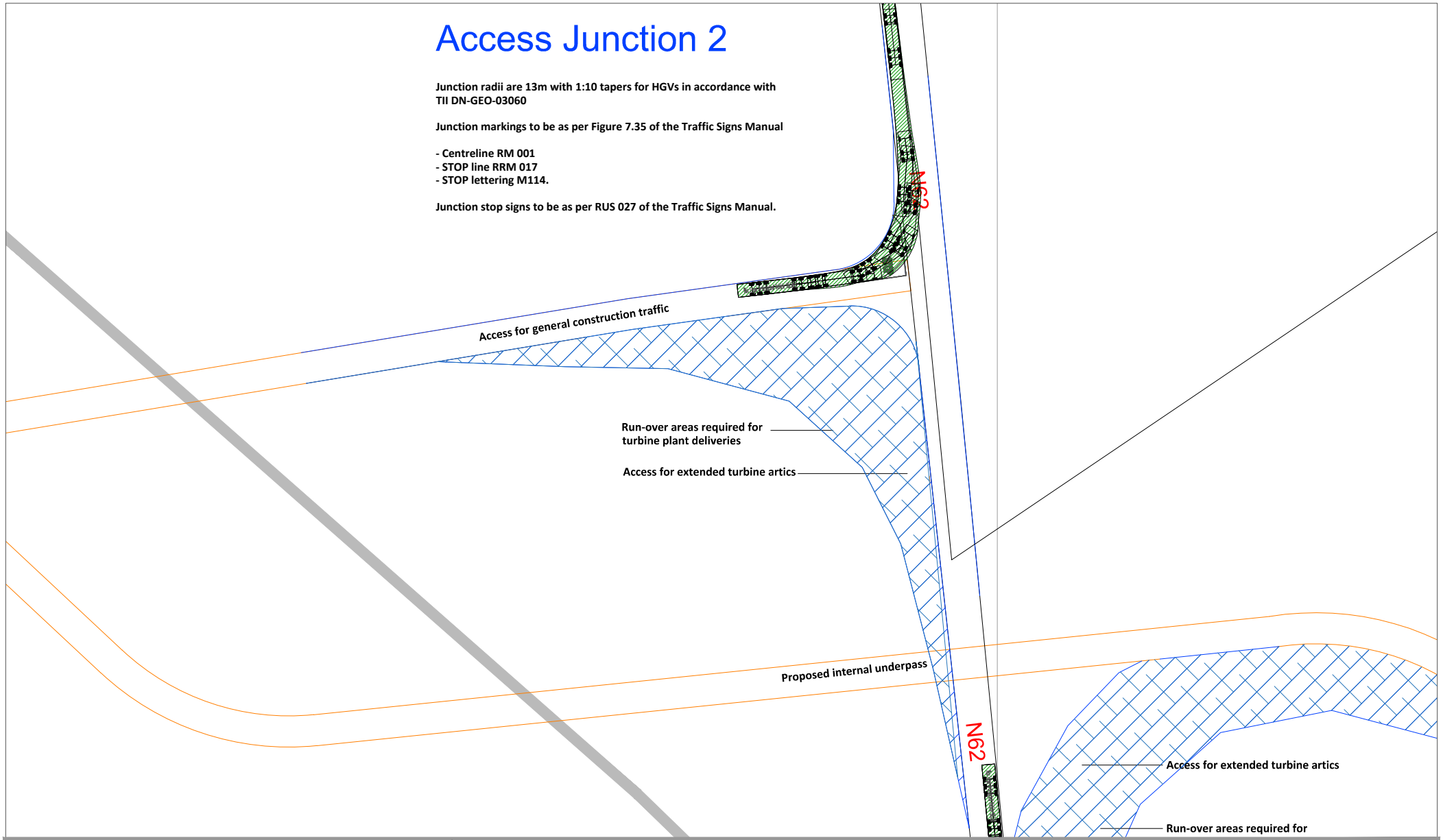
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.14 Access Junction 2 - N62 - Turbine artics and general construction traffic access to western site, autotrack assessment for large standard artic HGVs to/from south

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.15 Access Junction 2 - N62 - Turbine artics and general construction traffic access to western site, autotrack assessment for large standard artic HGVs to/from north

