

13. MATERIAL ASSETS

Material Assets are defined in the ‘*Advice Notes for Preparing Environmental Impact Statements*’ (EPA, Draft 2015) as ‘*resources that are valued and that are intrinsic to specific places*’. They may be either of human or natural origin. The cultural assets of Archaeology and Cultural Heritage are addressed in Chapter 11 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 7: Land, Soils and Geology, Chapter 8: Hydrology and Hydrogeology, and Chapter 9: Air and Climate. Tourism and amenity resources, which are also considered material assets, are addressed in Chapter 5 on Population and Human Health. The Population and Human Health chapter also addresses existing land-uses (economic assets), including forestry and agriculture.

This chapter of the EIAR addresses the likely significant effects of the Proposed Development on transportation infrastructure (Section 13.1 Traffic and Transport) and on Built Services (Section 13.2), which are economic assets of human origin.

13.1 Traffic and Transport

13.1.1 Introduction

13.1.1.1 Background and Objectives

The purpose of this section is to assess the effects on traffic and transport of the traffic movements that will be generated during the construction, operational and decommissioning phase of the Proposed Development. For the purposes of the Traffic and Transport assessment, the below sets out the elements assessed in chapter:

- **The ‘Proposed Development’** – This includes the underground cabling routes (and associated access roads), substation, access roads (new and upgrade of existing to facilitate the delivery of materials (in particular, turbine components) to the Permitted Development), junction upgrades, temporary access road, new borrow pit and forestry felling. The Proposed Development also includes amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit to facilitate the proposed access road works and the omission of the 38kV Electrical Substation, 38kV underground cabling and Battery Storage compound.

A full description of the Proposed Development, including construction phasing details, is provided in Chapter 4 of this EIAR.

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 the additional traffic volumes that will be generated on the road network. The requirements of the additional traffic generated during the construction stage were assessed on both the external highway network and at the proposed junction that will provide access to the site.

The magnitude of the increase in traffic volumes experienced on the surrounding network is identified during the construction of the Proposed Development. A preliminary traffic management plan is also provided in Sections 13.1.7.6 aimed at minimising the traffic impact on the local highway network. Refer also to the Construction and Environmental Management Plan (CEMP), Appendix 4.3 of this EIAR, for the Traffic Management Plan.

13.1.1.2 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, Derrinlough, Knocknamork, Shehy More, Cloncreen, Derrykillev, 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.

13.1.1.3 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 1.8.2 of this EIAR.

13.1.1.4 Scoping & 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 2.4 of Chapter 2 of the EIAR and summarised below.

Transport Infrastructure Ireland

Transport Infrastructure Ireland (TII) responded to Scoping on the 6th January 2022 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, October 2021
- DN-GEO-03060, Geometric Design of junctions, Transport Infrastructure Ireland, April 2017
- TII Automatic Traffic Count Data, on the N22 at Islandmore between the Proposed Development site and Killarney, 2017, and on the N22 between Ballincollig and Ovens, 2018

Department of Transport

The Department of Transport (DoT) responded to Scoping on the 13th January 2022. The DoT included a list of recommendations to be considered when preparing the EIAR. All recommendations, that will minimise the impacts on the public road network, are adhered to in this EIAR.

Kerry County Council

A pre-planning meeting was held with Kerry County Council on the 8th of March 2022. It was noted to representatives of the Planning Authority that a change in EirGrid requirements has spurred the application as a whole. With regards transportation matters, it was noted to the Planning Authority that road upgrades would be undertaken as part of the Proposed Development.

Cork County Council

A pre-planning meeting was held with Cork County Council on 24th of April 2022. It was noted to representatives from the Planning Authority that road upgrades and works will be required in both Kerry and Cork administrative areas and as such the proposed mitigation will be standard to both. It was confirmed that the application to Cork County Council would include for road upgrades and the construction of 33kV underground electrical cabling.

13.1.1.5 Methodology and Section Structure

The report adopts the guidance for such assessments set out by Transport Infrastructure Ireland, or TII, in the document number PE-PDV-02045 *Traffic and Transport Assessment Guidelines, May 2014*.

