Chapter 12: Traffic and Transportation

Coolglass Wind Farm Vol. 2 EIAR

Coolglass Wind Farm Limited

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Table of Contents

Tables in Text

Figures in Text

Acronyms and Abbreviations

SLR	SLR Consulting Limited
EIAR	Environmental Impact Assessment Report
EIA	Environmental Impact Assessment
AILs	Abnormal indivisible loads
HGVs	Heavy Goods Vehicles
TDR	Turbine Route Delivery
CIHT	Chartered Institute of Highways and Transportation
IEMA	Institute of Environmental Management and Assessment
CTMP	Construction Traffic Management Plan
NGOs	Non-Governmental Organisations
CMP	Construction Management Plan
FWD	Falling Weight Deflectometer
ESB	Electricity Supply Board
PCS	Pavement Condition Survey
ATC	Automatic Traffic Counter
RTC	Road Traffic Collision
RSA	Road Safety Authority
WTC	Wind Turbine Components
ECC	Export Cable Corridor

12.0 Traffic and Transportation

12.1 Introduction

This Chapter considers the environmental impacts that are potentially significant where the Proposed Development is likely to result in increased traffic flows.

The assessment focuses on the construction, operational and decommissioning phases of the Proposed Development as the worst-case scenario for traffic generation. Potentially significant traffic related environmental effects may result from two forms of potential impact:

- the transport configurations made for the movement of wind turbine components (including blade, tower sections and nacelle), transported as abnormal loads. Abnormal indivisible loads (AILs) are those which exceed the length, weight or height criteria defined in 'Road Traffic (Permits for Specialised Vehicles) Regulations 2009, S.I. No. 147 of 2009', and 'Road Traffic (Specialised Vehicle Permits) (Amendment) Regulations 2010, S.I. 461 of 2010 '; and
- the import of general construction materials transported via 'conventional' heavy goods vehicles (HGVs) and low loaders.

The assessment detailed within this Chapter is based around worst-case assumptions made for the purpose of forming a robust assessment of the Proposed Development within the parameters identified **in Chapter 3: Description of Development**, specifically, section 3.1 and 3.1.1 of Chapter 3 in this EIAR. Minimum and maximum hub height and rotor diameter parameters being proposed and all design permutations within that range as set out in Table 3.1 of Chapter 3 in this EIAR are being applied for.

Two cable connection route options (Options 1 and 2) which are part of the "Project" but not part of the Proposed Development that are being applied for are also assessed as part of this EIAR.

All elements of the Project are described in Section 3.5 of this EIAR and the description of the Proposed Development is found in section 3.8.1 of this EIAR.

This Chapter does not focus on the transport configurations made for the movement of wind turbine components. The potential route impacts have been considered in the separate Turbine Route Delivery (TDR) assessment document prepared by SLR Consulting which is available in Technical Appendix 12.1 found in Volume III of this EIAR and includes a detailed review of the preferred delivery route to site from the port of Dublin and any road route constraints with swept path analysis. The TDR report has been used to inform this Chapter. Site visits were undertaken to review the route on the 9th and 10th November 2021, with an additional site visit completed on 17th February 2023 to confirm the works required.

During operation, the Proposed Development would generate regular maintenance trips which are not anticipated to lead to any variation in the baseline traffic flows beyond that of everyday fluctuation. Given that there is a 35-year lifetime for the Proposed Development, the focus of the assessment within this Chapter is the construction phase.

12.1.1 Statement of Authority

This chapter has been prepared by Joanna Read, BSc MSc MCIHT, employed by SLR Consulting. Joanna has 20 years' experience in the field of transport planning. Joanna has nine years' experience with preparing environmental impacts assessment chapters and nine years'

experience with energy projects. Joanna has over twenty years' experience preparing transport assessments for a range of development types. Regulatory Background

A review of the national, regional and local planning guidance relevant to this Chapter is summarised below. **Chapter 4: Planning Policy** provides a more detailed review of the relevant legislations, planning policy and guidance relevant to the project.

Planning Policy

- Laois County Council Development Plan 2021 – 2027;
- Portlaoise Local Area Plan 2018 – 2024;

Guidance

- Environmental Protection Agency (EPA) 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports', 2022;
- National Roads Authority (2014) – Traffic and Transportation Assessment Guidelines;
- Transport Infrastructure Ireland (2017) Rural Road Link Design – DN-GEO-03031;
- 2006 Wind Energy Development Guidelines and 2019 Draft Revised Wind Energy Guidelines;
- Institute of Environmental Management and Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA, 1993), and other departmental design standards; and
- Design Manual for Roads and Bridges, Highways Agency (1997), now Standards for Highways.

The assessment is required to evaluate the effects of the Proposed Development and to determine the magnitude and significance of the impacts on the identified sensitive receptors. The main receptors which are sensitive to increased traffic levels and environmental impacts are anticipated to be located along the R425 and the R426 at the areas of Sheffield Cross and Timahoe. Residential properties and sensitive non-residential properties, such as schools, are also considered. The assessment also considers the impacts associated with the transport of the turbine components.

Consideration has been given to the proposed access route to the site. The assessment process comprised the following principal stages:

- baseline survey and characterisation of the existing traffic network through desk study and traffic surveys;
- review of the findings from the TDR assessment report (Technical Appendix 12.1 found in Volume III of this EIAR) and identification of the preferred route and potential effects along this route;
- derivation of mitigation measures, where appropriate, to address any identified effects; and
- description of any residual effects.

12.1.2 Assessment Methodology

The likely significance of the potential effects has been determined by considering the magnitude of change in traffic movements and the sensitivity of the receptors which would be

affected by these changes. This has been undertaken in accordance with the IEMA guidance (IEMA, 1993) and standard good practice, based on the experience of the assessor.

The IEMA guidance suggests that a day-to-day traffic flow variation of +/- 10% is to be expected in the baseline situation, and that projected traffic flow increases of less than 10% would be imperceptible to the general public and would create no discernible environmental impact. Therefore, increases in traffic levels of below 10% are considered insignificant.

Based on the IEMA guidance, the following factors have been identified as being the most discernible potential environmental effects likely to arise from changes in traffic movements. These are therefore considered in the assessment as potential effects which may arise from changes in traffic flows resulting from the Proposed Development:

- **noise and vibration** – the potential effect caused by additional traffic on sensitive receptors, which in this case would relate to residential properties near to the road (see also **Chapter 10: Noise**);
- **driver severance and delay** – the potential delays to existing drivers and their potential severance from other areas;
- **community severance and delay** – the potential severance to communities and the delays to movements between communities;
- **vulnerable road users and road safety** – the potential effect on vulnerable users of the road (e.g. pedestrians/cyclists);
- **hazardous and dangerous** loads – the potential effect on road users and local residents caused by the movement of AILs; and
- **dust and dirt** – the potential effect of dust, dirt and other detritus being brought onto the road.

In addition to the effects listed above, human health effects are considered in transport terms in reference to pedestrians within the vulnerable road user and road safety effects.

Significance of Effect

Criteria for the determination of sensitivity (e.g. 'high', 'medium', or 'low') or of importance (e.g. 'international', 'national', 'regional', or 'authority area') have been established based on prescribed guidance, legislation, statutory designation and/ or professional judgement.

The significance of the likely effect has been determined by consideration of the sensitivity of receptors to change, taking account of the specific issues relating to the study area, and then the magnitude of that change.

Sensitivity of Receptors

The potential sensitivity of receptors to changes in traffic levels has been determined by considering the study area and the presence of receptors in relation to each potential impact.

The IEMA guidelines provide two thresholds when considering predicted increase in traffic, whereby a full assessment of the impact is required:

- where the total traffic would increase by 30% or more (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and/or
- where traffic flows are predicted to increase by 10% or more in areas identified specifically as sensitive.

In this context, the IEMA guidance does not define a sensitive area and therefore the assessor has made a judgement based on experience and the nature of the study area. Each receptor has been assessed individually to determine its sensitivity and the assessment criteria chosen are shown in **Table 12-1.**

Table 12-1 Receptor Sensitivity

Impact	Low Sensitivity	Medium Sensitivity	High Sensitivity
Driver severance & delay	Road network not affected.	Road network not experiencing congestion at peak times.	Road network experiencing congestion at peak times.
Road safety	-	-	High sensitivity receptor.
Community severance & delay	No presence of existing communities severed by road.	Presence of existing communities with a moderate level of existing severance (subjective assessment).	Presence of existing communities with low existing severance (subjective assessment).
Noise	No sensitive receptors.	Presence of sensitive receptors near to the road.	Presence of sensitive receptors adjacent to the road.
Vulnerable road users	No vulnerable road users.	Limited vulnerable road users.	Clear presence of vulnerable road users.
Wider disruption due to dangerous loads	No hazardous or dangerous loads on the road network.	Some hazardous or dangerous loads on the road network. Loads are legally permitted on UK roads.	Abnormal and oversized loads to use road network.
Dust & dirt	Limited presence of sensitive receptors (subjective assessment).	Low to medium presence of sensitive receptors (subjective assessment).	High presence of sensitive receptors (subjective assessment).
Use of Open Trenching	Roads that are unlikely to be used regularly, with alternative routes available.	Roads that are regularly used with alternative routes available.	Major roads or any roads with no alternative route available, that serve residential properties or farms.

Magnitude of Impact

The magnitude of impact or change has been considered according to the criteria defined in **Table 12-2.**

Table 12-2 Magnitude Criteria

Impact	Negligible	Minor	Moderate	Major
Noise	<25% increase in traffic	>25% increase in traffic. Quantitative assessment based on predicted increase in traffic against measured baseline (see **Chapter 10: Noise**).		
Driver severance & delay	<10% increase in traffic.	Quantitative assessment of road capacity based on existing traffic flows and predicted future traffic levels.		
Community severance & delay	<10% increase in traffic.	<30% increase in traffic.	<60% increase in traffic.	>60% increase in traffic.

Impact	Negligible	Minor	Moderate	Major
Vulnerable road users	<10% increase in traffic.	Qualitative assessment of existing provision and future traffic levels.		
Road safety	<10% increase in traffic.	Quantitative assessment of existing accident records and predicted increases in traffic.		
Dangerous loads	0% increase in traffic.	<30% increase in traffic.	<60% increase in traffic.	>60% increase in traffic.
Dust & dirt	<10% increase in traffic.	<30% increase in traffic.	<60% increase in traffic.	>60% increase in traffic.

Significance of Effect (Potential Effects)

Sensitivity and magnitude of change as assessed under the criteria detailed above have then been considered collectively to determine the significance of effect, as described in **Table 12-3**. The collective assessment is a considered assessment by the assessor, based on the likely sensitivity of the receptor to the change (e.g. is a receptor present which would be affected by the change), and then the magnitude of that change. Effects of 'major' and 'moderate' significance are considered to be 'significant' in terms of the EIA Regulations.