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

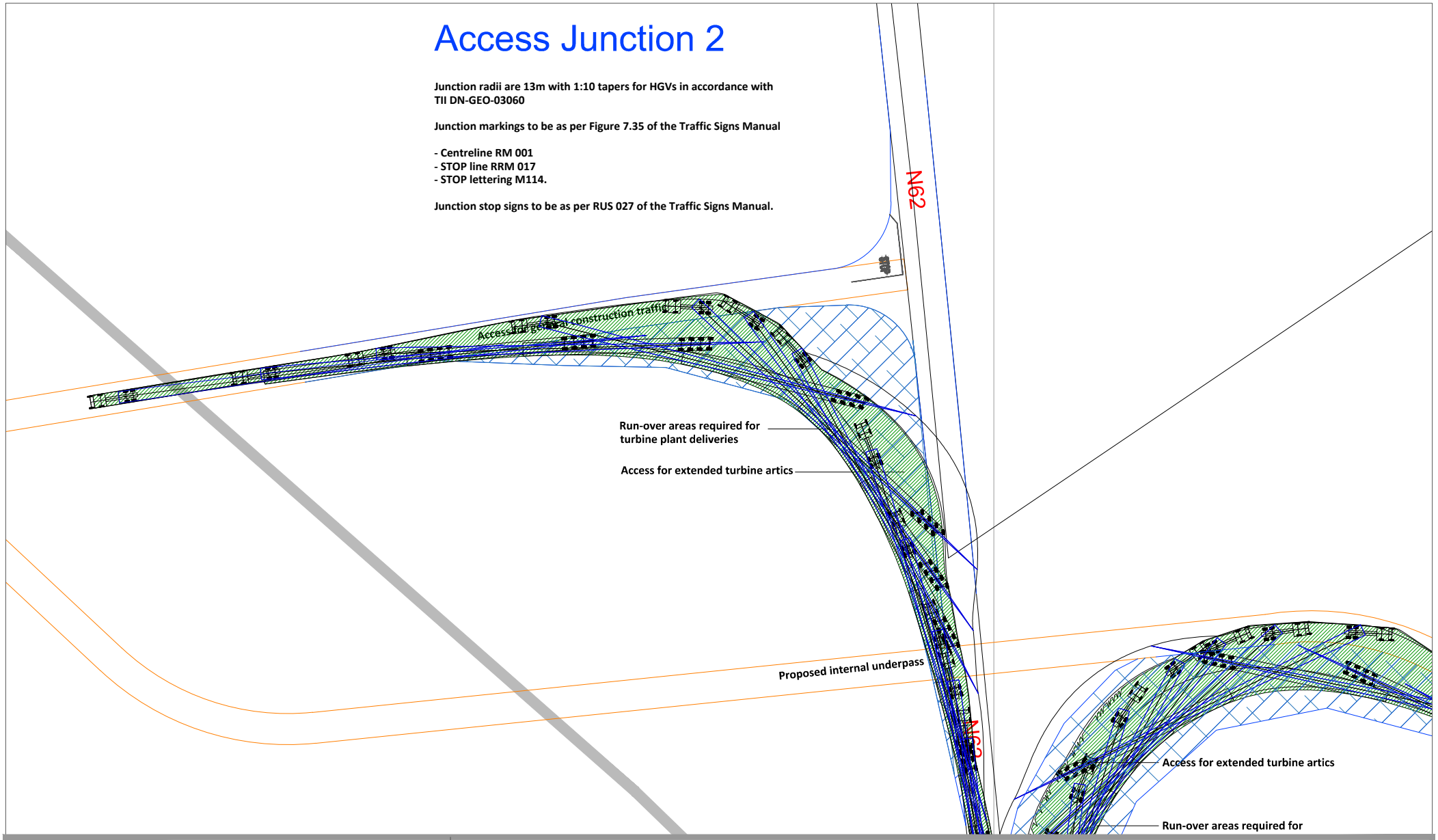
Access Junction 2

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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

Base mapping provided by MKO

Figure 14.16 Access Junction 2 - N62 - Turbine artics and general construction traffic access to western site, autotrack assessment for blade extended artic