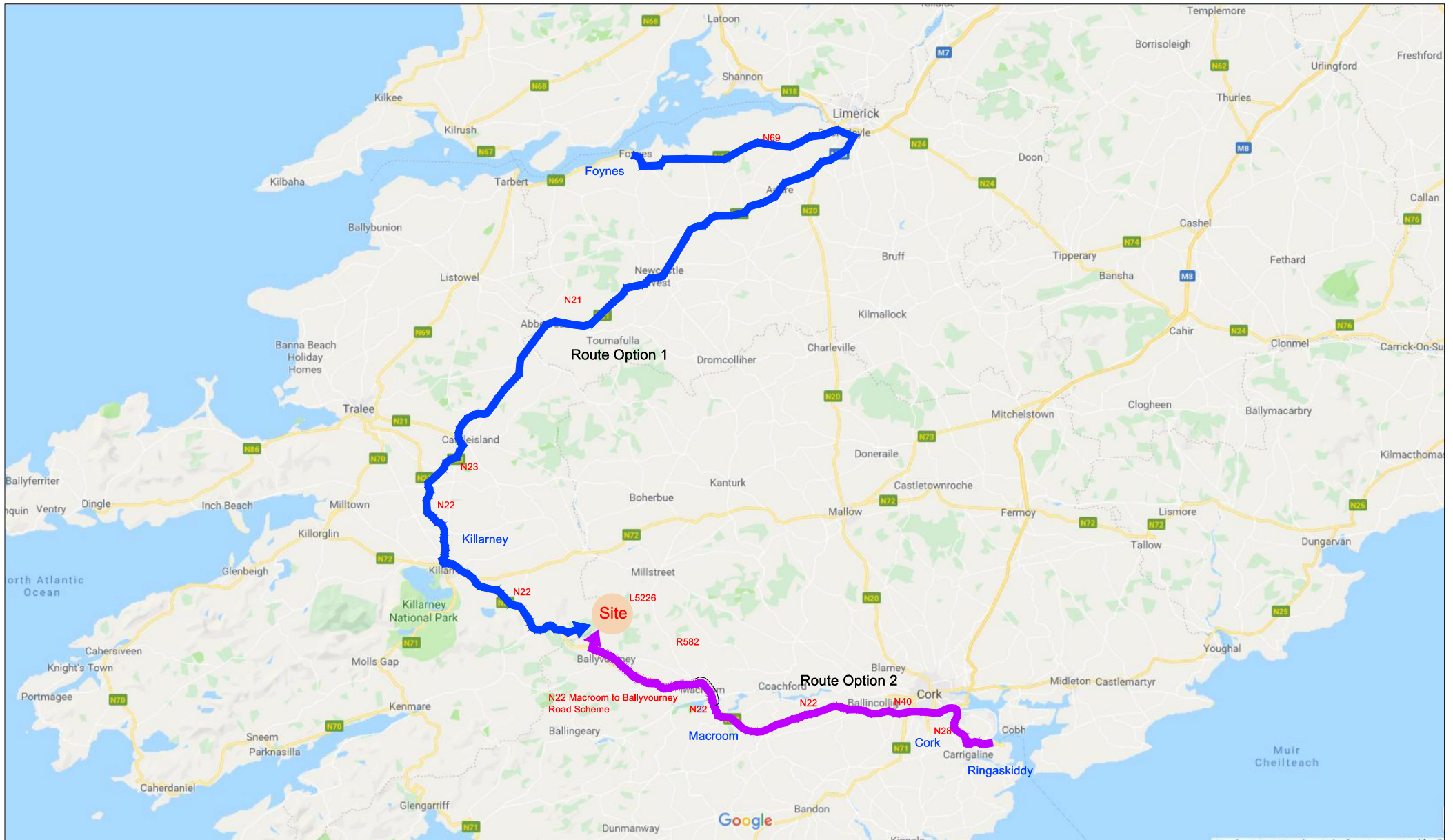
The Traffic and Transport Section of the EIAR is set out as follows:

- A review of the existing and future transport infrastructure in the vicinity of the Proposed Development, including the delivery route options, an assessment of 2017 / 2019 traffic flows and traffic forecasts on the delivery routes during an assumed construction year of 2024 (Sections 13.1.2 - Receiving Environment and 13.1.3 – 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 13.1.4 – Proposed Development Traffic Generation),
- A review of the effects of development generated traffic on links and junctions during construction and when the facility is operational (Section 13.1.5 –Traffic effects during construction and during operation),
- An assessment of the provision for sustainable modes of travel (in this case primarily with respect to the transport of construction staff) (Section 13.1.6 – Provision for Sustainable Modes of Travel),
- The description of potential significant effects is provided in Section 13.1.7.

13.1.2 Receiving Environment

13.1.2.1 Site Location

The site of the Proposed Development straddles the border between Counties Cork and Kerry, and is shown in the context of the national and local highway networks and the delivery route options considered in this EIAR in Figure 13-1. The townlands in which the Proposed Development site is located, are listed in Table 1-1 in Chapter 1 of this EIAR.



NOTES:
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Figure 13.1 Site location and route options

PROJECT: Knocknamorck Renewable Energy Development	
CLIENT: Knocknamorck Ltd	SCALE: NTS
PROJECT NO: 9770	DATE: 20.07.22
	DRAWN BY: AL

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13.1.2.2 Delivery routes for Proposed Development

There are 2 directions of travel that materials may be delivered to the Proposed Development site, which are the same as those assessed for the Turbine Delivery Routes for the Permitted Development. The first (Route Option 1) is from the west on the N22 in the direction of Killarney in County Kerry, and the second (Route Option 2) from the east in the direction of Macroom on the N22 in County Cork.

While it is acknowledged that there are other routes through the general road network which may be used to gain access to the 2 points of entry into the site, it is considered that these routes are the most likely, and are representative of other similar routes that may be used.

For route Options 1 and 2 it is proposed to access the site of the Proposed Development via an existing access track off the remaining section of the old N22 alignment to the southwest of the site. The proposed works will result in a permanent upgrade of this current site access from the old N22 road, which will also form the entrance to the Permitted Development, as described in Section 13.1.2.2, during the operational phase. The proposed improvements to the access junctions from the N22 are included as Appendix 13.1

It is also proposed that general HGV construction traffic will access the east of the site via the R582 followed by the L5226 Local Road.

All route options are considered in this EIAR.

13.1.2.3 Permitted Knocknamork Renewable Energy Development

The Permitted Development site is located approximately 11 kilometres southwest of the town of Millstreet and 3 kilometres northwest of the village of Ballyvourney. The Permitted Development site is located adjacent to the border between Co. Kerry and Co. Cork. The Grid Reference co-ordinates of the approximate centre of the Permitted Development site are E518118 N581610. The Permitted Development comprises up to 7 no. turbines, up to 70,000m² of solar panels and associated works. Planning permission was granted by Cork County Council on 2nd January 2020 (Ref. No. 19/4972).

For the Permitted Development it is estimated that there will be 2,412 truckloads of normal construction materials (ready mix concrete, steel, aggregates, component parts etc.). In addition, it noted that there would be 56 oversize or abnormal loads during a 6-week period when the turbines are being delivered. The attendance of a crane will be required during this period and subsequently during the erection of the turbines. During the turbine delivery period, there will be 5 transporter loads per working day for a total of 11 days.

The traffic related effects of the Permitted Development were established as part of the EIAR undertaken for Planning Ref No 19/4972 and are addressed in the Cumulative Impacts section of this EIAR.

13.1.3 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).