Table 12-3 Significance of Effects

Significance of Effects					
Sensitivity of Receptor	**Magnitude of Impact**				
	No Change	**Negligible**	**Low**	**Moderate**	**High**
Negligible	Negligible	Negligible	Negligible	Negligible	Minor
Low	Negligible	Negligible	Minor	Minor	Moderate
Moderate	Negligible	Minor	Minor	Moderate	Major
High	Negligible	Minor	Moderate	Major	Major
Very High	Negligible	Minor	Major	Major	Major

Potential Cumulative Effects

An assessment has been undertaken to establish potential cumulative effects from all relevant developments upon the local road network within the study area, including local wind farms, within a 40km radius of the site (either in the planning system or under construction) which may utilise the same local road network and access routes as the Proposed Development.

Operational Cumulative Effects

As the operational impact of the Proposed Development on the study area is indiscernible, the operational cumulative effects have not been assessed.

Mitigation

The Proposed Development has been designed to include a range of measures to mitigate potential effects and the assessment assumed that general good practice would be deployed,

with a detailed Construction Traffic Management Plan (CTMP) being secured prior to the commencement of development. A CTMP has been prepared and is found in **Technical Appendix 12.3** of Volume 3 of this EIAR.

Residual Effects

Following consideration of mitigation measures, an assessment of the residual effects has been made. Potential residual impacts include general wear and tear to roads and verges as a result of increased traffic, and temporary road closures caused by AIL deliveries.

Statement of Significance

A statement of significance is provided at the end of the chapter which provides a summary of the complete assessment for each receptor, taking into consideration any proposed mitigation measures, and it reports the significance of the residual effects in compliance with the EIA Regulations.

12.1.3 Consultation and Scoping Responses

SLR prepared scoping material for discussion with the determining authority and with other relevant stakeholders and organisations, including Transport Infrastructure Ireland, Laois County Council, Kilkenny County Council and Carlow County Council Roads departments. A scoping report was distributed to consultees on the 7th of June 2022. The recipients included the Local Authority, An Bord Pleanala, Government Departments, non-governmental organisations (NGOs), interested parties and key stakeholders. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey methodologies and potential impacts that should be considered as part of the impact assessment process and in preparation of the EIAR.

Account has been taken of the scoping responses received and **Table 12-4** summarises the identified key issues with the access, traffic and transport of the Proposed Development, and where these issues have been addressed in this Chapter.

The site visit undertaken on the 17th of February 2023 included the LCC road engineers, with all parties reviewing the TDR route and proposed works. It was confirmed that the proposed route raised no concerns and was generally acceptable for the delivery of the turbine components.

Table 12-4 Key Issues

Consultee and Date	Summary of Key Issues	Where addressed in Chapter
Laois County Council	With respect to Access, Traffic and Transport, information needs to be updated with regard to Laois Roads and Parking Standards 2007 Document. Information provided is limited to access arrangements. Additional listed requirements include: 1. Measures to prevent flow of surface water from the site onto public road(s). 2. Wheel washes to prevent dirt and debris onto public road(s). 3. Details relating to haulage routes, the number of traffic movements per day together with the weights and types of vehicles. 4. The locations of quarries from which stone and concrete will be sourced, and associated traffic movements shall be incorporated into a transport Impact Assessment. 5. A road opening licence for the route of the ESB cable route will be required. 6. A precondition survey identifying bridges and culverts on haulage routes and the ESB cable route. This shall include tests such as visual video inspections and FWD tests and Pavement Condition Survey (PCS). Post road video inspection and post PCS surveys will need to be carried out for a number of years post construction. Bridge inspection surveys (preconstruction and post construction). Heavy load permits for the delivery of the wind turbines will be required. Any alterations that may be required to bridges, signs, road junctions will need to be identified.	1. Please see Chapter 9 for further details. 2. Please see Section 12.5.2, Technical Appendix 3.2 CEMP and Technical Appendix 12.3 CTMP 3. This is addressed in the TDR Report (Technical Appendix 12.1). 4. Quarry locations available in various locations. Robust traffic generation and assessment in 12.4. 5. A road opening licence will be obtained post consent and pre-construction. 6. A TDR Works assessment has been completed (see TDR Report) and the requirements for precondition surveys will be adhered to once permission is secured.
Transport Infrastructure Ireland	No response received	-
Roads Department – Kilkenny County Council	No response received	-
Roads Department – Carlow County Council	No response received	-

12.1.4 Effects Scoped Out

Recreational Amenity Trail Works

The majority of the recreational amenity trail will be located on the Proposed Development associated access tracks and as such there will be limited impacts associated with the works required for the trail. Any traffic generated during these works will be limited and at a scale far reduced from that generated during the construction of the Proposed Development. As such assessment of the amenity trail construction works has been scoped out of the assessment.

Operational Effects

It is estimated that the operational phase of the Proposed Development would generate no more than five vehicle trips in any one day and zero trips most days. Typical duties onsite would include routine maintenance, such as safety checks and repairing faults. These visits would normally require light vans or similar vehicles and would use the same routes as those used during construction.

The trips generated by the operational activities onsite would be no greater than those expected and accounted for in background variations to the existing traffic flows. As such, negligible traffic flows would be indistinguishable from normal daily traffic flows and, therefore, assessment of operational effects has been scoped out of this assessment.

Decommissioning Effects

The Proposed Development has been designed with an operational life of up to 35 years. At the end of this period or before time if necessary, the turbines would be decommissioned. It is currently anticipated that the decommissioning of the proposed scheme would comprise the following elements which would lead to future traffic movements:

- dismantling and removal of turbine components – the turbines will be disassembled and so the components will not be transported from the site as abnormal loads;
- removal of all turbine foundations to a depth of one metre below ground level, with deeper infrastructure remaining in-situ;
- removal of hardstanding areas adjacent to turbines to a depth of one metre below ground level; and
- removal of substation compound to a depth of one metre below ground level.

Similarly to the operational phase, the decommissioning phase is expected to generate less vehicle traffic than the construction phase, and so this is not included in the assessment.

12.2 Baseline Conditions

The Proposed Development is located approximately 11km south-east of Portlaoise as shown in **Figure 1-1** of Chapter 1 of this EIAR. The main towns and villages within the vicinity of the Proposed Development include: Timahoe, Swan, Wolfhill, Newtown, Ballinakill, Stradbally, Athy, Carlow, Portlaoise, and Abbeyleix. The site spans Fossy Mountain and Wolfhill, north of Swan and south of Timahoe. The site is accessible from both the north and the south via the R526 Regional Road which runs the M7 Motorway and the N78 National Road.

12.2.1 Existing Road Network

The study area for this assessment has been defined as the R426 and L3851. There are other roads that will experience an increase in traffic associated with the Proposed Development, such as those required to access the quarry locations, however the source quarry is subject to agreement between the applicant and the suppliers and so it is not possible to determine these roads. The roads included in the turbine delivery route are:

- The R425 from the junction with the R445;
- The R426 south from the R425 to the L3851; and
- L3851 to site access.

The majority of construction traffic will travel to the site along the routes as described above and so much of the wider network has been excluded from this assessment.

12.2.2 Existing Traffic Flows

Baseline traffic flow surveys were undertaken by TRACSIS who installed two automatic traffic counters (ATCs) within the study area, with one located on the R426 and the other located on the L3851. The locations of the ATCs can be seen in Figure 12-1 Access LocationsError! Reference source not found.. Traffic data was not obtained for the other roads within the study area as the traffic generated would distribute on to the wider road network once away from the R426.

The ATCs collected data continuously over the seven-day period between Tuesday 7th June and Monday 13th June, a period which lies outside of any school, public or bank holidays. The full traffic survey results for both sites are provided in **Technical Appendix 12-2** found in Volume III of this EIAR and a summary of the average weekday traffic is provided in **Table 12-5**. The data includes directions and two-way flows.

Table 12-5 Average Weekday Traffic Flows (R426)

Location	Northbound		Southbound		Two-Way	
	Total	HGVs	Total	HGVs	Total	HGVs
24 Hr	484	17	466	12	949	29
12 Hr	392	13	368	11	760	24

Table 12-5 shows that the average two-way flow on the R426 is below 1,000 vehicles, with HGVs making up 3% of the total. The directional flows are very similar, with 484 northbound and 466 southbound. HGVs make up a slightly larger proportion of the northbound flow at 4% with 3% HGVs recorded in the southbound flow. The 12-hour flows for the average weekday are 80% of those recorded during 24 hours, with a similar directional split. The number of HGVs is recorded to be lower during the 12 hrs, which indicates that HGVs travel on the R426 between 19:00 and 07:00. The 85th percentile speed for the average weekday (two-way) was recorded at 89.4 kilometres per hour. During the seven-day survey period an average of 6 pedal cycles/motorcycles were recorded each day, making up less than 1% of the total traffic.

Figure 12-2 presents the profile of traffic on the R426 during the average weekday through a full 24hrs. It can be seen that the northbound traffic flow peaks during the morning at around 08:00 with the southbound traffic flow peak at around 17:00; this suggests that the route is used by drivers travelling for work with commuter related peaks in the AM and PM.

Figure 12-2 (Graph) Average Weekday Traffic Flows (R426)