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

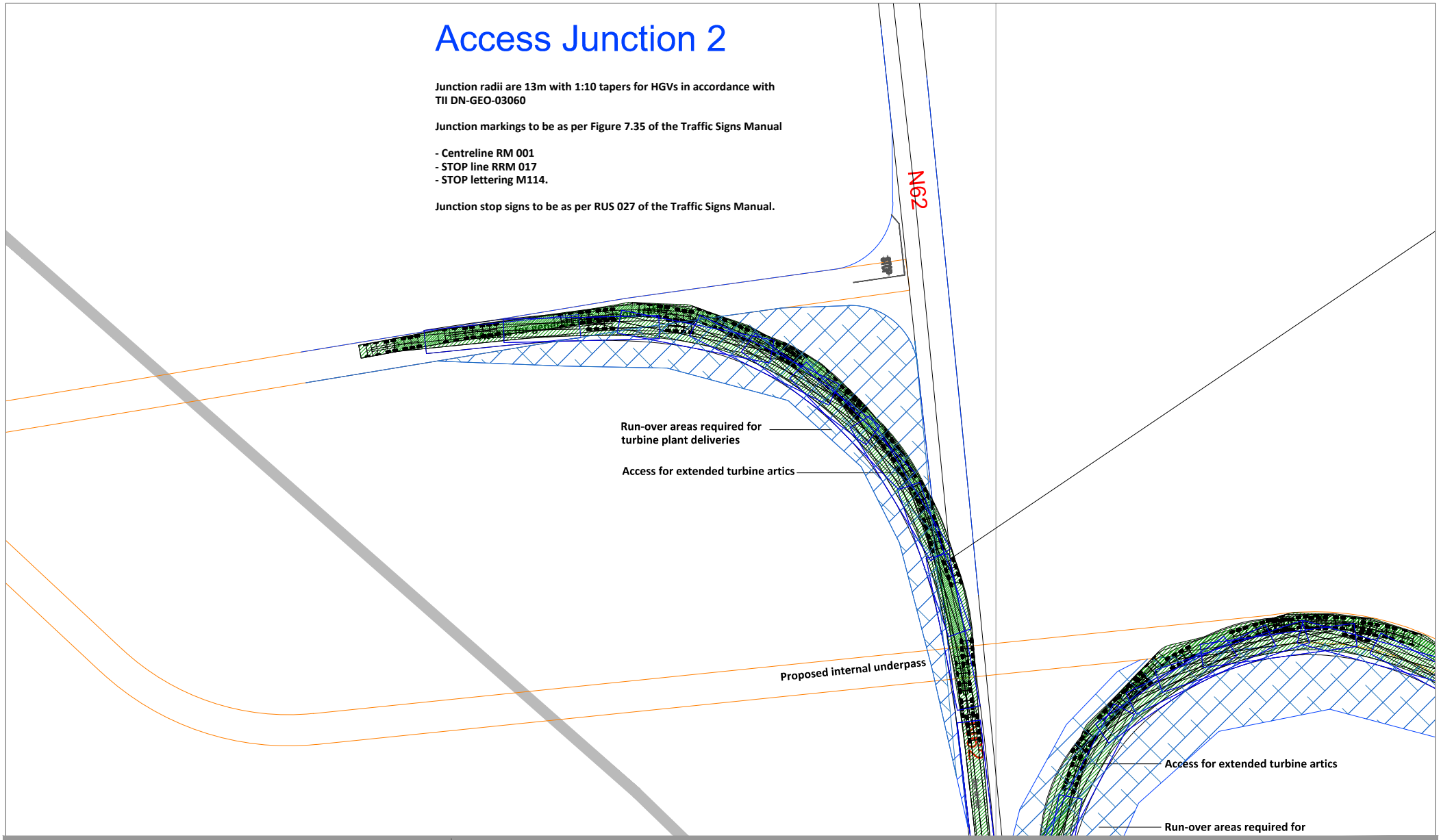
Access Junction 2

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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:

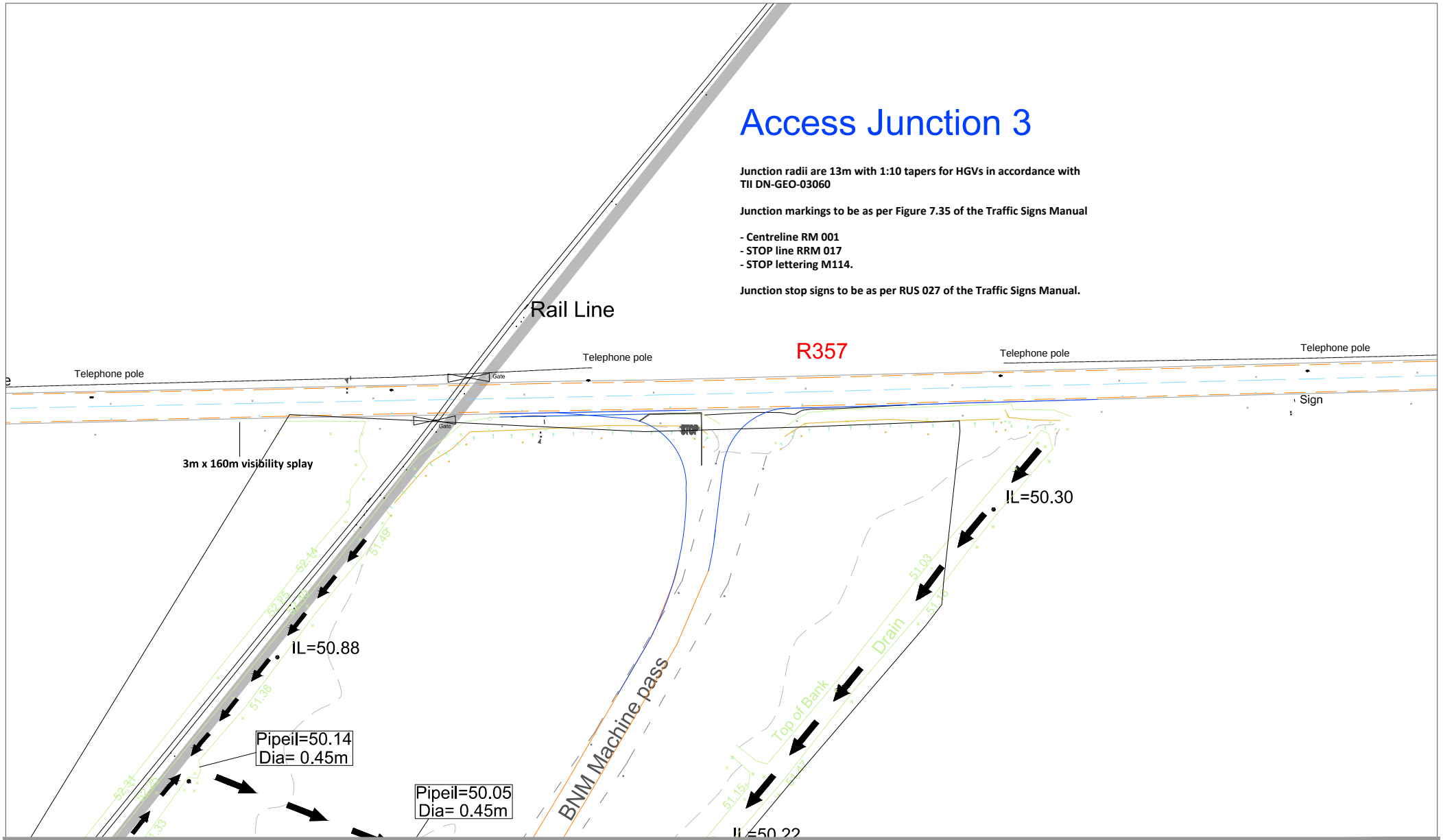
PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.17 Access Junction 2 - N62 - Turbine artics and general construction traffic access to western site, autotrack assessment for tower extended artic