13.1.3.1 Background Traffic Flows

For Route Option 1 approaching the west, a continuous traffic counter is maintained by Transport Infrastructure Ireland (TII) on the N22 at Islandmore between the Proposed Development site and Killarney, with the Average Annual Daily Traffic volume (AADT) on the N22 recorded to be 8,507 vehicles in the year 2017, as shown in Table 13-1.

For Route Option 2 approaching from the east on the N22, and for traffic approaching the site from the east via the R582, daily flow profiles were estimated using data from a continuous traffic counter site maintained by Transport Infrastructure Ireland on the N22 between Ballincollig and Ovens which was applied to observed short term hourly traffic counts. The relevant traffic volumes, including the daily expansion factor determined from the TII count site, are shown in terms of 2-way flows in Table 13-2. A daily traffic volume of 15,443 vehicles per day is estimated on the N22 through Macroom, and 6,436 vehicles per day on the R582 approaching the site from the east. The two locations included in the link flow assessment are shown in Figures 13-2.

13.1.3.2 Background Traffic Volumes for construction year 2024

Revised guidelines for forecasting annual growth in traffic volumes were produced by TII in October 2021, as set out by region in the Project Appraisal Guidelines (Unit 5.3 – Travel Demand Projections). The annual growth rates for light vehicles for County Cork, and factors for the years relevant to this study, are shown in Tables 13-3 and 13-4, with traffic volumes forecast to increase during the period from 2017 to 2024 by 14.0%, and from 2018 to 2024 by 11.9% assuming a medium growth scenario. Year 2017/2018 and 2024 AADT flows on the study area network are compared in Table 13-5. It is noted that the TII growth indices determined for County Cork were used for the assessment rather than those for County Kerry, as they were established to be the higher for the two counties.

TII traffic count data recorded at the TII count sites on the N22 were also used to estimate the existing percentage of HGVs on the delivery routes. The observed percentage of HGVs was 4.9% on the N22 to the west, and 4.2% to the east of the site, with volumes on the study network shown in Table 13-6.

Table 13-1 Average annual daily traffic flow (AADT), Route Option 1, 2017 (2-way vehicles)

Link	AADT
N22 between site and Killarney	8,507

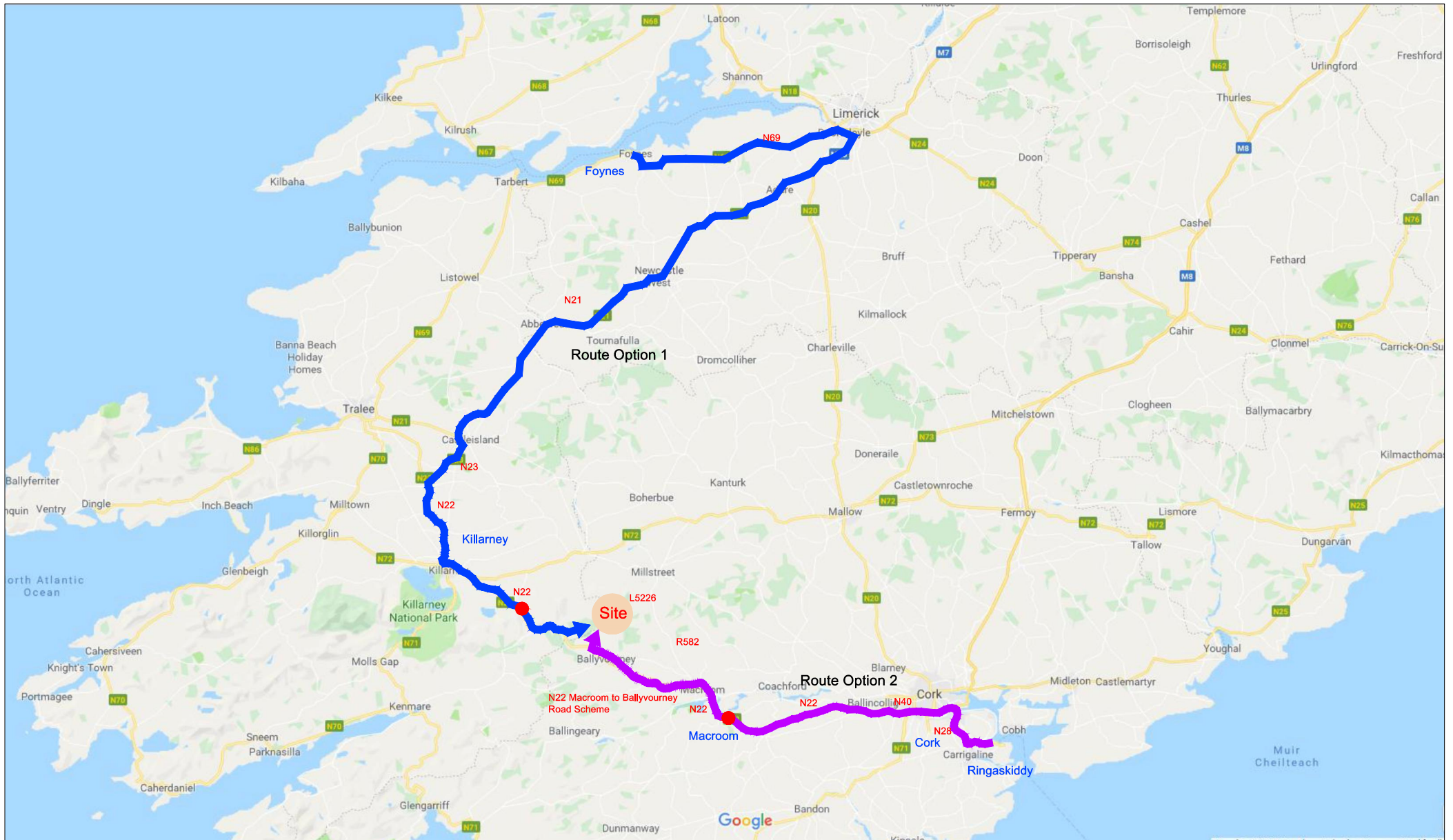
Table 13-2 Observed hour link flows, AADT factors, AADT traffic flow (AADT), Route Option 2, 2018 (2-way vehicles)