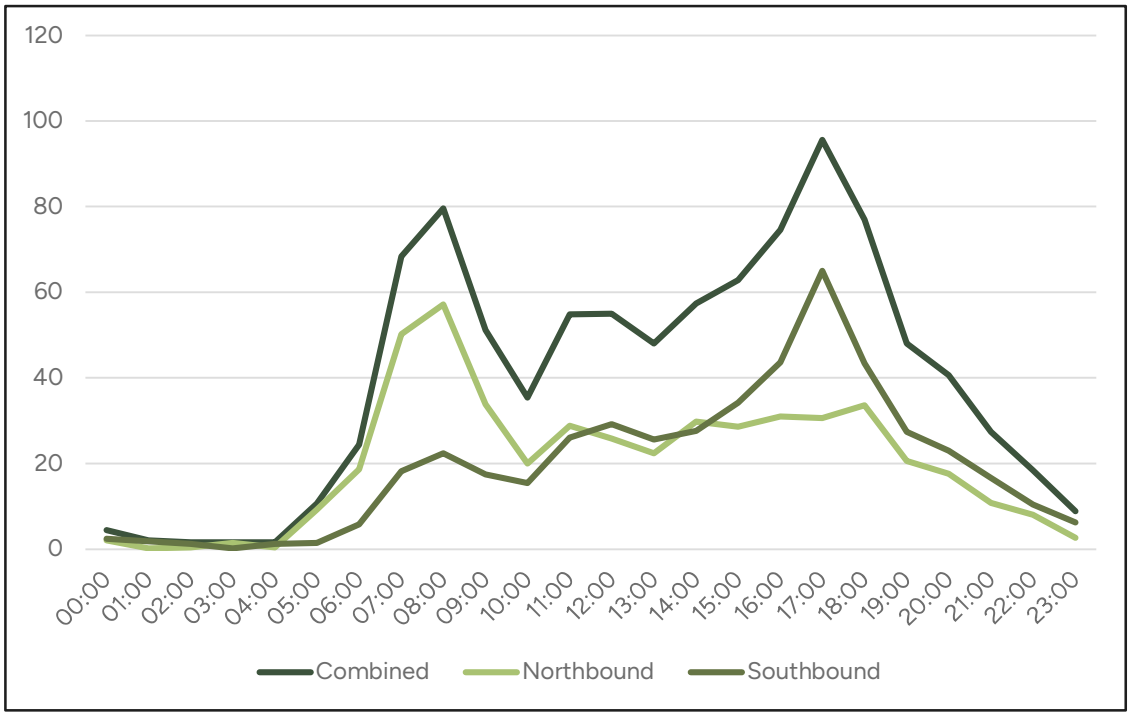


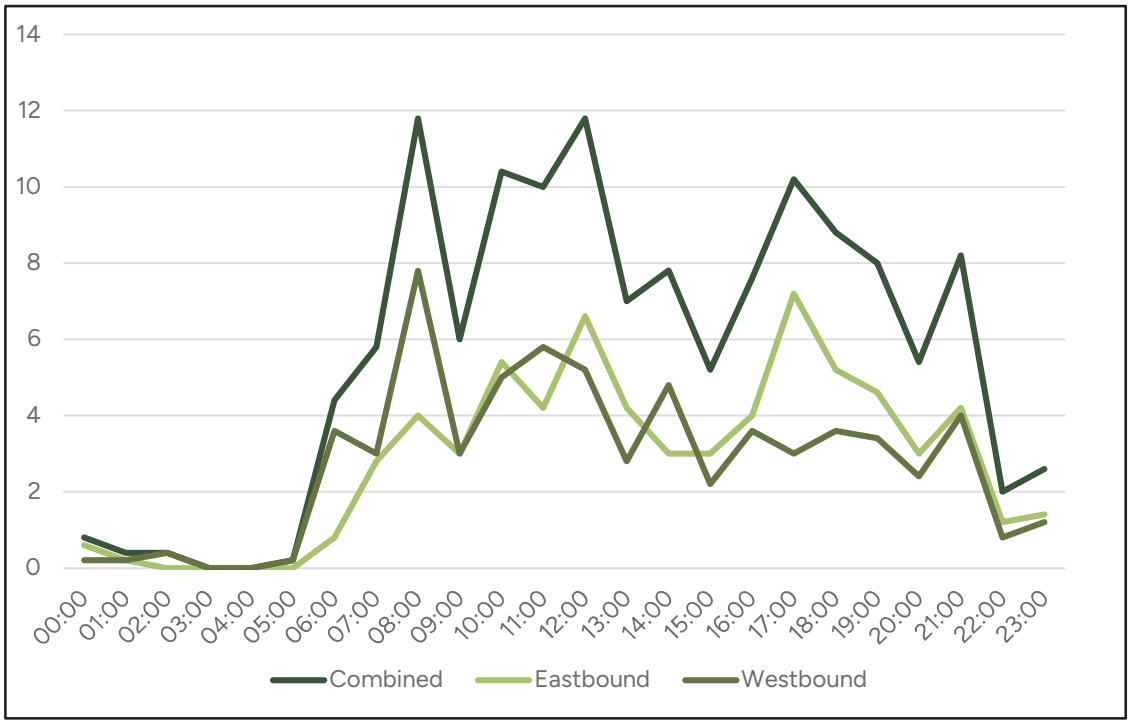
Table 12-6 Average Weekday Traffic Flows (L3851)

Location	Eastbound		Westbound		Two-Way	
	Total	HGVs	Total	HGVs	Total	HGVs
24 Hour	69	2	66	2	135	5
12 Hour	53	2	50	2	103	4

Table 12-6 confirms that the two-way traffic flow during 24 hours on the L3851 for an average weekday is 135 vehicles, with 5 HGVs which make up 4% of the total traffic. The directional flows in 24 hrs are very similar, with 69 heading eastbound and 66 heading westbound. The flows are not significantly different for a 12 hour period during the average weekday, with slightly less traffic and the same number of HGVs. The number of pedal cycles/motorcycles was recorded as an average of 1 per day over the seven days, making up less than 1% of the total traffic.

Figure 12-2 sets out the traffic profile of an average weekday on the R426, as recorded. It can be seen that there are two distinct peak periods, with a peak northbound in the morning around 08:00 and a peak southbound in the evening around 17:00. This suggests that there is a flow of commuter traffic along the R426. Figure 12-3 sets out the profile for the directional and two-way flow on the L3851, as recorded. It can be seen that there are no clear peak periods and the flow of traffic varies through the day in both directions.

Figure 12-3 Average Weekday (24hr) Traffic Profile– L3851



Network Capacity Performance

The capacity performance of the R426 and the L3851 has been calculated from Design Manual for Roads and Bridges, Volume 5, Section 1 TA 46/97, and compared against the existing 24-hour baseline traffic flows. The spare capacity has then been calculated and presented in **Table 12-7**.

Table 12-7 Existing Capacity of R426

Road	Baseline Flow (24-hr)	Capacity	Spare Capacity	Spare Capacity %
R426	949	21,175	20,226	96%
L3851	135	12,128	11,993	99%

Both roads have been calculated to have over 95% spare capacity.

12.2.3 Accident Records

Personal Injury Accident (PIA) collision data would normally be obtained for the study area to cover the most recent five-year period. This data is then used to determine the existing road safety situation and to establish a base against which the effects of the Proposed Development are assessed. However, the Road Safety Authority (RSA) is currently in the process of reviewing its road traffic collision (RTC) data sharing policies and procedures and as such it is not making the RTC data available. As a result, it has not been possible to obtain PIA data specifically for the roads within the study area.

A review of the available information has identified that road collision annual reports provide information on Road Casualties and Collisions in Ireland annually up to 2019; in addition, it is possible to look at the five-year trend analysis of fatalities and serious injuries from 2017 to 2021.

The 'Road Casualties and Collisions in Ireland 2019 – Tables [Online]' dated June 2022[1], has been reviewed. Data is provided for each County confirming the number of persons killed or injured between 2015 and 2019. This information provides statistics which have been obtained from all road traffic collisions as reported to An Garda Síochána, with data presented to confirm the number of persons killed or injured. The relevant information has been summarised in **Table 12-8** and **Table 12-9**:

Table 12-8 Persons Killed and Injured

	Ireland		Co. Laois	
Year	Total Killed	Total Injured	Total Killed	Total Injured
2015	162	7840	4	96
2019	140	7598	1	95

Table 12-9 Persons Killed by Road User Type

Year	Pedestrians	Pedal Cyclists	Car User	Motor Cyclist	Other*
2015	31	10	89	22	10
2019	27	8	81	17	7

(*Other includes Passenger Service Vehicles, goods vehicles and unknown road users)

It can be seen from the information in **Table 12-8** that the number of people injured and killed in road collisions has reduced in both Ireland and in the County of Laois between 2015 and 2019, with only one recorded death in 2019 in Co. Laois. The information in **Table 12-9** confirms that more car users were killed but that the number of deaths reduced from 2015 to 2019. The deaths of vulnerable road users (pedestrians and cyclists) reduced in 2019 also across Ireland.

While the data is not specific to the roads within the study area it is possible to confirm that the number of people killed in County Laois in 2019 was not abnormal, with just one recorded death due to a road collision. There were fewer vulnerable road users killed through Ireland in 2019 than in 2017 which would indicate that fatalities for vulnerable road users are reducing.

12.2.4 Existing Road Network Performance

From the sections above which had provided an assessment of the baseline situation, it may be concluded that the existing road network provides substantial reserve capacity against existing traffic demand; and that the instances of deaths cause by road collisions in County Laois is not high.

12.3 Proposed Development (Future Baseline)

. All elements of the Project are described in Section 3.5 of this EIAR and the description of the Proposed Development is found in section 3.8.1 of this EIAR.

[1] https://www.rsa.ie/docs/default-source/road-safety/r2---statistics/road-collision-annual-reports/road-casualties-and-collisions-in-ireland-2019.pdf?Status=Master&sfvrsn=a6dcadd8_3

Access to the Site would be provided via two access locations from Luggacurren Road and thus to the existing tracks across the site. All aggregate material required on Site will be imported and all concrete will need to be imported as there will be no concrete batching plant on Site.

12.3.1 Site Entrances

Access to the Northern Cluster is via Access Point 1 (AP1) is located 1.5km east along the L3851, with access to Access Point 2 (AP2) a further 2.1km along the L3851. The access locations can be seen in **Figure 124**.

It is expected that approximately 13.8 kilometres of internal access tracks will be required to be upgraded as part of the Proposed Development. Approximately 5.2 kilometres of old internal access tracks will be utilised.

12.3.2 Development Site Construction Haul Routes

All construction vehicles would enter the sites from the west, having turned onto Knocklead Road from the R426. It is anticipated that HGVs and deliveries will travel from Portlaoise to the north as this is the largest town in the vicinity of the Site, with a small percentage travelling along the R426 from the south. Light vehicles are likely to travel from both directions along the R426.

12.3.3 Turbine Delivery Route

The proposed turbine delivery route is presented in **Figure 12-2**. A turbine delivery route selection and assessment was carried out to identify the optimum delivery route to the sites as set out in Technical Appendix 12.1. The assessment has considered maximum turbine component parameters and so covers all turbine permutations identified in Table 3.1

Turbine delivery will be from Dublin port with delivery of the wind turbine components (WTCs) along one distinctive route. The turbine delivery route will leave Dublin port and join with the M50 motorway via the Dublin Port Tunnel. The transport will continue along the M50, exiting the M50 onto the N7 National Road / M7 Motorway; the transport will continue west before exiting the N7 at Junction 16.

The transport route exits the motorway at Junction 16 to travel west on the R425 for a short distance before heading south on the R426, through the town of Timahoe. The transport will continue along the R426 Regional Road before heading east on Knocklead Road before accessing either the southern or northern clusters via existing forestry tracks.

The route was assessed for a candidate turbine with a tip height of 180m, a rotor diameter up to 162m and a hub height up to 110m which has encompassed all the turbine permutations within the dimensions set out in Table 3.1 of Chapter 3 of this EIARThe exact make and model of the turbine will be dictated by competitive tender process but will remain within the parameters assessed.

12.3.4 Cable Route

While the cable route does not form part of this planning application and the cable route is assessed as part EIAR consent process. The associated cable route will consist entirely of underground cable and consists of two options as set out in Chapter 3 of this EIAR.

The cable routes will involve a trench being constructed in the road along the export cable corridor (ECC) to install the cable. The electricity from the northern and southern clusters will be

exported from the on-site substation to the existing grid via a 110 KV buried cable to either the Option 1 or the Option 2 substations.

Cable trenching will be carried out with the aid of either a lane closure or road closure, which will ensure that the trenching works are completed as expeditiously as possible. Due to the length of cabling within the road corridor (ca 10 km), these works could be conducted over a 6-month period of time (ca 26 weeks).

Construction Programme

The construction phase of the Proposed Development, which includes civil, electrical, grid works, and turbine assembly will take approximately 18-24 months once the proposed turbines are acquired via a competitive tender process. The main activities will include:

- off-site highway works;
- site establishment (construction compounds);
- construction of access tracks and crane pads;
- turbine foundation construction;
- substation civil and electrical works;
- cable delivery and installation;
- turbine delivery and erection;
- wind farm commissioning; and
- reinstatement/restoration.