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS



NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.18 Access Junction 3 - R357 - Sub-station traffic access, proposed layout

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 13.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

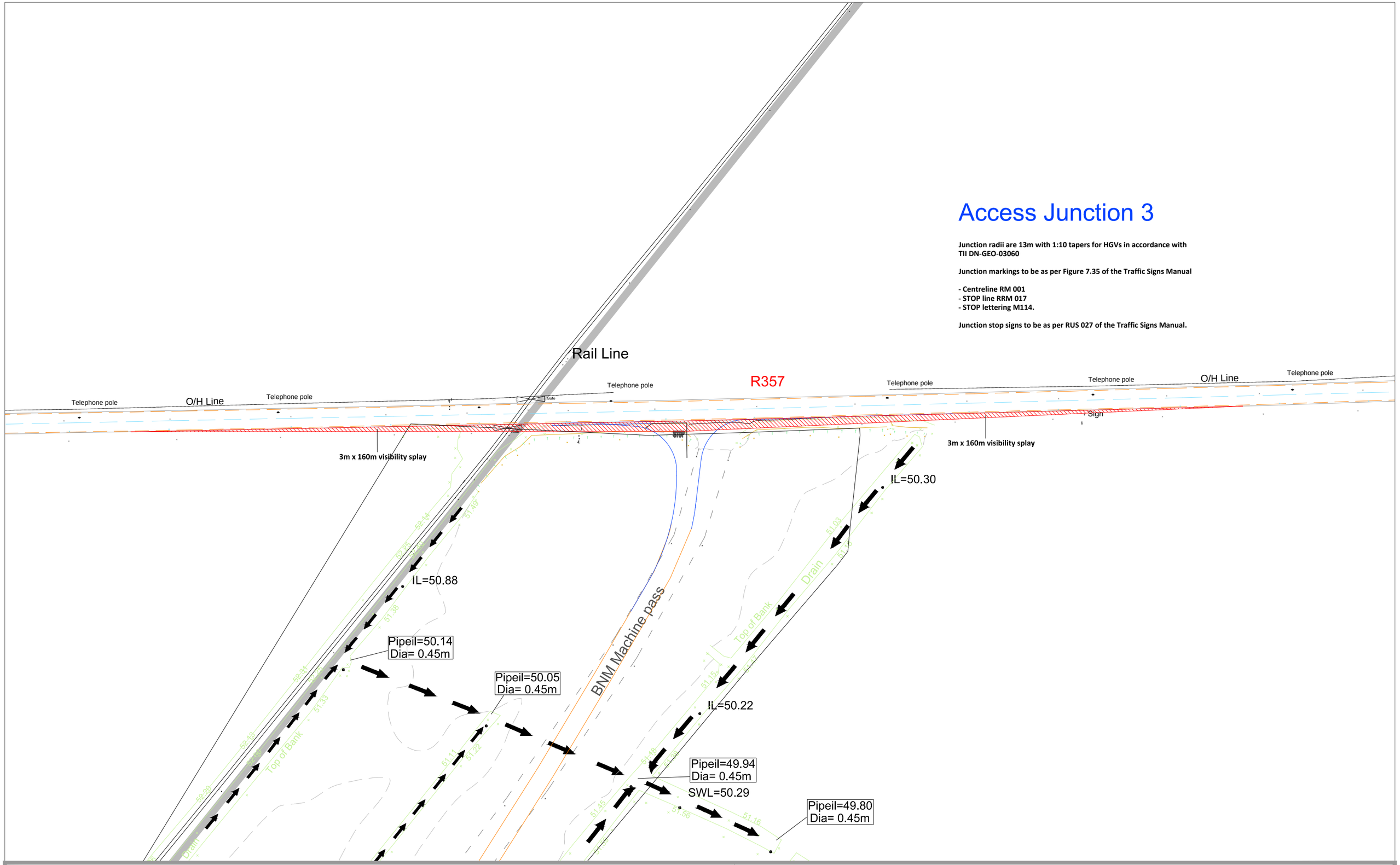
Access Junction 3

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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

Base mapping provided by MKO

Figure 14.19 Access Junction 3 - R357 - Sub-station traffic access, proposed layout and visibility splays