Link	Observed flow	Observed hour	AADT factor	AADT flow
N22 through Macroom	1,111	15:00 – 16:00	13.9	15,443
R585 north of Macroom	463	15:00 – 16:00	13.9	6,436

Table 13-3 TII Traffic Growth Indices by growth scenario and year (County Cork)

Year	Lights – Annual Factor			Lights – Cumulative Index		
	Low	Medium	High	Low	Medium	High
2017	1.0173	1.0189	1.0223	1.000	1.000	1.000
2018	1.0173	1.0189	1.0223	1.017	1.019	1.022
2019	1.0173	1.0189	1.0223	1.035	1.038	1.045
2020	1.0173	1.0189	1.0223	1.053	1.058	1.068
2021	1.0173	1.0189	1.0223	1.071	1.078	1.092
2022	1.0173	1.0189	1.0223	1.090	1.098	1.117
2023	1.0173	1.0189	1.0223	1.108	1.119	1.141
2024	1.0173	1.0189	1.0223	1.128	1.140	1.167

Source: TII Project Appraisal Guidelines – Unit 5.3



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Figure 13.2 Link flow locations

PROJECT: Knocknamorck Renewable Energy Development	
CLIENT: Knocknamorck Ltd	SCALE: NTS
PROJECT NO: 9770	DATE: 14.07.22
	DRAWN BY: AL

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Table 13-4 TII traffic growth rates by growth scenario

Period	New Factors		
	Low	Medium	High
2017 – 2024	1.128	1.140	1.167
2018 – 2024	1.108	1.119	1.141

Table 13-5 Average annual daily flows by year (2-way vehicles)

Link	2017	2018	2024
N22 between site and Killarney	8,507	NA	9,698
N22 through Macroom	NA	15,443	17,281
R582 north of Macroom	NA	6,436	7,202

Table 13-6 AADT, percentage HGVs and HGV flow, 2024

Link	AAADT	% HGV's	HGV flows	Cars / LGV's
N22 between site and Killarney	9,698	4.9%	475	9,223
N22 through Macroom	17,281	4.2%	726	16,555
R582 north of Macroom	7,202	4.2%	302	6,899

13.1.4 Proposed Development Traffic Generation

13.1.4.1 Proposed Development Trip Generation – During Construction

The HGV movements that are estimated to be generated during the construction of the Proposed Development are set out in Table 13-7. It is estimated that a total of 1,617 HGV 2-way trips will be generated during the construction of Proposed Development.

Table 13-7 Stage 1 – Proposed Development - total loads

Element of development	Total no. Truck Loads	Truck type
Site preparation and borrow pits	36	Tipper trucks / artics
Substation construction	90	Tipper trucks / artics
33 kV grid cable laying	65	Tipper trucks / artics
110 kV grid cable laying	413	Tipper trucks / artics
Tree felling	304	Large artic
Turbine delivery road	555	Tipper trucks / artics
Miscellaneous	154	Tipper trucks / artics / tankers
Total	1,617	

For assessment purposes the construction of the Proposed Development is estimated to last 12 months or 255 days. As set out previously in Table 13-7, during the construction of the Proposed Development, it is estimated that 1,617 loads will be delivered to the site over a period of 255 days.

The total number of loads and trips (each load is 2 trips) for each element of construction is converted to PCUs and averaged over the 255 days construction period in Table 13-8. The figures show that during the construction of the Proposed Development it is forecast that a total of 1,617 HGV loads will result in an average of 30.4 PCUs traveling on the local road network for 255 working days.

Table 13-8 Proposed development construction materials - total movements and volumes per delivery day

Material	Total Truck Loads	Truck type	Trips	PCU Value	Total PCUs	2- way PCUs/day
Site preparation and borrow pit	36	Tipper trucks / artics	72	2.4	172.8	0.68
Substation construction	90	Tipper trucks / artics	180	2.4	432.0	1.69
Ducting and cabling	65	Tipper trucks / artics	130	2.4	312.0	1.22
110 kV grid cable laying	413	Tipper trucks / artics	826	2.4	1,982.4	7.77
Tree felling	304	Large artic	608	2.4	1,459.2	5.72
Turbine delivery road	555	Tipper trucks / artics	1,110	2.4	2,664.0	10.45
Miscellaneous	154	Tipper trucks / artics / tankers	308	2.4	739.2	2.90
Total	1,617	-	3,234		7,761.6	30.4

* Estimation based on 255 working days)

13.1.4.2 Construction Traffic Vehicle Types

During the construction of the Proposed Development vehicles requiring access to the site will be standard HGVs, tipper trucks, concrete mixers, tankers and LGVs and will be accommodated by the National Road network followed by an existing access track off the remaining section of the old N22 alignment to the southwest of the site for Route Options 1 and 2, and by the R582 and L5226 for traffic approaching the site from the eastern point of access.

13.1.4.3 Construction Employee Traffic

During the construction of the Proposed Development it is estimated that 60 construction staff will be present on site at any given time.

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 60 PCU movements (each trip is two way) will be added to the network during the construction of the Proposed Development.

13.1.4.4 Development Trip Generation – During Operation

It is estimated that the traffic volumes that will be generated by the Proposed Development once it is operational will be minimal, with an average of 2 maintenance staff, or 2 car trips in and out, visiting the site per day.

13.1.5 Traffic Effects During Construction and During Operation

It should be noted that for the purpose of the assessment all vehicles travelling to and from the site for the Proposed Development have been assumed to do so from the same direction for both route options. The following assessment of the impacts on the external road network is therefore based on the worst case scenario, where all traffic generated by the development travels to/from the site from the same direction.