The main construction works which are expected to generate the most vehicle trips to the site will be undertaken during months 5 to 18, with the final 7 months of the construction programme accommodating the wind turbine deliveries and erection. An indicative construction programme has been prepared and is set out in the construction timeline shown in **Chapter 3: Description of Development**, as summarised in **Table 12-10**.

Table 12-10 Indicative Construction Programme

Construction Activity	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site establishment																		
Access tracks																		
Felling operations																		
Turbine foundations																		
Concrete pour																		
Substation &compound																		
Cable laying																		

Construction Activity	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site restoration																		

12.4 Site Construction Traffic Generation

The construction phase working hours for the Proposed Development would be 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 at weekends. It should be noted that out of necessity some activity, for example WTC deliveries and the lifting of the turbine rotors, may need to occur outside the specified hours stated, although they would not be undertaken without prior approval from Laois County Council as the Roads Authority The impact of the Proposed Development has been assessed over a 12-hour weekday period, which considers the natural peak usage of the road network.

The Proposed Development would require the transportation of a range of construction materials to the site. The aggregate material required on site will be sourced locally, with a number of existing quarries being available. These are all located in various locations around the site and include Carroll Quarries Ltd to the north west, Roadstone Ballyadams to the north east and Dan Morrisey and Company to the south east. The key elements of construction work which would result in vehicle trip generation have been summarised in **Table 12-11**.

Table 12-11 Construction Activities Requiring Vehicle Trips

Key Work Element	Details and Assumptions	Conventional HGVs	Abnormal Loads
Site establishment	Provision of hardstanding, cabins and plant for construction activities at commencement of construction and later removal from site.	Yes	No
Site access	Provision of plant and materials associated with improvements to the site access.	Yes	No
Access track upgrade and construction	15.5km of internal access track, 5km of which will be old internal access tracks.	Yes	No
Crane hardstandings, turbine laydown areas and turbine foundations	Construction of crane hardstandings at each turbine location with additional laydown areas for blades in addition to cement, aggregate, concrete and reinforcement materials for turbine foundations.	Yes	No
Control buildings and substation	Construction of building foundations, structure and finishings. Installation of electrical equipment.	Yes	Yes
Electrical installation	Delivery of sand and cables to connect turbines to substation.	Yes	No
Waste Collection	Collection of waste water from the holding tank and collection of general waste and waste for recycling. Expected to be minimal HGV trips.	Yes	No
Wind turbine delivery	Transport of WTC to site. Bringing in of crane equipment to erect turbines. Includes escort vehicles associated with movement of WTC loads.	Yes	Yes

An estimation of the aggregate material quantities for all elements of the Proposed Development has been made; the on-site borrow pit and the excess from the cut and fill requirements are likely to result in all aggregate material being won within the site. However to ensure a robust assessment, it has been assumed that the type of aggregate required for construction will be imported. **Table 12-12** provides a summary of the material quantities (aggregates only) required on site.

Table 12-12 Estimated Aggregate Quantities

Proposed Infrastructure	Volume of Aggregate	Approximate Tonnages of Aggregate
Access tracks (new & upgraded)	15,365m^3	23,048t
Turbine bases (area & base formation)	1,217m^3	1,825t
Hardstanding and laydown areas	7,800m^3	11,700t
Substation	15,000m^3	22,500t
Construction compound	6,250m^3	9,375t
TOTAL	**45,632m^3**	**68,448t**

A total of 68,448 tonnes (t) of aggregate material will be required for the construction of the Proposed Development. The aggregate required will be brought to Site from external sources, mainly from local quarries. **Table 12-13** provides material quantities for all other non-aggregate materials.

Table 12-13 Estimated Material Quantities

Construction Activity	Infrastructure	Material Quantities
Turbine Foundations	Installation 6N structural fill	5,131t
	Blinding	738t
	Installation of can/ bolts	13no
	Reinforcement	1,066t
	Plinth shutter	48t
	Base slab perimeter shutter	114t
	Ducts (200mm diameter)	78no
	Ducts (75mm diameter)	78no
	Transformer plinths	13no
	Step plinths	13no
Electrical Connection	Sand layer – (15,507m length by 0.5m x 0.3m)	2,326m^3 (4,187t)
	Cable – drums hold 500m	32no
Concrete	-	1250m^3
Control Building	Reinforcement	48t
Substation Compound	Imported type 1 running surface	1,255t
	Imported 6F2 capping	2,500t
	Class 1C1 Roadbox bulk fill	6,300t

Construction Activity	Infrastructure	Material Quantities
	Class 1 general fill	18,800t

12.4.1 Trip Generation

HGV Trip Generation

The total number of HGV trips predicted to arise during the construction phase of the Proposed Development has been calculated based on estimated material quantities provided in **Table 12-13**. These have been doubled to provide the two-way movements that would occur from delivery and then returning vehicles, as shown in **Table 12-14**.

Table 12-14 Total Number of HGV Trips

Construction Activity	Infrastructure	Load Size	No. of Loads	Two-Way Movements
On-site	Imported Aggregate	20t	3,422	6,844
Felling	Assumed 2 per day	-	2	4
Turbine foundations	Installation 6N structural fill	20t	257	514
	Blinding	20t	37	74
	Installation of can/ bolts	-	1	2
	Reinforcement	20t	53	106
	Plinth shutter	-	1	2
	Base slab perimeter shutter	-	1	2
	Ducts (200mm diameter)	-	1	2
	Ducts (75mm diameter)	-	1	2
	Transformer plinths	-	13	26
	Step plinths	-	13	26
Electrical connection	Sand layer – 5,484m of trench (0.50m x 0.25m)	20t	209	418
	Cable – drums hold 500m	-	13	26
Concrete	1250m^3	9m^3	96	192
Control Building	Reinforcement	20t	3	6
Substation compound	Imported type 1 running surface	20t	63	126
	Imported 6F2 capping	20t	125	250
	Class 1C1 Roadbox bulk fill	20t	315	630
	Class 1 general fill	20t	940	1,880
Total Loads/ Two-Way Movements			**5,566**	**11,132**

The two-way movements for HGVs have been spread over the construction programme according to the relevant activity. The total two-way trip generation has been divided by the number of construction working days in each month to provide daily two-way trip generation.

For ease of phasing the construction period, the following categories have been used (the final three months, not included, are reserved for commission of the wind turbines and for takeover):

- **site establishment and restoration** – it has been assumed that the majority of plant required on site would be delivered here, with a number of HGV deliveries;
- **access track construction** – it is assumed that the majority of aggregate would be required for the access tracks, with all aggregate sourced from external locations for delivery during these months;
- **substation and compound construction** – this will include some aggregates and all materials associated with the substation compound;
- **concrete** – concrete will be imported to the site in ready mixed loads and the nature of the operation is that concrete would be required to be imported on thirteen isolated and non-sequential 'pour days' to account for the pouring of each foundation;
- **cabling** – electrical connection materials; and
- **turbine foundations** – turbine bases, fill above turbine bases (aggregates), concrete pour and all associated materials for turbine foundations. The delivery of the turbines is not included here.

The vehicles to be generated in association with the management of waste during construction will be limited and are not accurate to predict. However the robust traffic generation figures set out in **Table 1214** include an element of 'rounding' to take account of unknown elements.

The total two-way daily vehicle generation figures within each month (30 days) of the 18 month programme, can be seen in **Table 12-15** and **Table 12-16**. **Table 1215** presented the total daily figures to include the concrete pour days and **Table 1216** presents the daily figures for non-pour days or average days. The concrete pour days are not likely to occur every day during the construction of the turbine foundations. This approach ensures that the 'worst case' daily figures are confirmed for normal construction days and for concrete pour days.

The 'worst case' is described as such because the likely significant effects would occur with the highest level of traffic generation from the site, which would occur when various different construction activities occur at the same time. IEMA Guidelines state that the assessment should identify the 'worst' impacts.[2]

[2] Institute of Environmental Management and Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA, 1993).

Table 12-15 Daily Two-Way HGV Trip Generation by Construction Month – Concrete Pour Days

Construction Activity	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site establishment	12	4	4															
Access tracks		38	38	38	38	38	38											
Felling operations	4	4	4	4	4	4												
Turbine foundations					24	24	24	24	24	24	24							
Concrete pour					21	21	21	21	21	21	21							
Substation & compound		39	39	39	39	39	39	39	39	39	39	39	39	39				
Cable laying					14	14	14	14	14	14	14							
Grid connection													1	1	1	1	1	
Site restoration															4	4	4	12
TOTAL	16	85	85	81	140	140	136	98	98	98	98	39	40	40	5	5	5	12

Table 12-16 Daily Two-Way HGV Trip Generation by Construction Month – Non Concrete Pour Days

Construction Activity	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site establishment	12	4	4															
Access tracks		38	38	38	38	38	38											
Felling operations	4	4	4	4	4	4												
Turbine foundations					24	24	24	24	24	24	24							
Concrete pour					0	0	0	0	0	0	0							
Substation & compound		39	39	39	39	39	39	39	39	39	39	39	39	39				
Cable laying					14	14	14	14	14	14	14							
Grid connection													1	1	1	1	1	
Site restoration															4	4	4	12
TOTAL	16	85	85	81	119	119	115	77	77	77	77	39	40	40	5	5	5	12

12.4.2 HGV Trip Generation

The above tables (Error! Reference source not found. and **Table 12-16**) show that the maximum level of trip generation would occur during the 'worst case' scenario in the early months of the construction period, when various construction activities would coincide; for the concrete pour during months 5 and 6 there are predicted to be 140 HGV two-way trips. The average construction day maximum would also fall during months 5 and 6, with 119 HGV two-way movements. Through months 5 and 6 on a concrete pour working day there would be 12 two-way HGV movements per hour; during an average working day in months 5 and 6 there would be 10 HGV two-way movements per hour. This is based on the dimensional specifications noted in section 12.3.3. Trip Generation for Wind Turbine Components

Each wind turbine consists of seven WTC deliveries: three blades, three tower sections and the nacelle (generator). Other loads would be associated with the delivery of the hub, cranes and drilling rigs, which would not be considered to be AILs, these however would be delivered at a similar time. Towers would be carried in a 4+7 clamp adaptor style trailer, whereas loads such as the hub, nacelle housing and top towers would be carried on a six-axle step frame trailer. All components would be transported under suitable traffic management procedures.

On the premise that the 91 components are to be delivered in convoys of three, the AILs could be completed over 30 days, subject to the supply of turbines for the site. Over the seven-month period allocated for the erection of the turbines (turbine foundations), this would equate to an average of approximately 4 delivery days per month.

To ensure a robust assessment, it has been assumed that three WTC load transport vehicles would deliver components on a day during the 'worst case' month, with an additional two HGV deliveries included for the crane and drilling rigs. The maximum turbine components have been assessed in line with the candidate turbines listed in Table 3.1 of Chapter 3 of this EIAR which covers all the permutations therein

12.4.3 Light Vehicles and Staff Trip Generation

Light vehicles of which consist of smaller vehicles such as cars and vans, which would typically be associated with the workforce, have also been calculated to provide total two-way vehicle movements predicted to arise from the Proposed Development. It is envisaged that a maximum of 274 personnel would be required on the site at any one time. It is expected that the majority of staff will travel to the proposed development construction site in 14-seater minibuses, to be provided by the contractor, with 20 minibus trips during the peak of the construction period. To ensure that the prediction of light vehicles is robust, it has been assumed that a further 20 light vehicle trips would be seen during the peak of the construction period; this would equate to 50 vehicle trips per day (100 two-way movements per day).