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

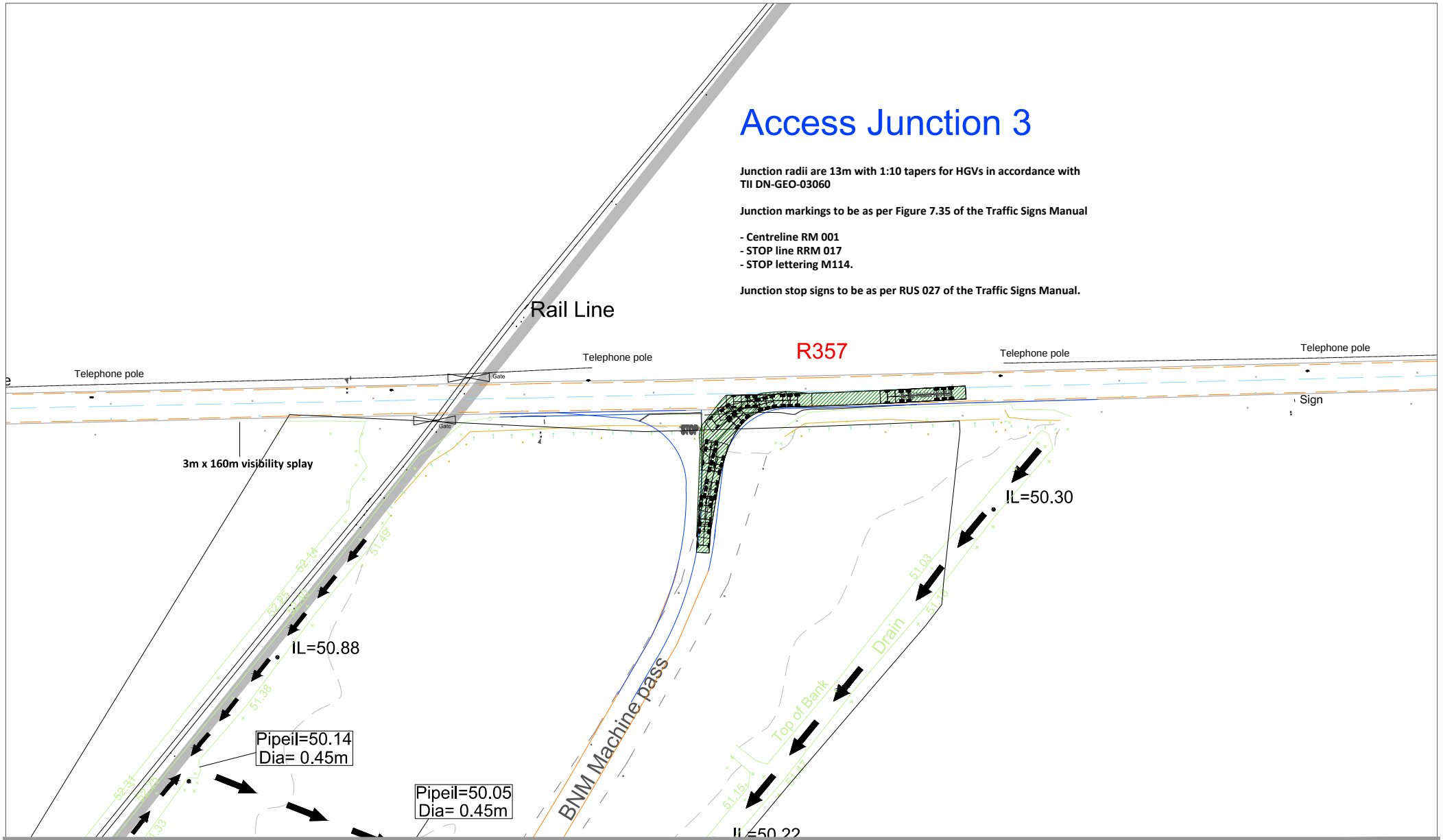
Access Junction 3

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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

Base mapping provided by MKO

Figure 14.21 Access Junction 3 - R357 - Sub-station traffic access, autotrack assessment for large standard artic HGVs to/from east