13.1.5.1 Effect on Link Flows – During Construction

Background traffic volumes and development generated traffic volumes are shown for a typical construction day in Table 13-9, with the impact of the additional development generated traffic summarised in Table 13-10.

During the 255 days when the Proposed Development is constructed, an average of an additional 91 PCUs will travel to/from the site. For Route Option 1 from the west, it is estimated that the percentage increase in traffic volumes experienced on the N22 will be +0.9% and if via the N22 from Macroom in the east via Route Option 2 it is forecast to be +0.5%. On days when traffic approaches the site from the east via the R582 it is forecast that traffic volumes will increase by 1.3%.

Table 13-9 Effects of Proposed Development traffic during construction

Link	Background PCUs			Development PCUs			Total PCUs (Background + Development)		
	Car	HGV	Total	Car	HGV	Total	Car	HGV	Total
N22 between the site and Killarney	9,223	475	9,698	60	31	91	9,283	506	9,789
N22 through Macroom	16,555	726	17,281	60	31	91	16,615	757	17,372
R582 north of Macroom	6,899	302	7,202	60	31	91	6,959	333	7,293

Table 13-10 Summary effect of Proposed Development traffic during construction

Link	Background	Development	Total	% increase	Estimated No. of days
N22 between the site and Killarney	9,698	91	9,789	0.9%	255
N22 through Macroom	17,281	91	17,372	0.5%	255
R582 north of Macroom	7,202	91	7,293	1.3%	255

13.1.5.2 Link Capacity Assessment

An assessment of the impact on link capacity on the N22 and R582 was undertaken as set out in Tables 13-11 to 13-13 with the capacity of the links on the route options, as shown in Table 13-11, being 11,600 vehicles per day on the N22, and 8,600 on the R582. Capacities are based on road types and widths as 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 13-12, with the percentage capacity reached for each stage shown in Table 13-13.

For the construction of the Proposed Development the impact on the N22 from the west (Route Option 1) is forecast to be minimal, with the link capacity forecast to be 84% for both the background and with development traffic scenarios.

For Route Option 2, if the development is constructed before the completion of the N22 Baile Bhuirne Macroom Bypass, this section of the N22 is forecast to operate over capacity for scenarios. During the construction of the Proposed Development the impact on the N22 from the east is forecast to be minimal, increasing the link capacity from a background level of 149% to 150%. In the event that the N22 Baile Bhuirne Macroom Bypass is complete (as is scheduled by 2023) all Proposed Development traffic will use the new road scheme which will operate well within capacity for all construction days.

For traffic approaching via the eastern access point the impact is forecast to be minimal on the R582, with the link capacity forecast to be 84% for background traffic volumes, increasing to 85% for the with development traffic scenario.

Table 13-11 Carriageway width, link type and link capacity

Link	Width (m)	Link type	Link capacity
N22 between the site and Killarney	7.3	Type 1 single	11,600
N22 through Macroom	7.3	Type 1 single	11,600
R582 north of Macroom	7.0	Type 2 single	8,600

Table 13-12 Link capacity and summary of link flows, background traffic and with Proposed Development

Link	Link capacity	Scenario	
		Background traffic	Proposed Development
N22 between the site and Killarney	11,600	9,698	9,789
N22 through Macroom	11,600	17,281	17,372

Link	Link capacity	Scenario	
R582 north of Macroom	8,600	7,202	7,293

Table 13-13 Link capacity and summary of link flows, background traffic and with Proposed Development

Link	Link capacity	Scenario	
		Background traffic	Proposed Development
N22 between the site and Killarney	11,600	84%	84%
N22 through Macroom	11,600	149%	150%
R582 north of Macroom	8,600	84%	85%

13.1.5.3 Effect on Link Flows – During Operation

Once the Proposed Development is operational it is estimated that there will be an average of 2 staff members visiting the site per day, with a similar number of vehicle trips into and out of the site. It is likely that the Proposed Development will attract some recreational trips, although it is expected that visitor numbers will be low. It is considered that the traffic impact during this phase will be negligible.

13.1.5.4 Effect on Junctions – During Construction

The capacity of the junctions most affected for each route option (the junction between the N22 and old N22 for both Route Options), 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 time 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.

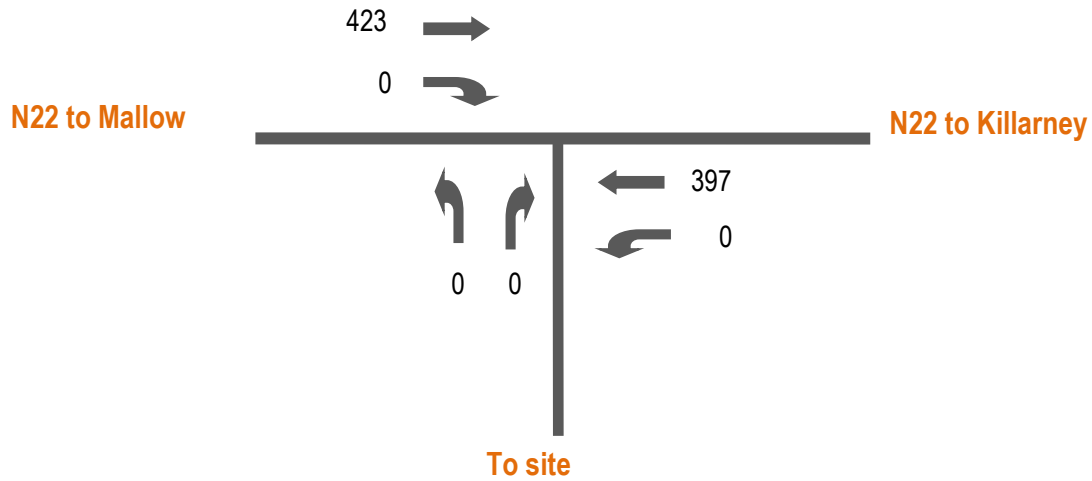
Degree of Saturation or Ratio of Flow to Capacity (% Sat or RFC) – As suggested, this offers a measure of the amount of available capacity being utilised for each movement. Ideally each movement should operate at a level of no greater than 85% of capacity.