12.4.4 Accumulative Trip Generation

Table 12-17 provides the calculated daily and hourly two-way movements during the 'worst-case' for the concrete and average month of the construction phase (months 5 and 6). There are predicted to be 140 HGVs movements per day during the concrete pour days (119 HGV movements on non-pour days), 10 HGVs/abnormal load movements for the turbine delivery and 100 light vehicle movements; as such there will be 250 two-way vehicles per day on the concrete pour days, and 229 two-way vehicles per day on the non-pour days. This calculation is based on the maximum turbine components, hardstandings and infrastructural requirements in line with the candidate turbines listed in Table 3.1 of Chapter 3 of this EIAR which covers all the permutations therein.

Table 12-17 Trip Generation (Two-way)

	HGV/ AIL	Lights	Total
Worst Case – Concrete Pour			
Daily	150	100	250
Hourly	13	8	21
Worst Case - Average			
Daily	129	100	229
Hourly	11	8	19

All construction vehicles would enter each site access from the R426 to the west, having travelled along the R426 from the wider road network. It is assumed that the majority of HGVs will travel south along the R426 from the M7 and Portlaoise however a small percentage may travel to the site from the south. As such it assumed that 85% of HGVs will travel along the R426 to/from the north and 15% will travel to/from the south.

WTC deliveries will travel from the M7 having collected the WTCs from the port at Dublin. From the M7 the turbine delivery route follows the R425 to the south of Portlaoise before heading south towards the site on the R426.

Light vehicle trip generation would see a minimum of 100 two-way trips each day during the peak months. It has been assumed that the majority of light vehicles will travel to the site via the R426 from Portlaoise, however a small number may also come from the south. As such, it is assumed that 85% of light vehicles will travel along the R426 from the north while the remaining 15% will travel along the R426 from the south. This calculation is based on the maximum turbine components, hardstandings and infrastructural requirements in line with the candidate turbines listed in Table 3.1 of Chapter 3 of this EIAR which covers all the permutations therein.

12.5 Decommissioning

During the decommissioning phase of the Proposed Development, there will be less vehicle movements than during the construction phase as there will be less activities on site, less materials required and less plant.

Cranes will disassemble the above grounds turbine components which will be removed off site for recycling. As the turbines will be deconstructed the parts will be smaller and so transported off site on normal HGVs and not as abnormal loads.

The foundations will be covered over and allowed to re-vegetate naturally, limiting the amount of material required to be transported off-site. Leaving turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust. It is proposed that the internal site access tracks will be left in situ, subject to agreement with Laois County Council and the relevant landowners.

The proposed on site substation will be taken in charge by ESBN /EirGrid upon completion and should be left in place forming part of the national electricity network.

Underground cabling will be cut back and left in situ.

There will be a requirement for construction workers on site, however these numbers will be less than required for construction. There will be some movement of materials between the north and south of the site to optimise reuse of the excess material, however these numbers will be lower than those seen on the L3851 than during construction. There will be no requirement for the

import of materials such as concrete or aggregate and so the overall number of HGVs will be less than generated during construction.

12.6 Potential Impacts of the Proposed Development

12.6.1 Potential Construction Effects

Embedded Measures

The Proposed Development has been designed to include a range of measures to mitigate potential effects. Embedded mitigation measures for the site are described fully in **Chapter 3: Description of Development**.

The assessment has been undertaken under the assumption that general good construction practice would be deployed and that, prior to the commencement of development, the detailed Construction Traffic Management Plan (CTMP) would be agreed Laois County Council and Garda Síochána. A CTMP is found in Technical Appendix 12.3.

The detailed CTMP includes a number of measures to reduce the effects of the construction of the Proposed Development on local receptors and communities, including effects from turbine deliveries (abnormal loads). This would include details of any required temporary widening and other road improvement measures, together with detailed consideration of vehicle swept paths, loadings, structural assessments (where required), temporary street furniture removal details, dust and dirt management, and community engagement.

An element of preparation of the CTMP would be a trial run, which would be undertaken through a special licence, with Garda Síochána in attendance. Information, with regards to abnormal loads, would be provided to local residents and users of amenities to alleviate stress and anxiety.

The CTMP will also ensure that:

- a reputable construction contractor will be procured, with an Environmental Policy and good environmental track record;
- all HGVs delivering materials to the site will be roadworthy, adequately maintained and sheeted as required;
- adequate traffic management and banksmen will be deployed for the movement of HGVs and abnormal loads; and
- HGV loads will be maximised to ensure that part load deliveries would be minimised.

Wind Farm & TDR

The predicted increases in traffic levels against the baseline levels have been calculated in this section, and an assessment of the significance of the effect has been made against the criteria described in **Table 12-1**, **Table 12-2** and **Table 12-3**.

The IEMA guidelines provide two thresholds when considering predicted increases in traffic, whereby further consideration of impacts would be required:

- where the total traffic would increase by 30% or more (10% in sensitive areas); and/or
- where the HGV traffic would increase by 30% or more (10% in sensitive areas).

Although sensitive receptors, e.g. residential properties, are present within the study area, the study area in its entirety is not considered to be sensitive; the study area is not consistently populated with sensitive receptors. Therefore the threshold of 30% has been applied.

Construction phase working hours for the Proposed Development will be 07:00 to 19:00 Monday to Friday and 07:00 to 16:00 at weekends, other than in exceptional circumstances. It should be noted that out of necessity some activity, for example WTC deliveries and the lifting of the turbine rotors, may need to occur outside the specified hours stated, although they would not be undertaken without prior approval from Laois County Council as the Roads Authority. The impact of the Proposed Development has been assessed over a weekday, which considered the natural peak usage of the road network.

The increase in traffic flows along the L3851 and the R426 have been calculated for the maximum trip generation occurring during the worst-case day for the concrete pour and for the average trip generation likely to occur during the rest of the construction phase, without the inclusion of the WTC deliveries- this would include all design permutations of the ranges set out in Table 3.1 of Chapter 3 of this EIAR. The generated traffic flows are expected to begin to distribute after the R426 and so the R425 and R445 have not been included in the assessment.

Table 12-18 shows the predicted daily total and HGV traffic increases for these two different occurrences for the L3851 and **Table 12-19** provides the predicted flows for the R426. The baseline flows are those observed on an average weekday over a 12-hr period. It has been assumed that all development generated traffic will travel on the L3851 to the west of the Site access locations, while 85% of the development generated traffic will head north on the R426 and so these numbers are reflected in the Tables below.

Table 12-18 Predicted Daily Increase in Traffic along the L3851 – 12 Hour Flows

Road Link	Trip Case	Baseline		Development		Baseline + Development		Increase %	
		Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs
L3851	Maximum day	103	4	250	150	353	154	243%	3,750%
	Average day			229	129	332	181	222%	3,225%

Table 12-19 Predicted Daily Increase in Traffic along the R426 – 12 Hour Flows

Road Link	Trip Case	Baseline		Development		Baseline + Development		Increase %	
		Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs
R426 north of Site	Maximum day	760	29	213	128	973	157	28%	441%
	Average day			195	110	955	139	26%	379%

From **Table 12-18** and **Table 12-19** above it can be seen that the development generated traffic will result in a significant increase to the number of HGVs on both the L3851 and the R426. The existing HGV flows on the L3851 are currently very low at just 103 total vehicles and 4 HGV two-way movements per day, and so the additional result in a significant percentage increase.

As a regional road the R426 experiences higher flows, and therefore the increase is less significant with the total traffic flow predicted to increase by less than 30% for both the maximum and average day during the construction phase; the impact to flows on the R426 can be seen in **Table 12-20**. The increase in HGVs on the R426 will result in a rise of 441% during the maximum day and 379% during the average day.

Table 12-20 Capacity of R426 with Development

Road	Baseline Flow (24-hr)	Capacity	Development Traffic	Spare Capacity	Spare Capacity %
R426 (N)	949	21,175	213	20,013	95%
L3851	135	12,128	250	11,743	97%

Table 12-20 above confirms that the addition of the construction generated traffic would not have a material impact on the capacity of the roads within the study area; both the R426 and the L3851 will retain at least 95% capacity.

Traffic Increases Summary

For the R426 the results **Table 12-20** above show that the increase in total traffic for both the maximum and average days will remain just below the 30% IEMA threshold; however, the increase in HGV traffic along the R426 exceeds the IEMA thresholds (30% or more). The largest increase for the total traffic flows is shown to be 26% (379% for HGVs) during the average day with the cable route included. The maximum day during the construction period would see a 28% increase total traffic flows, but a significant increase to HGVs at 441%.

Along the short section of the L3851 to be used by the development generated traffic it can be seen that all IEMA thresholds will be exceeded, with 222% increase to the total traffic and 3,225% increase to the HGVs during the average construction day. While the increase in vehicle numbers on the L3851 is significant above the base level, it can be confirmed that the impact to the

theoretical capacity of the local road is negligible with capacity remaining at 97% during the maximum day.

Potential Effects - Construction

Effects on Road Safety

There are no general thresholds used when determining the significance of increased traffic on highway safety, therefore professional judgement is required to identify the potential road safety effects associated with the construction phase. The IEMA guidance confirms that existing road accident rates and professional judgement are needed to assess the implications of the cumulative construction traffic. It should be noted that this assessment does not constitute a road safety audit.

It has not been possible to obtain injury accident data for the study area (The R426 and the L3851) as no location specific data is currently available from the RSA. The national data reviewed has identified that the number of accidents within the County of Laois reduced in 2019 from previous years and that there was one single fatality in the County in 2019. While this data does not allow any conclusions about road safety within the study area to be confirmed, it does imply that there are no significant road safety issues within the County. Due to the lack of information available regarding existed road safety within the study area, and in line with Table 12-1, the study area is classified as having a **high sensitivity** to impacts to road safety.

The predicted number of HGV movements on both the L3851 and the R426 would be greater than the 30% threshold as set out in **Table 12-18** and **Table 12-19**, however, this would be easily accommodated within the available capacity of the road network and road safety would not, therefore, be compromised. Any impacts would be limited and temporary due to the relatively short construction period (approximately 18 months) and so the impact to road safety will have a **low magnitude**. This is applicable for all design permutations of the ranges set out in Table 3.1 of Chapter 3 of this EIAR.

In summary, the Proposed Development would create a significant increase to HGV traffic levels within the study area but these levels would remain well within the design capacity of the local road network. Any impacts would be short lived due to the temporary nature of the construction phase. In line with the embedded mitigation measures, deliveries of large components such as those required for the substation and turbines would be moved under suitable traffic management procedures, including the provision of banksmen at the site access junction and appropriate warning signage.

In accordance with the significance criteria set out in **Table 12-3** the level of effect is considered to be **moderate and significant** for the short duration of the construction phase.