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

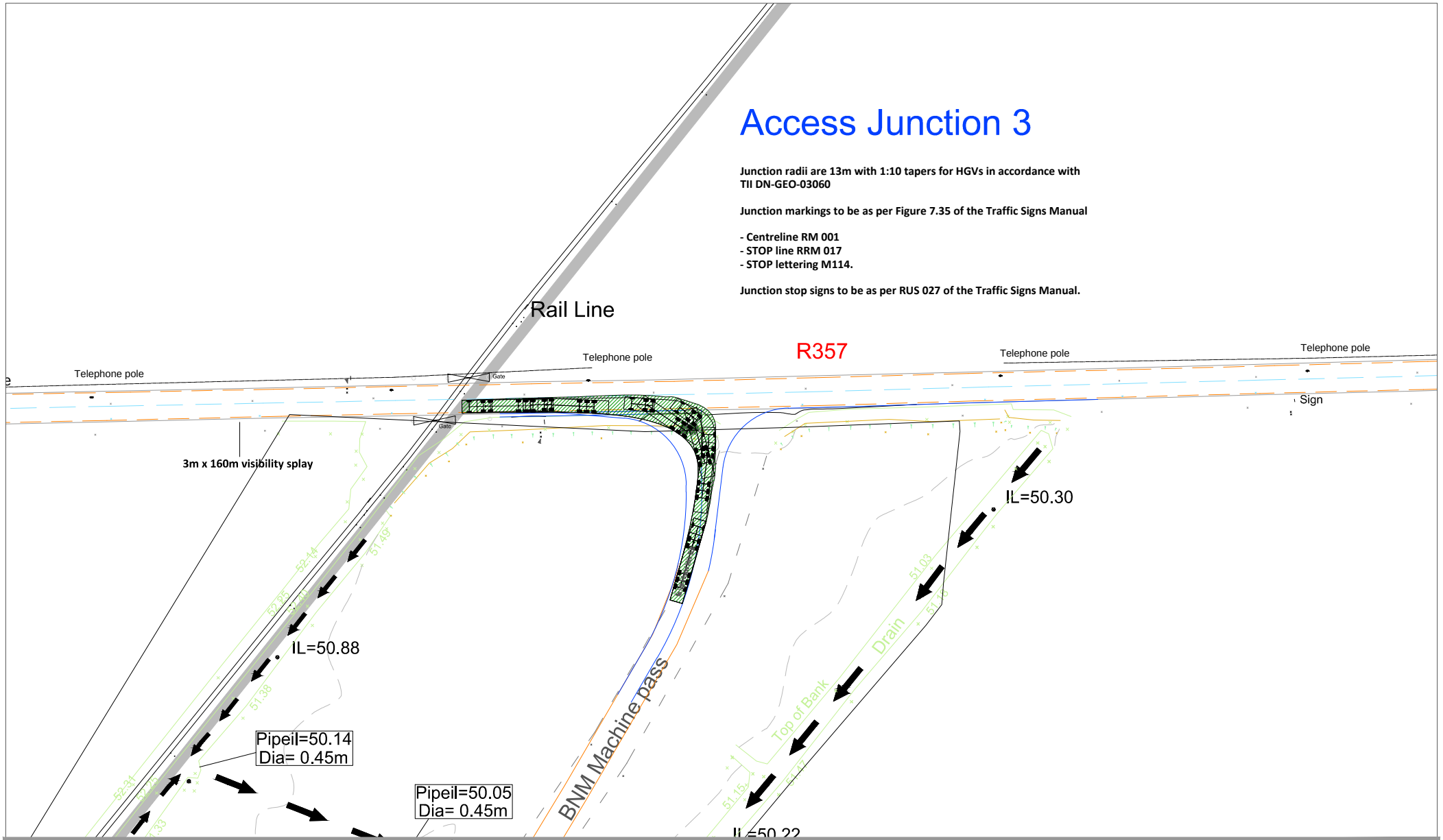
Access Junction 3

Junction radii are 13m with 1:10 tapers for HGVs in accordance with TII DN-GEO-03060

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

Base mapping provided by MKO

Figure 14.20 Access Junction 3 - R357 - Sub-station traffic access, autotrack assessment for large standard artic HGVs to/from west

PROJECT:	Derrinlough Wind Farm, County Offaly		
CLIENT:	Bord na Mona	SCALE:	1:1000
PROJECT NO: 7380	DATE: 12.02.20	DRAWN BY:	AL

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

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 wind farm does not proceed, there will 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 21 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 8.1% on the N52 to an increase of 14% on the N62 leading to the site. The direct effect will be temporary, and will be slight.

During the remaining 489 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 5.9% on the N52, to an increase of 15.5% on the N62 and 20.6% on the R357 approaching the site. On these days, the direct effect will be temporary and will be slight.

During the 21 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 1.6% on the N52, to an increase of 2.8% on the N62. The direct effect during this period will be temporary and will be slight.

During the 38 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 3.0% on the N52 to 5.3% on the N62 leading to the site, but will be temporary. The direct effect may be reduced to slight if the delivery of the large plant is done at night, as is proposed.

It was determined that all links in the study area will operate within operational capacity for all days within the construction period.

14.1.10.3 Operational Phase

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.

Should the proposed wind farm be consented and developed, the recreational and amenity proposals set out in Chapter 4 will be implemented which means that there will be some levels of traffic accessing the site for amenity use during the operational stage. This traffic will access the site via the R357 where the proposed amenity car park is located. The volumes are likely to be small (up to a maximum of 40 car trips per day) based on information from other similar Bord na Móna facilities. Given the capacity of the local highway network there is no significant effects anticipated on roads and traffic.

14.1.10.4 Decommissioning Phase

The design life of the wind farm is 30 years. If the site is decommissioned, cranes will disassemble each turbine tower and all equipment.

All turbine infrastructure including turbine components will be separated and removed off-site for re-use, recycling and waste disposal.

It is proposed that turbine foundations and hardstanding areas will be left in place and covered with soil/topsoil. It is proposed to leave the access roads in situ at the decommissioning stage. It is considered that leaving the turbine foundations, access tracks and hardstanding areas in situ will cause less environmental damage than removing and recycling them. However, if removal is deemed to be required all infrastructure will be removed with mitigation measures similar to those during construction being employed.

After decommissioning, the areas around the turbine bases and other disturbed areas will be encouraged to revegetate naturally and will be backfilled with peat and spoil similar to that removed during excavation so as to allow natural recolonisation.

14.1.10.5 Cumulative Effects

A detailed assessment of all developments at varying stages in the planning process (from pre-planning to operational), is set out in Section 2.6 of this EIAR, with an assessment of the potential cumulative traffic effects with the proposed subject wind farm assessed on the following criteria;

- 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 wind farm development in terms of traffic impacts are summarised in Table 14.25.

All other wind farm developments located within a 20km radius and shown in Figure 2.7 are also listed in Table 14.25. It is noted that the delivery routes for the granted Cloghan and Meenwaun Wind Farms are common to the delivery route (the N52 and the N62) for the Proposed Development. In the event that the Proposed Development is constructed at the same time as either of these developments it is forecast that there will be a temporary and moderate level of cumulative impact. This will be avoided by ensuring that the construction phases for all 3 developments do not overlap through careful scheduling of deliveries to each site and with agreement of Offaly County Council .