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 due to the Proposed Development, the worst-case effect will be experienced during peak hours at the N22 / Old N22 junction, during peak construction periods, approximately 60 workers (30 cars) will pass through it.

PM Peak hour
2024 background
traffic flows



PM Peak hour
2024 “with
construction
workers” traffic
flows

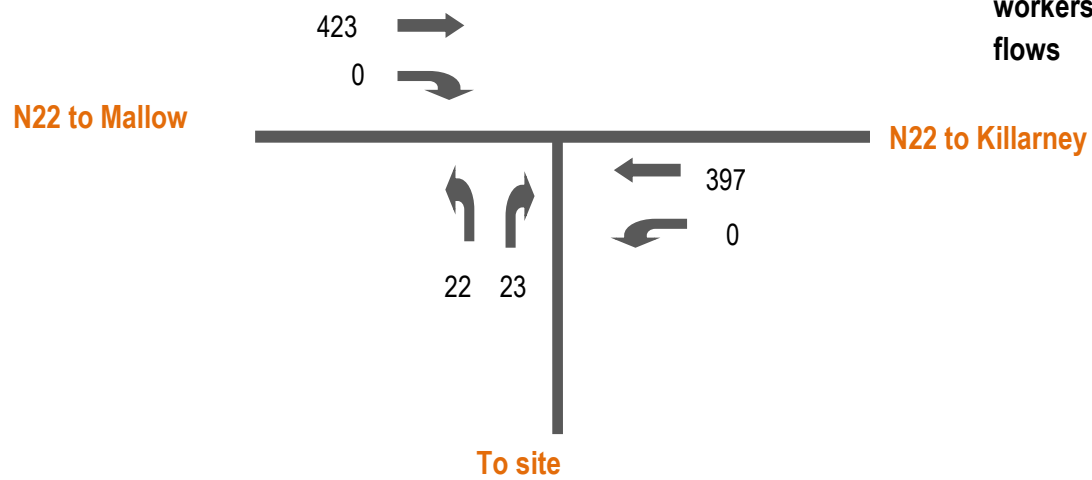


FIGURE 13.3 Traffic flows, with and without construction workers, N22 / Old N22 junction, PM Peak hour, 2024

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Project: Knocknamorck Renewable Energy Development
Client: Knocknamorck Ltd

Date: 30.05.22
Drawn by: AL
Project No.: 9770

It is assumed 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.

N22 / Old N22 Capacity Test Results

The PM peak hour traffic flows for the year 2024 scenario with construction workers passing through this junction are shown in Figure 13-3, with the capacity results shown in Table 13-14. The results show that additional car trips passing through the junction will have a minor effect, increasing the maximum ratio of flow to capacity (RFC) at the junction from 0.0% to 9.9% for the exit from the old N22 onto the N22, which is well within the acceptable limit of 85%.

Table 13-14 Junction capacity test results, N22/local access junction, PM peak, without and with construction staff, year 2024

Year	Location	Without construction traffic			With construction traffic		
		RFC	Queue (vehicles)	Delay (minutes)	RFC	Queue (vehicles)	Delay (minutes)
2024	Exit from old N22	0.0%	0.00	0.00	9.9%	0.11	0.16
	Right turn off N22	0.0%	0.00	0.00	0.0%	0.00	0.00

13.1.5.5 Effect on Junctions – During Operation

As discussed previously it is forecast that once operational, the Proposed Development is expected to generate an average of 2 trips per day for maintenance purposes. It is also likely that small numbers of amenity traffic will be attracted to the site. It is therefore concluded that the Proposed Development will have a negligible effect on the local network once constructed.

13.1.6 Provision for Sustainable Modes of Travel

13.1.6.1 Walking and Cycling

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

13.1.6.2 Public Transport

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

13.1.7 Likely and Significant Effects and Associated Mitigation Measures

13.1.7.1 “Do Nothing” Scenario

If the Proposed Development were not to proceed it would not be possible to access and construct the Permitted Development. The opportunity to generate renewable energy and electrical supply to the national grid would be lost. Commercial forestry operations and existing land-use practices would

continue at the site. With respect to traffic effects, if the Proposed Development is not constructed, there would be no traffic related impacts on the existing surrounding road network.

13.1.7.2 Construction Phase

During the 255 days when the Proposed Development is constructed, for Route Option 1 from the west it is estimated that the percentage increase in traffic volumes experienced on the N22 will be +0.9%, or for Route Option 2 approaching from the east +0.5%. Similarly, for vehicles approaching the site from the east on the R582 it is estimated that the percentage increase in traffic volumes will be +1.3%. The effect will be negative, temporary, lasting for 255 days, and will be imperceptible to slight.

13.1.7.3 Operational Phase

For the Proposed Development during the operational phase the effect on the surrounding local highway network will be long term but will be imperceptible given that there will be an average of two staff members on site per day travelling by a car or light goods vehicle.

13.1.7.4 Decommissioning Phase

It is not intended that the on-site electrical substation will be removed at the end of the useful life of the Permitted Development, as permanent planning permission is being sought for the substation. By the time the decommissioning of the Permitted Development is to be considered, the proposed 110kV substation and the proposed underground electrical cabling (110kV) from the proposed 110kV electrical substation to the existing 220kV Ballyvouskill will likely form an integral part of the local electricity network, with a number of supply connections and possibly some additional generation connection. Therefore, it is intended that the proposed 110kV substation and underground electrical cabling (110kV) will be retained as a permanent structure and will not be decommissioned.