Effects on Driver Severance and Delay

The IEMA guidance states that there are a number of factors which determine driver severance and delay; these include delay caused by additional turning vehicles and additional parked cars at the site, delays at junctions due to increased traffic, as well as delays at side roads due to reduced gaps in the oncoming traffic.

The capacity performance of the R426 determined that existing traffic levels on this road are substantially below the maximum theoretical capacity of the roads, with 95% spare capacity. It is therefore considered that the construction of the Proposed Development would not lead to a material adverse capacity impact on the R426. Similarly, while the increase in total vehicles using the L3851 is significant, the theoretical capacity of the road remains at 97%. As such, the impact of the construction traffic on driver severance will have a **negligible magnitude**.

Using the criteria as outlined in **Table 12-1**, **Table 12-2** and **Table 12-3**, driver severance and delay is considered to be of **low sensitivity** as there is expected to be some tolerance to the issue of severance and delay**.** Neither of the roads have been identified as experiencing very high flows and so are likely to be able to tolerate some congestion during peak times; the roads do not extend through busier urban areas more likely to experience congestion regularly and on the R426 the magnitude of the potential effect is considered to be minor with 26-28% increase in total vehicular flows. Both the L3851 and the R426 remain well within the maximum theoretical capacity of the road network.

As such, and in line with **Table 12-3**, the overall effects are assessed as **minor and not significant**.

Effects on Community Severance

The IEMA guidance identifies severance as "the perceived division that can occur within a community when it becomes separated by a major traffic artery". As an example, a road that passes through a community such as a town or village, where perhaps amenities are located on one side of the road and residential properties are located on the other side, causes severance to the movements between those places. The degree of severance depends on the traffic levels on the road and the presence of adequate crossing opportunities.

The L3851 does not sever any communities as the few properties are isolated as set back from the road. There are a limited number of urban communities separated by the R426 and there are few locations where residential dwellings are separated from community facilities. The potential for community severance within the study area is considered to be low and the community receptor is considered to have **negligible sensitivity**.

It has been demonstrated that the R426 and the L3851 have the capacity to accommodate additional traffic and the total vehicle numbers are not predicted to increase by more than 28%; as such the additional traffic within the study area will have a **low magnitude** of impact.

The potential for community severance effects for the study area is **negligible** and **not significant**.

Effects on Noise and Vibration

The Study Area would be classified as a having a **moderate sensitivity**. This is a result of residential properties being present and adjacent to both sides of the R426 within the Study Area. The IEMA Guidelines state that an increase in noise due to an increase in traffic of less than 25% is deemed a negligible noise impact to receptors with anything greater than 25% requiring a quantitative assessment.

The traffic increase predicted for the construction phase on the R426 is 213 vehicle movements per day, resulting in a 28% increase; for the L3851 the increase is 250 vehicles per day with a 243% increase. In both instances this is more than 25% of the current number of daily vehicle movements and hence, the traffic noise effects are considered to have a negligible magnitude of impact, particularly as the effects will be temporary. As such the additional traffic would have a **negligible magnitude of impact**.

Therefore, the overall effects are considered to be **minor and not significant** in terms of the EIA Regulations.

Effects on Vulnerable Road Users

Vulnerable road users are not exclusively referenced within the IEMA guidance however this is often considered separately where the presence of vulnerable road users is confirmed. Vulnerable road users are defined as road users most at risk from road traffic (pedestrians,

particularly children and older adults or disabled people, cyclists, horse riders, and motorcyclists). The traffic data collected confirmed that vulnerable road users made up less than 1% of the total traffic; vulnerable road users have been recorded within the study area, but at low levels.

The impact of traffic on vulnerable road users would be most substantial within settlements along the proposed access routes where the presence of vulnerable road users, such as pedestrians and cyclists, is greatest. This includes the communities within Timahoe.

The percentage increase in total traffic on the R426 will be no more than 28%, however there is predicted to be a significant increase in the HGV traffic on both the L3851 and the R426. Consequently, there would be a potential increase in risk to vulnerable road users during the construction period as a result of the increased numbers of HGVs as vulnerable road users are likely to have a low capacity to adapt to any impacts. As such the receptors in the study area on the L3851 and the R426 will have a **moderate sensitivity.**

The construction period is temporary and the highest numbers of HGVs will be limited to the peak period of the construction phase and so the impacts will have a **low magnitude**.

The overall effect on vulnerable road users is therefore considered to be **minor and not significant** in terms of the EIA regulations.

Effects on Dust and Dirt

The movement of construction traffic would have the potential to bring dust, dirt and other detritus onto the highway. Sensitive receptors within the study area include some residential properties along the L3851 and R426, but mostly along the R426 at Timahoe. These residential receptors may experience dust and dirt and as such, due to the low tolerance to accommodate the effects from dust and dirt, the **sensitivity is low**.

HGVs are likely to create the greatest impact in terms of dust and dirt. HGV traffic will increase above the existing levels during the construction phase. Despite this, the proposed development is relatively remote from the public highway, and would be accessed via separate access tracks, reducing the risk of dust and dirt being transported onto the public roads. In addition, the impacts would be temporary and so the **magnitude of impact is low**.

The increase in HGVs during construction has the potential to result in effects which are assessed as **minor and not significant** in terms of the EIA Regulation.

Impact Cause by Movement of Abnormal Loads

The turbine delivery route review for abnormal loads is provided in Technical Appendix 12.1 found in Volume III of this EIAR. The assessments undertaken for the transportation of the AILs has demonstrated a feasible route coming direct from the Dublin Port. The route is considered suitable for such movements, subject to localised temporary works at junctions and pinch points to facilitate movements. The route would pass all properties from the port to the Site, and so is considered to have **moderate sensitivity**.

Any modifications to existing road layouts would be confirmed through a trial run and further surveys, and any modifications or works required to accommodate abnormal loads would be discussed with Laois County and TII as the Roads Authorities and the necessary consents and permits would be obtained in advance of any works or delivery periods.

Transportation of the turbine equipment would lead to the following effects:

- the rolling closures of roads and footways causing temporary driver and pedestrian delay; and

- the perceived effect to pedestrians and vulnerable road users caused by the movement of large turbine components in close proximity to property and infrastructure.

The severity of these impacts is considered as follows:

- delays to drivers due to lane/road closures would be inevitable, though abnormal loads would travel in convoy as described above and movements would be timed so as to avoid the peak hours. Abnormal load movements occurring outside of the peak hours would have a temporary minor adverse effect; and
- the perceived effect to residents is subjective and it is likely that the transport of abnormal loads close to properties could lead to local objection, stress and anxiety. Residential properties/sensitive receptors within the study area include the Timahoe on the R426.

It is also important to note that the abnormal load movements would occur over a short period of time.

Each wind turbine consists of seven component parts: three blades, three tower sections and the nacelle (motor). Other loads would be associated with the delivery of the hub, cranes and drilling rigs, which would not be considered to be AILs, they however would be delivered at a similar time. These movements would be on articulated low loaders and would be moved under suitable traffic management procedures, including the provision of banksmen and appropriate warning signage.

There may be the potential to group the turbine component deliveries into a number of small convoys. This would allow the deliveries to occur over a reduced number of days, while only slightly increasing the impact on those days.

Turbine deliveries would be undertaken in consultation with the relevant roads authorities and Garda Síochána and could include movements during the night which would reduce effects on road users at busier daytime periods. Deliveries are also usually scheduled to avoid peak times of the day and school opening/closing times.

There would be an unavoidable **moderate magnitude** impact associated with the delivery of turbine components, however with ongoing community liaison and suitable public awareness and the proposed grouping of component deliveries, the significance of effect would be **moderate and significant** with all impacts limited to the turbine delivery days.

12.6.2 Potential Effects – Decommissioning

The traffic generation during the decommissioning period will be significantly less than that which has been assessed for the construction phase, and so the impacts associated with decommissioning will be reduced from that already assessed. Any effects would be **low and not significant**.

12.6.3 Mitigation Measures

Wind Farm and TDR

A full and detailed CTMP has been prepared (Technical Appendix 12.3) to outline the mitigation measures that would be suitable to apply during the construction phase prior to the commencement of the construction and during the construction phase. A summary of measures is provided below:

- Turbine delivery management - prior to the movement of abnormal loads, extensive public awareness is required to allow residents to plan and time their journeys to avoid disruption. In line with the turbine manufacture's requirements, the haulage contractor

shall remain responsible for obtaining all necessary permits from the relevant road and bridge authorities along the access route. The movement of abnormal loads would be timed to avoid periods of heavy traffic flow to minimise disruption to the public. The appropriate permits will be secured and escorts appointed.

- Contractors – all contractors will have experience in wind farm construction projects and will be required to supply details of method statements which incorporate mitigation measures. A Principal Contractor and Environmental Clerk of Works will be appointed;
- Signage – Warning signs will be provided throughout the site. Any on-street signs will be in accordance with requirements of the 'Traffic Signs Manual' and in consultation with the Co.Laois as the Roads Authority;
- Site traffic - traffic visiting the Site would be required to report to the gatehouse to obtain clear instructions. Inductions would be completed, vehicle permits would be issued, and the site rules and emergency procedure would be explained. Heavy site traffic would be equipped with audible reversing warning with additional visual aids e.g., reversing cameras, mirrors utilised on all plant. Drivers would ensure that all loads are covered fully to limit the loss of material in transit.
- On site safety - personnel entering the working area would wear hi-visibility vest or jacket, head protection, safety footwear, eye protection and gloves at all times when out with the vehicle. All workers will be made aware that they have a responsibility for the safety of themselves and others. In the event of an emergency, right of way to all emergency services would be given at all times. Emergency services and control of access would be carried out in compliance with the site emergency procedures.
- Parking - parking areas located at the site construction compound would have safe and secure barriers to segregate all personnel from site plant and vehicle routes. No parking whatsoever would be allowed on public roads; all cars that are directed to the site parking area would be required to reverse park to comply with the Principal Contractors requirements.
- Vehicle cleaning – a wheel and body wash would be operated within the site to ensure materials from the Site are not transferred onto the highway, and road cleaning would take place when required to remove any deposits that are carried from the Site. It is anticipated that any road cleaning activities would remain local to the site access.

The Construction Environmental Management Plan (CEMP) is a key construction contract document, which will ensure that all necessary mitigation measures are implemented. The CEMP is found in **Technical Appendix 12.3**. The CEMP would be revised and updated and would be used by the contractor to ensure that the appropriate environmental management is implemented throughout the construction phase, to include mitigation measures. The CEMP includes information on general construction good practice, including waste management, dust mitigation, vehicle washing, vehicle storage and maintenance, noise management, and on-site vehicle movement. The measures described above would serve to mitigate the predicted effects, as set out in **Table 12-21**.