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

Table 14.24 Summary of projects considered in cumulative assessment and potential for cumulative traffic effects with proposed Derrinlough Wind Farm

Project	Status	Degree of overlap of highway network (low / medium / high)	Traffic volumes (low / medium / high)	Potential cumulative traffic effects
1. Gas fired electricity generating station, Lumcloon Energy Ltd	Permission granted	Medium	Low	Slight
2. Leabeg Wind Farm, 2 turbines (PL Ref 10/130), Gaelectric Developments Ltd	Existing	Not relevant	Not relevant	Included in background traffic levels
3. Cloghan Wind Farm, 9 turbines (PL ref 14/188 & 19/404) Gaeltech Developments Ltd	Permission granted	High	Medium	Moderate
4. Meenwaun Wind Farm, 5 turbines (PL ref 15/44), Meenwaun Wind Farm Ltd	Almost complete	High	Low	Slight
5. Carrig Wind Farm, 3 turbines (PL ref 5123496) T and G Armitage	Existing	Not relevant	Not relevant	Included in background traffic levels
6. Skehanagh Wind Farm, 5 turbines (PL ref 5123495) N and R Alexander	Existing	Not relevant	Not relevant	Included in background traffic levels
7. Lumcloon 100 MW Energy Storage Facility, Lumcloon Energy Ltd	Under construction	Medium	Low	Slight

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.

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 wind farm.

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 189 abnormal sized loads will be delivered to the site, comprising 38 convoys of 5, undertaken over 38 separate nights.
- These nights will be spread out over an approximate period of 19 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 5 vehicles.
- There will also be two escort vehicles provided by the haulage company for each convoy.

Other traffic management measures

A detailed **Traffic Management Plan (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.
- **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.
- **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 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 24-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 wind farm 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 wind farm 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.

14.2.2 Methodology and Guidance

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 2.7 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 of the EIAR.

The assessment of likely significant effects on material assets uses the standard methodology and classification of impacts as presented in Section 1.8.1 of Chapter 1 of this EIAR. The full project description, including proposed turbine locations and elevations, is provided in Chapter 4.

14.2.2.1 Statement of Authority

This section of the EIAR has been prepared by Eoin McCarthy (B.Sc. Env.), Environmental Scientist with MKO. Eoin has over 8 years' experience in the preparation of EIARs for wind energy developments, including the assessment of likely significant effects on material assets. He has coordinated the scoping and consultation exercise with telecommunications operators and aviation authorities for numerous wind energy developments and prepared the relevant sections of the EIARs.

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 wind farm 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, 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. These effects are generally easily dealt with by detailed micro-siting of turbines in order to avoid alignment with signal paths or by the use of repeater relay links out of line with the wind farm.

14.2.4 Preventing Electromagnetic Interference

14.2.4.1 National Guidelines

Both the adopted 2006 and the Draft Revised 2019 '*Wind Energy Development Guidelines for Planning Authorities*' produced by the Department of the Environment, Heritage and Local Government (DOEHLG) 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 2.7 in Chapter 2 of this EIAR.

The layout and design of the proposed development has taken into account nearby telecommunications links.

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 14.25.

Table 14.25 Telecommunications and Aviation Scoping Responses

Consultee	Response	Potential for Interference Following Consultation Exercise	Action Required	Potential for Interference Following Final Consultation Exercise
Airspeed	No Response	N/A	N/A	N/A
Broadcasting Authority of Ireland	Received 08.11.2019	No	N/A	No
BT Communications Ireland	Received 08.03.2018	No	N/A	No
ComReg (Commission for Communications Regulation)	No Response	N/A	N/A	N/A
Department of Defence - Telecoms	No Response	N/A	N/A	N/A
Department of Defence – Aviation	Received 02.07.2018	Please see Section 14.2.4.2.3 below for details.	N/A	No
Eir (Formerly Meteor)	Received 13.03.2018 & 11.04.2018	Requested buffer for link site Please see Section 14.2.4.2.2 below for details.	Buffer applied as per Eir response.	No
EMR Solutions	No Response Received to date	No	N/A	No
ESB Telecoms	Received 16.03.2018	Requested buffer for 1MW link and multiple point to point links. Please see Section 14.2.4.2.2 below for details.	26m buffer incorporated into design	No
Irish Aviation Authority	25.06.2018	Please see Section 14.2.4.2.3 below for details.	N/A	No

Consultee	Response	Potential for Interference Following Consultation Exercise	Action Required	Potential for Interference Following Final Consultation Exercise
Imagine Group	08.03.2018 & 11.11.2019	No Please see Section 14.2.4.2.2 below for details.	N/A	No
Ripplecom	No response received to date	N/A	N/A	N/A
RTE Transmission Network (2rn)	Received 12.03.2018 & 19.12.2019	No	N/A	No
Tetra Ireland Communications (emergency services)	Received 23.03.2018 & 13.11.2019	Requested a 500m buffer to link site Please see Section 14.2.4.2.2 below for details.	500m applied	No
Three Ireland	Received 09.03.2018 & 09.04.2018	Please see Section 14.2.4.2.2 below for details.	NA	No
Towercom	Received 20.03.2018	No	N/A	No
Virgin Media	Received17.04.2018 & 11.11.2019	No	N/A	No
Viatel Ireland Ltd	Received 09.03.2018	No	NA	No
Vodafone Ireland	Received 27.03.2018	Requested 30m buffer at link site. Please see Section 14.2.4.2.2 below for details.	30m buffer applied	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 Broadcasters

RTÉ Transmission Network (operating as 2rn) replied on the 12th of March 2018 to a scoping request from MKO stating that there is no potential for interference to RTÉ television or radio reception due to the operation of the proposed wind farm. A further response was received on the 19th December 2019 requesting that a protocol agreement be signed between 2rn and the wind farm developers.