The underground electrical cabling (33kV) connecting the Permitted Development to the proposed 110kV electrical substation will be removed from the underground cable ducting at the end of the useful life of the renewable energy development. The cabling will be pulled from the cable duct using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at each of the joint bays/pull pits along the underground cabling route. The original pulling pits will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

During the construction of the Proposed Development, a number of road and junction improvements and temporary works will be completed to provide access to the site during materials delivery. All these accommodation areas will be re-used during decommissioning. This includes the re-instatement and re-establishment of the temporary access road from the N22 to the old N22 alignment to facilitate the removal of abnormally large vehicle loads. The use of this temporary access road will be carefully managed, and the route will be blocked with traffic bollards when not in use for component removal. On completion of the component removal from the site, the temporary accommodation area will be fully re-instated.

Site roadways could be in use for purposes other than the operation of the development by the time the decommissioning of the Permitted Development is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site, along with general agricultural use.

13.1.7.5 Cumulative Effects

The main potential for cumulative impacts for the Proposed Development is with the Permitted Development, as both developments will be constructed concurrently and will use the same delivery routes to site. With the construction phase for the Proposed Development estimated to take 12 months, and for the Permitted Development 18 months, there is the potential to schedule construction elements for the 2 developments in order that the busiest delivery days do not coincide. On this issue the following measures are proposed;

- On the busiest delivery days for the Permitted Development, that is the 7 days that the concrete for the turbine foundations are poured, there will be limited deliveries made for the Proposed Development,
- While the delivery of turbine components for the Permitted Development will take place during night time hours, the same is proposed for these 11 days.

For the remainder of the common construction period the worst case in terms of potential for cumulative impacts will be when the construction of the Proposed Development takes place at the same time as the site preparation and groundworks stage of the Permitted Development. On these days there will be an additional 214 pcus on the network (123 generated by the Permitted Development and 91 pcus by the Proposed Development) with the combined percentage increase in traffic volumes on the N22 from the west forecast to be +2.2%, and via the N22 from Macroom in the east +1.2%. It is therefore determined that potential for cumulative impacts between the Proposed Development and the Permitted Development is negative and will be slight.

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

- Project status (proposed to operational)
- Degree of overlap on the highway network (low to high)
- Traffic volumes (low to high).

The development or activities that were considered to have potential cumulative impacts with the Proposed Development in terms of traffic impacts are set out below in Table 13-15. It is concluded that there is 1 proposed development (Cummeennabuddoge Wind Farm), and one permitted development (Knocknamork Wind Farm, as discussed previously), where the potential for cumulative impacts are slight.

Table 13-15 Summary of other projects considered in cumulative assessment and potential for cumulative traffic effects with Proposed Development

Project	Status	Degree of overlap of highway network (low / medium / high)	Traffic volumes (low / medium / high)	Potential cumulative traffic effects
1 Clydaghroe Wind Farm	Operating	High	Low	* None
2 Caherdowney Wind Farm	Operating	High	Low	* None
3 Curragh Wind Farm	Operating	High	Low	* None
4 Knocknamork WF (PL ref 194972)	Permitted	High	Low	** Slight
5 Cummeennabuddoge WF (NA)	Proposed	High	Low	** Slight

*Included in background traffic

** Forecast effect if constructed with the Proposed Development simultaneously

13.1.7.6 Mitigation Measures

This section summarises the mitigation measures to minimise the effects of the Proposed Development during the construction stage.

Mitigation by Design

Mitigation by design measures includes the following;

- Selection of the most appropriate delivery route to transport the wind turbine and solar array components, requiring the minimum remedial works to accommodate the vehicles as set out in Section 13.1.2.2; and,
- The majority of gravel and stone material being obtained from the new borrow pit and borrow pit extension located within the site boundary.

Mitigation Measures During the Construction Stage

The successful completion of this project will require significant coordination and planning and a 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 Development. The range of measures will include the following which are also set out in the CEMP Section 3.9, Traffic Management Plan;

A detailed **Traffic Management Plan (TMP)**, incorporating all the mitigation measures set out in the TMP submitted as part of the CEMP, included in Appendix 4.3 of this EIAR, will be finalised and confirmatory detailed provisions in respect of traffic management agreed with the road's 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 construction of the Proposed Development 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 Cork and Kerry County Councils in advance of deliveries of turbine components to site.

Information to locals – Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract 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 – A pre-condition survey of roads associated with the Proposed Development will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority.

Liaison with the relevant local authorities - Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse and An Garda Síochána, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required.

Identification of delivery routes – These routes will be agreed and adhered to by all contractors.

Travel plan for construction workers – While the assessment above has assumed the worst case 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 a routes to / from the site and identification of an area for parking.

Temporary traffic signs – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including the access junction on the N22. All measures will be in accordance with the “*Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works*” (DoT now DoTT&S) and “*Guidance for the Control and Management of Traffic at Roadworks*” (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times.

Additional measures - Various additional measures will be put in place in order to minimise the effects of the Proposed Development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required.

Re-instatement works - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

13.1.7.7 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.

13.1.7.8 Mitigation Measures During Decommissioning Stage

In the event that the Proposed Development is decommissioned after the 25 years of operation of the Permitted Development, only the 33kV electrical cabling between the Permitted Development and the proposed 110 kV electrical substation will be removed. As set out in Section 13.1.7.4, all other components of the Proposed Development, including the 33kV cable ducting, will remain in-situ. It is considered that the potential for effects on traffic will be imperceptible. A Decommissioning Plan has been prepared which includes material recycling / disposal and traffic management plan. See Appendix 4-7.

13.1.7.9 Residual Impacts

Construction Stage

During the 12-month construction stage of the Proposed Development, it is forecast that the additional traffic that will appear on the delivery route options indicated in Figure 13-1 will have a temporary imperceptible to moderate impact on existing road users, which will be minimised with the implementation of the mitigation measures included in the proposed Traffic Management Plan.

For the 255 days the Proposed Development is constructed the impacts will be slight.

Operational Stage

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

Decommissioning Stage

As stated above, a Decommissioning Plan has been prepared and will be implemented in order to minimise the residual impacts during this stage.