Table 12-21 Summary of Predicted Effects (Pre and Post-Mitigation)

Summary of Effect	Receptor	Sensitivity	Magnitude	Rationale	Significance	Additional Mitigation	Residual Effects
Road safety	Road users in study area	High	Low	The development will increase traffic but the levels would remain within design capacity and impacts will be short lived.	Significant	Traffic Management Plan for the movement of abnormal loads. Construction Traffic Management Plan (CTMP) included as Technical Appendix 12-3.. Trial Run for abnormal loads prior to commencement of construction. Provision of information to local residents and users of amenities, to involve the community in the safe operation of the Traffic Management Plan (Technical Appendix 12-3) and to alleviate stress and anxiety. Good construction practices including wheel wash and careful loading.	Not significant
Driver severance & delay	Drivers on roads in study area	Low	Negligible	Expected to be some tolerance to delays and impacts will be short lived.	Not significant		Not significant
Community severance & delay	Road users in study area (R426 Timahoe)	Negligible	Low	There are few locations where severance may occur so there is considered to be tolerance to the increase in traffic.	Not significant		Not significant
Noise & vibration	Residential properties	Moderate	Negligible	The traffic increase is short lived and so the effects will be temporary.	Not significant		Not significant
Vulnerable road users	Pedestrians/cyclist/ motorcyclists	Moderate	Low	The construction period is temporary and the numbers of vulnerable road users is low.	Not significant		Not significant
Dust & dirt	Residential properties	Low	Low	The construction period is temporary and the construction site is remote from the public roads.	Not significant		Not significant

Summary of Effect	Receptor	Sensitivity	Magnitude	Rationale	Significance	Additional Mitigation	Residual Effects
Hazardous & dangerous loads	Road users in study area	Moderate	Moderate	The transport of abnormal loads will impact road users and residents.	Significant		Not significant

Residual effects are those that would still occur after mitigation measures have been incorporated into the scheme. Potential residual effects are most likely to be those associated with delivery of the abnormal loads and resultant temporary road closures. As summarised in Table 12-22 Cumulative Development Sites, those impacts identified as significant will be mitigated through the proposed measures, with the impacts managed to ensure that they are not significant.

12.7 Cumulative Impacts

Any major developments in the area or along the access route that may arise at the same time as the construction of the Proposed Development could result in a cumulative increase in traffic flows on the routes. In this regard, **Table 12-22** identifies other development proposals that have been included within the cumulative assessment as taken from Section 3.12 of Chapter 3 of this EIAR.

Table 12-22 provides a summary of the developments likely to result in cumulative impacts when vehicle trip generation numbers combine on roads within the Coolglass study area. All available information is specified in the table. This cumulative assessment factors all design permutations of the dimensions set out in Table 3.1 of Chapter 3 of this EIAR.

Table 12-22 Cumulative Development Sites

Development	Status	Distance from Site	Direction from Site	R426 Daily Traffic (Two-way)	Notes
Michael Johnson	Granted	4km	East	n/a	15,000 tonnes per year, approximately 750 HGVs per year (assume 20t loads). Assumed not to use R426 due to location.
Bilboa Wind Farm – cable	Granted	17km	East	n/a	Traffic predicted on the N78, with no traffic on the R426.
Bord Na Mona Powergen Ltd	Granted	20km	Northwest	n/a	The R426 is not included within the study area for the assessment as no traffic predicted to travel on the R426.
Spink Quarry	Granted	9.5km	Southwest	No traffic predicted to use the R426	The R426 is not included within the study area for the assessment as no traffic predicted to travel on the R426. The application is for continued operations, and so no new traffic movements.
Pine Wood Wind Farm	Granted	13.5km	Southwest	No traffic predicted to use R426.	The Transport & Access Chapter does not predict vehicle trips on particular routes.
Pine Wood Substation	Granted	13.5km	Southwest	No traffic predicted to use R426.	Chapter 13 Transport and Access Chapter. No traffic on R426.

From **Table 12-22** it can be seen that the cumulative developments are not anticipated to add any development or construction generated traffic to the roads within the study area, in particular the R426. Therefore, the assessment does not include any further assessment of the potential cumulative impacts.

12.8 Conclusion

Taking account of all the potential effects that are likely to arise and the assessment having tested the worst-case scenario expected, it is considered that the Proposed Development would not lead to a significant adverse effect due to traffic impacts.

The assessment concludes that the impacts during the construction, operational and decommissioning phase will not be significant; the review of the worst-case scenario as set out in section 12.3.3, the temporary nature of the construction and decommissioning phases and the application of mitigation measures will further reduce any impacts in traffic and transportation terms.

12.9 References

Laois County Council Development Plan 2017 – 2023, January 2022 https://laois.ie/departments/planning/review-of-laois-county-development-plan-2017-2023-2/;

Laois County Council Portlaoise Local Area Plan 2018 – 2024, available https://laois.ie/departments/planning/development-plans/portlaoise-local-area-plan-2018-2024/;

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Institute of Environmental Management and Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA, 1993). Available https://gat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/filer_public/dc/df/dcdfa287-b475-4fbb-bd4e-a1e96b06be5d/cd71-guideline-for-the-environmental-assessment-of-road-traffic-institute-of-environmental.pdf;

Design Manual for Roads and Bridges, Highways Agency (1997), now Standards for Highways. Available https://www.standardsforhighways.co.uk/dmrb;

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654000
656000
658000
688000
686000
02036.00787.0117.0 Location of Traffic Counts

T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13

N

LEGEND

- Proposed Development Site Boundary
- Proposed Turbine Layout
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Hardstanding
- Proposed Access Track
- Proposed Met Mast Hardstanding
- Proposed Turbine Delivery Route
- Traffic Monitoring Location

Portlaoise
263 m
317 m
Athy
Dinin River
N78
R417
CO. KILKENNY

0 0.5 1
Kilometres

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LOCATION OF TRAFFIC COUNTS

FIGURE 12-1

Scale 1:20,000 @ A3

Date JUNE 2023

654000 656000 658000

688000 686000

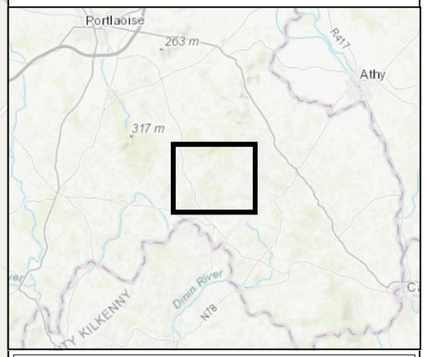
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13

AP1 AP2

N

LEGEND

- Proposed Development Site Boundary
- Proposed Turbine Layout
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Hardstanding
- Proposed Access Track
- Proposed Met Mast Hardstanding
- Proposed Access Point
- Proposed Turbine Delivery Route



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ACCESS LOCATIONS

FIGURE 12-4

Scale 1:20,000 @ A3

Date JUNE 2023

0 0.5 1
Kilometres

02036.00787.0118.0 Access Locations

660000 680000 700000 720000

740000 720000 700000

N

TDR Node 1
TDR Node 2
TDR Node 3
TDR Node 4
TDR Node 5
TDR Node 6
TDR Node 7
TDR Node 8
TDR Node 9
TDR Node 10
TDR Node 11
TDR Node 12
TDR Node 13

R445 R425 R426 M50 M7 M6 M4 M9 N77 N78 N80 N81

Kinnegad Enfield Kilcock Maynooth Leixlip Lucan Dunboyne Swords Malahide Blanchardstown Dublin Dublin Airport Phoenix Park Celbridge Clondalkin Blackrock Dún Laoghaire Dundrum Tallaght Edenderry Timahoe Bog Prosperous Clane Sallins Naas Kilbride Army Camp Blessington Poulaphouca Reservoir Ballymore Eustace Kilcullen Newbridge Kildare Monasterevin Portarlington Clonsast Bog Derryounce Bog Derrylea Bog Garryinch Bog Mountmellick Portlaoise Stradbally Athy Baltinglass Castledermot Rathdrum Abbeyleix

South Dublin Bay Special Area of Conservation

0 10 20
Kilometres

LEGEND

- Proposed Development Site Boundary
- Dublin Port
- Proposed Turbine Delivery Route Node
- Proposed Turbine Delivery Route

COUNTY MEATH COUNTY WESTMEATH Mullingar Dublin COUNTY DUBLIN Tullamore Naas COUNTY KILDARE 849 m WICKLOW MOUNTAINS 527 m Portlaoise 925 m COUNTY LAOIS COUNTY WICKLOW Carlow COUNTY CARLOW

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PROPOSED TURBINE DELIVERY ROUTE OVERVIEW

FIGURE 12-5-a

Scale 1:250,000 @ A3

Date JUNE 2023

02036.00787.0149.0 TDR Overview

650750

651000

700250

N

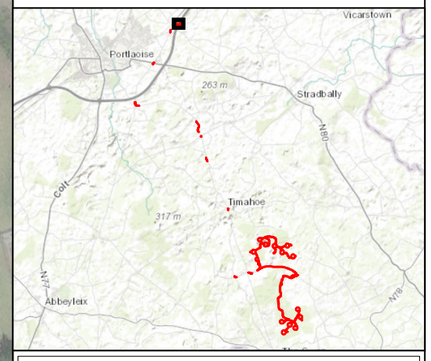
0 50 100

Metres

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODES 1 AND 2

FIGURE 12-5-b

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

650500

650750

700000

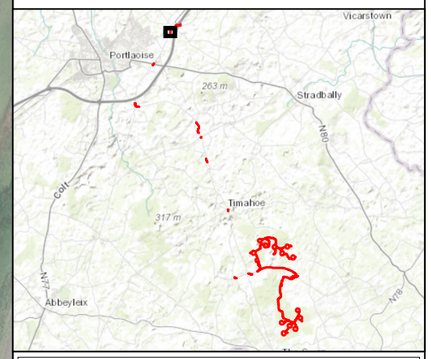
699750

N

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODE 3

FIGURE 12-5-c

Scale 1:1,500 @ A3

Date JUNE 2023

0 50 100

Metres

02036.00787.0119.0 Turbine Delivery Route

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community.Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

649500

649750

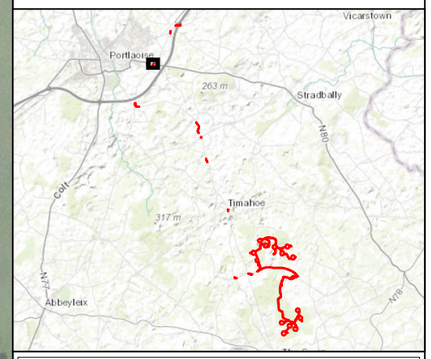
698250

N

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



0 50 100

Metres

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PROPOSED TURBINE DELIVERY ROUTE NODE 4

FIGURE 12-5-d

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community.Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