Virgin Media replied on the 17th of April 2018 and the 11th November 2019 to scoping requests from MKO stating stated no potential for interference.

14.2.4.2.2 Other Operators

Of the scoping responses received from telephone, broadband and other telecommunications operators, those who highlighted an initial potential interference risk are addressed below. The final proposed turbine layout does not overlap with any of the telecoms links or clearance zones requested by operators. The remaining consultees who 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.

Vodafone Ireland

Vodafone Ireland replied on the 27th March 2018 to a scoping request from MKO, noting a link in the area of the proposed development and requested a minimum 30 buffer between the maximum diameter of the '1st Fresnel zone and the rotor blade tip'. The requested buffer was implemented, and the final design layout sent to Vodafone for approval on 8th November 2019.

Eir (Meteor)

Eir replied on the 13th March 2018 to a scoping request from MKO noting 6 links within the proposed 5km study area. Eir requested 100m buffer to be included with a minimum of 30m. A 100m buffer zone was implemented and the final design layout sent to Eir for approval on 8th November 2019.

Three Ireland

Three Ireland replied on the 9h March 2018 to a scoping request from MKO stating a link within 5km of the proposed site boundary and requested buffer details. Three Ireland sent a follow up response on the 9th April 2018 stating that the link in the area 'Wolftrap Mountain to Banagher' will not be retained by the company and therefore no buffer zone is required. The final design layout was sent to Three Ireland on the 8th November 2019 and 17th December 2019.

Tetra

Tetra Ireland replied on the 23rd March 2018 to a scoping request from MKO stating a link site within the study area and requested a 500m buffer to be applied to prevent potential interference. The buffer was applied to the final design layout which was sent to Tetra Ireland for approval on the 8th Nov 2019. Tetra Ireland responded on the 13th November 2019 that they do not anticipate impacts from the proposed turbine locations.

ESB Telecoms

ESB Telecoms replied on the 13th March 2018 to a scoping request from MKO stating no potential impacts from the proposed development. A further response was sent on the 16th March 2018 noting the location of a 1MW link and multiple point to point links which may be impacted. A buffer of 26m was applied to the link and the final design layout sent to ESB Telecoms on 8th November 2019.

Imagine Group

Imagine Group replied to scoping requests from MKO on the 8th of March 2018 and the 11th of November 2019. The first reply stated that Imagine Group had no microwave links in the vicinity of the site. The second reply stated that they had one link running from a mast near Banagher to a mast near Birr. This link is located approximately 200 metres from the nearest proposed turbine location. This was not highlighted as an issue by Imagine Group.

14.2.4.2.3 *Aviation*

Department of Defence - Aviation

In July 2018, a scoping response was received from the Department of Defence 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.*
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.*

The final design layout was sent to the Department of Defence on the 8th November 2019 and a response restating item 3, as above, was returned on 7th December 2019.

In response to the lighting requirements requested by the Department of Defence, the turbines will be included on mapping, fitted obstruction lighting and entered into aircraft navigation databases to ensure they will be avoided during flight.

Irish Aviation Authority

The Irish Aviation Authority (IAA) replied on the 25th June 2018 to a scoping request from MKO outlining recommended conditions should the project be granted a consent:

1. *Agree an aeronautical obstacle warning light scheme for the wind farm development*
2. *Provide as-constructed co-ordinates 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.*

All of the above requests will be complied with should the proposed development receive a grant of planning permission.

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 potential for direct or indirect effects on telecommunications or aviation.

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. There will be no direct or indirect effects on telecommunications or aviation.

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

It is standard practice of 2RN to produce a Protocol Document for wind farm developments, which will be signed by the developer. The Protocol Document ensures that in the event of any interference occurring to television or radio reception due to operation of the wind farm, the required measures, as set out in the document, will be carried out by the developer to rectify this. The Protocol Document ensures that the appropriate mitigation is carried out in the event of unanticipated broadcast interference arising to television or radio reception as a result of the proposed wind farm.

In the event of further scoping responses being received from the EIA consultees, the comments of the consultees and any proposed mitigation measures will be considered in the construction and operation of the proposed development, subject to a grant of planning permission.

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 direct or indirect effect on telecommunications from the proposed development.

14.2.5.3.2 *Aviation*

Pre-Mitigation Impact

The scoping response of the Department of Defence has requested that standard lighting requirements be used at the proposed wind farm, in line with Air Corps policy on tall structures.

Mitigation Measures

The scoping response from the Department of Defence 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 Department of Defence, Air Corps and the Irish Aviation Authority (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 requirement will be met by the applicant.

Significance of Effects

There will be no significant direct or indirect effects on aviation operations due to the proposed development.

14.2.5.4 Cumulative Effect

There are three wind farms (2 constructed, 1 permitted-not-yet-constructed) within 5 kilometres of the proposed development. As the proposed development will not have any direct or indirect effects on telecommunications or aviation, there will be no cumulative impacts relating to the proposed development and surrounding projects in relation to the same.

During the development of any large project that holds the potential to effect telecoms or aviation, the Developer is responsible for engaging with all relevant telecoms operators and aviation authorities to ensure that the proposals will not interfere with television or radio signals by acting as a physical barrier. In the event of any potential impact, the developer for each individual project is responsible for ensuring that the necessary mitigation measures are in place. Therefore, as each project is designed and built to avoid impacts arising, a cumulative impact cannot arise.