As the majority of the Proposed Development would remain in-situ the impacts for this element will be imperceptible.

13.2 Built Services and Waste Management

13.2.1 Introduction

This section of the EIAR addresses the likely significant effects of the Proposed Development on built services and waste management.

13.2.1.1 Statement of Authority

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

13.2.1.2 Methodology and Guidance

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

- ‘Guidelines on the Information to be contained in Environmental Impact Statements’ (EPA, 2002)
- ‘Advice Notes on Current Practice in the Preparation of Environmental Impact Statements’ (EPA, 2003)
- ‘Advice Notes for Preparing Environmental Impact Statements – Draft September 2015’ (EPA, 2015).
- ‘Guidelines on the Information to be contained in Environmental Impact Assessment Reports’ (EPA, 2022)

The assessment of likely significant effects on material assets uses the standard methodology and classification of effects, as presented in Section 1.8.2 of Chapter 1 Introduction. A full description of the Proposed Development is provided in Chapter 4 Description of the Proposed Development.

13.2.2 Scoping and Consultation

The relevant national and regional authorities and bodies listed in Section 2.4 and 2.5 of Chapter 2 Background were consulted to identify any potential impact on material assets. Those relevant to built services and waste management are presented below in Table 13-16.

Table 13-16 Built Services and Waste Management Scoping Responses

Consultee	Date Response Received	Response Detail
EirGrid	Follow on reminder email was issued to Eirgrid on the 11 th April 2022	N/A
ESB Networks	Acknowledgement received 20 th December 2021	N/A
Faílte Ireland	Response received 5 th January 2022	<p>Provided a copy of Fáilte Ireland standard <i>Guidelines for the Treatment of Tourism in an EIS</i> which should be considered during preparation of the EIAR. The section on Material Assets; Waste Management indicated the following:</p> <p><i>Tourism is a resource heavy activity and can impact waste streams and waste segregation. Impacts here should be considered strongly and with knowledge of the variation that arises from the particular tourist activity. Waste and Waste disposal issues can also impact the perception of an unspoiled environment, effecting tourism, which should be considered.</i></p>

Copies of formal scoping responses are provided in Appendix 2-1. No responses have been received from ESB Networks and Eirgrid at the time of reporting. A full description of the scoping and consultation exercise is provided in Section 2.4 of this EIAR.

13.2.3 Receiving Environment

13.2.3.1 Electricity

There are no overhead electricity cables on the site of the Proposed Development. There are existing underground electricity cables present on the site of the Proposed Development and in the vicinity of the site. Damage of underground electricity cables during construction operations could potentially result in serious injury or death of site staff. The Proposed Development has been designed to avoid existing underground electricity cables and the appropriate separation distances in accordance with ESB requirements have been maintained.

13.2.3.2 Other Services

There are no other known services (i.e. water supply, gas, sewage, telecommunications) at the site of the Proposed Development or in the vicinity of the site.

13.2.3.3 Waste Management

A Waste Management Plan (WMP) has been prepared and forms part of the Construction and Environmental Management Plan (CEMP) in Appendix 4-3 of the EIAR.

The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Development. Disposal of waste will be a last resort.

All waste generated on site will be contained in waste skips at a waste storage area on site. This waste storage area will be kept tidy with skips clearly labelled to indicate the allowable material to be disposed of therein. The expected waste volumes generated on site are unlikely to be large enough to warrant source segregation at the Proposed Development site. Therefore, all wastes streams generated on site will be deposited into a single waste skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

Site personnel will be instructed at induction that under no circumstances can waste be brought to site for disposal in the on-site waste skip. It will also be made clear that the burning of waste material on site is forbidden.

Further details on waste management are presented in the CEMP.

13.2.4 Likely Significant Effects and Associated Mitigation Measures

13.2.4.1 'Do-Nothing' Scenario

If the Proposed Development were not to proceed it would not be possible to access and construct the Permitted Development. The opportunity to generate renewable energy and electrical supply to the national grid would be lost. Commercial forestry operations and existing land-use practices would continue at the site.

13.2.4.2 Construction Phase

There are existing underground electricity cables present on the site of the Proposed Development and in the vicinity of the site. The Proposed Development which has been designed to avoid existing underground electricity cables can be described as mitigation by design and therefore there is no potential to give rise to effects on electrical services.

Proposed Mitigation Measures

Notwithstanding the above, specific measures are incorporated into the CEMP, included as Appendix 4-3 of this EIAR, to ensure that the construction of the Proposed Development will not have effect on underground electrical cables at the site. The mitigation measures include the following:

- Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works.
- Liaison will be had with the relevant sections of the Local Authority including all the relevant area engineers to ensure all services are identified.
- Excavation permits will be completed and all plant operators and general operatives will be inducted and informed as to the location of any services.
- The contractor must comply with and standard construction codes of practice in relation to working around electricity, gas, water, sewage and telecommunications networks.

Residual Impacts

Following the implementation of the above mitigation measures, there will be a short-term imperceptible negative residual impact during the construction phase of the Proposed Development.

Significance of Effects

Based on the assessment above there will be no significant effects.

13.2.4.3 Operational Phase

There will be no operational phase impacts or associated effects on built services and waste management associated with the Proposed Development.

13.2.5 Cumulative Impact Assessment

The potential cumulative impact of the Proposed Development and other relevant developments has been carried out with the purpose of identifying what influence the Proposed Development will have on the surrounding environment when considered cumulatively and in combination with relevant approved, proposed, and existing projects in the vicinity of the Proposed Development site.

On the basis of the assessment above, the Proposed Development will have no impact on built services and waste management. It is assumed also that all mitigation measures in relation to the other cumulative projects, as set out in Section 2.6 of Chapter 2: Background to the Proposed Development will also be implemented. It is on this basis that it can be concluded that there would be a short-term imperceptible cumulative impact on built services and waste management from the Proposed Development and other developments in the area.