648750

649000

696000

N

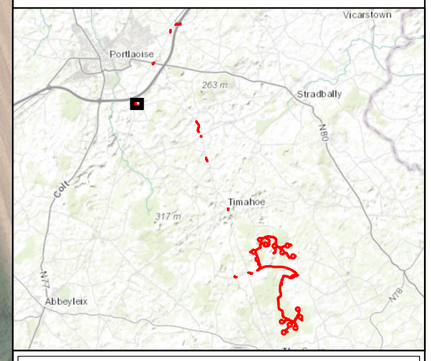
0 50 100

Metres

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODE 5

FIGURE 12-5-e

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

652000

652250

695000

694750

N

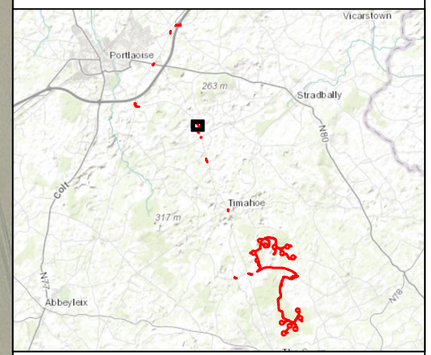
0 50 100

Metres

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODES 6 AND 7

FIGURE 12-5-f

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

652000

652250

694500

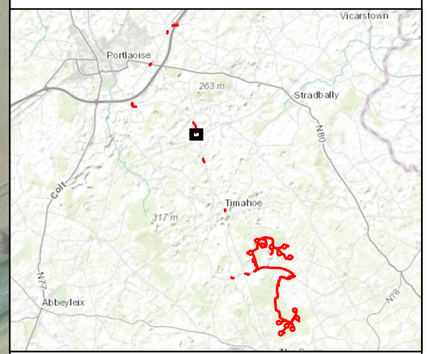
694250

N

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



0 50 100

Metres

02036.00787.0119.0 Turbine Delivery Route

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ASSESSMENT REPORT

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PROPOSED TURBINE DELIVERY ROUTE NODES 6 AND 7

FIGURE 12-5-g

Scale 1:1,500 @ A3

Date JUNE 2023

652500

652750

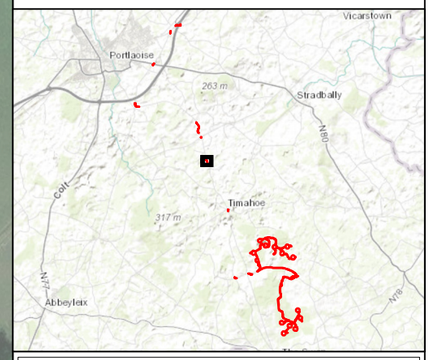
693000

N

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



0 50 100

Metres

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ASSESSMENT REPORT

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PROPOSED TURBINE DELIVERY ROUTE NODE 8

FIGURE 12-5-h

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community.Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

653500

653750

690250

N

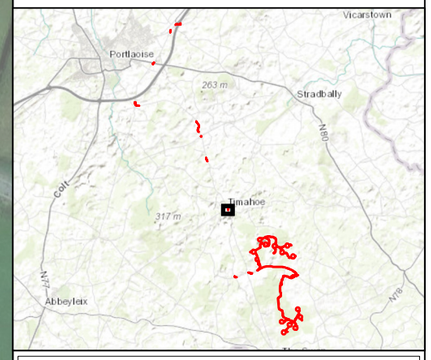
0 50 100

Metres

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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ASSESSMENT REPORT

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PROPOSED TURBINE DELIVERY ROUTE NODE 9

FIGURE 12-5-i

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

654000

654250

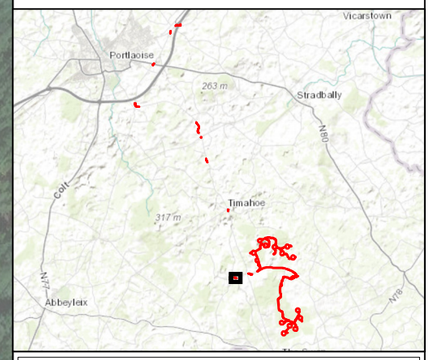
686750

N

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODE 10

FIGURE 12-5-j

Scale 1:1,500 @ A3

Date JUNE 2023

0 50 100

Metres

i86500

02036.00787.0119.0 Turbine Delivery Route

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community.Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

654750

655000

687000

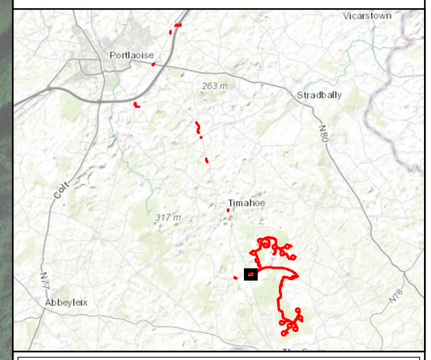
686750

N

LEGEND

Proposed Development Site Boundary

Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODE 11

FIGURE 12-5-k

Scale 1:1,500 @ A3

Date JUNE 2023

0 50 100

Metres

02036.00787.0119.0 Turbine Delivery Route

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community.Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

655250

655500

687250

687000

N

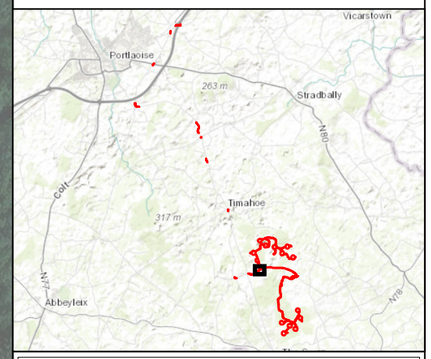
AP1

0 50 100

Metres

LEGEND

- Proposed Development Site Boundary
- Proposed Access Track
- Proposed Access Point
- Proposed Turbine Delivery Route



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PROPOSED TURBINE DELIVERY ROUTE NODE 12

FIGURE 12-5-I

Scale	Date
1:1,500 @ A3	JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

657250

657500

686750

N

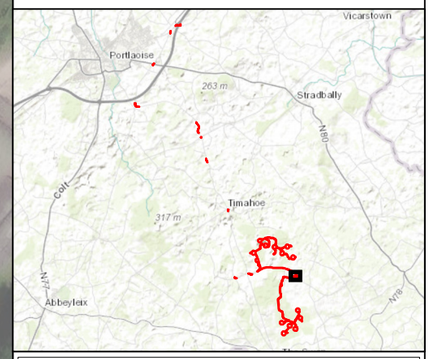
AP2

0 50 100

Metres

LEGEND

- Proposed Development Site Boundary
- Proposed Borrow Pit
- Proposed Access Track
- Proposed Access Point
- Proposed Turbine Delivery Route



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ASSESSMENT REPORT

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PROPOSED TURBINE DELIVERY ROUTE NODE 13

FIGURE 12-5-m

Scale 1:1,500 @ A3

Date JUNE 2023

02036.00787.0119.0 Turbine Delivery Route

650000

655000

660000

690000

685000

02036.00787.0151.0 Grid Connection Route

N

Option 2

Option 1

T1

T2

T3

T4

T5

T6

T7

T8

T9

T10

T11

T12

T13

AP1

AP2

0 0.5 1

Kilometres

LEGEND

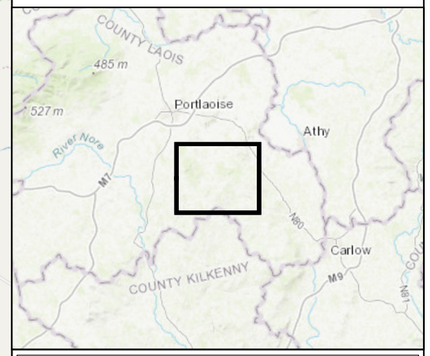
Proposed Development Site Boundary

Proposed Turbine Layout

Proposed Cable Routes to be Assessed (Separate Planning Application)

Proposed Access Point

Existing High Voltage Transmission Line



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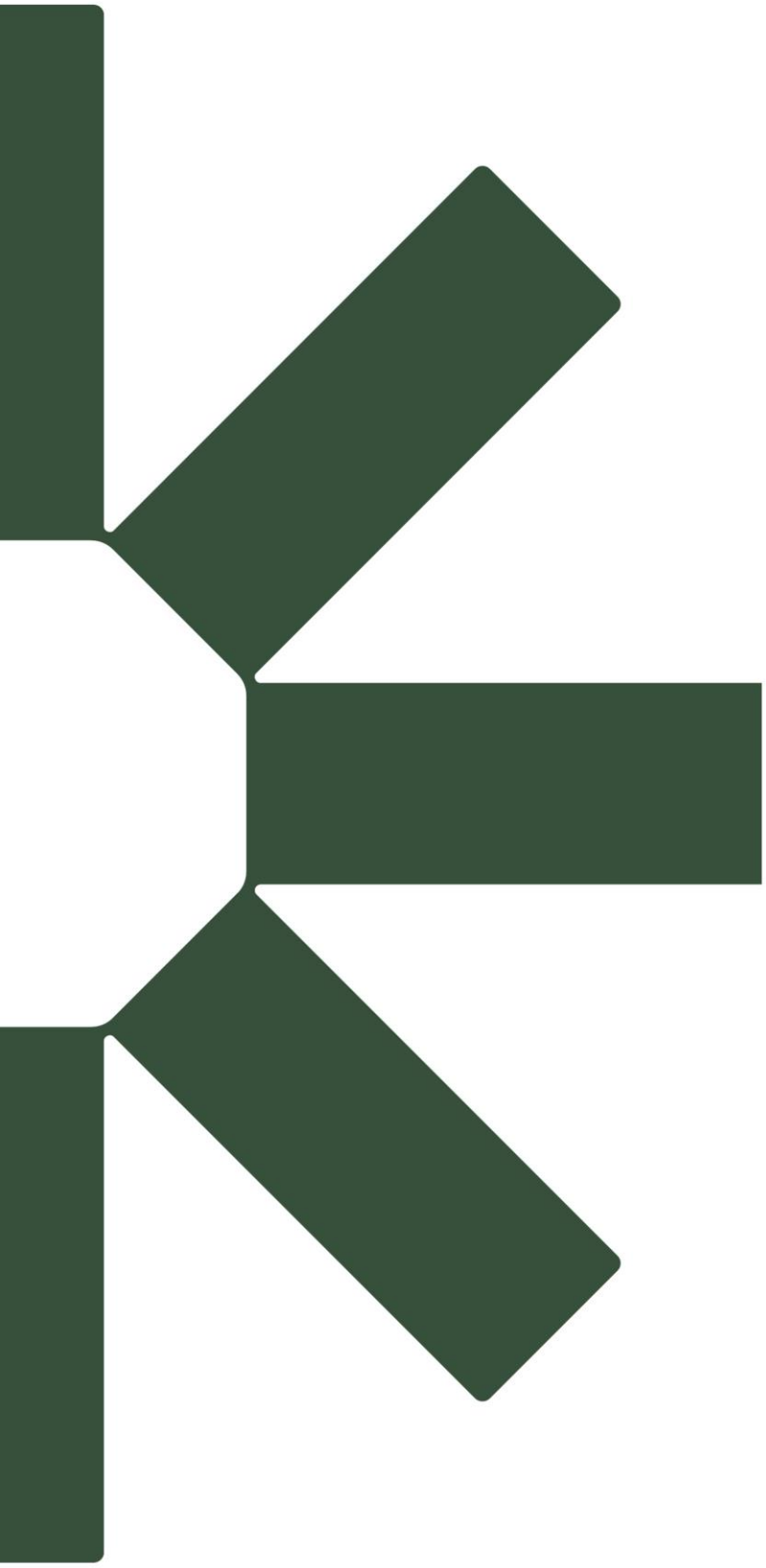
CABLE ROUTES

FIGURE 12-6

Scale 1:40,000 @ A3

Date JUNE 2023



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