



Chapter 16 Material Assets – Traffic and Transportation

Ballinlee Wind Farm

Ballinlee Green Energy Ltd.

September 2025

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Appendices

Appendix 16A – Traffic Management Plan (TMP)

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16. Material Assets – Traffic and Transportation

16.1 Introduction

This chapter considers the potential effects on traffic and transport material assets arising from the proposed development. A full description of the proposed development, development lands and all associated project elements is provided in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR. The nature and probability of effects on traffic and transport arising from the overall project have been assessed.

16.1.1 Competency of Assessor

This chapter assessment has been prepared by Seamus Quigley BE CEng MIEI MCIHT of Malachy Walsh and Partners (MWP). Seamus has 34 years' experience in transport planning and traffic engineering projects, including EIS/EIAR traffic and transportation chapters, traffic impact assessments, traffic management studies, mobility management plans, traffic modelling studies, feasibility studies and road safety audits. Seamus is a Chartered Engineer with Engineers Ireland and is also a member of the Chartered Institution of Highways and Transportation. Seamus joined MWP in 2007, having spent over sixteen years with Atkins.

16.2 Methodology

16.2.1 Legislation, Policy and Guidance References

This chapter has been prepared to align with best practice, legislation, policy and guidance as follows:

- Limerick City and County Council's Limerick Development Plan 2022-2028;
- Limerick City and County Council's Croom Local Area Plan 2020-2026;
- The Transport Infrastructure Ireland (TII) Traffic and Transport Assessment (TTA) Guidelines PE-PDV-02045 May 2014;
- TII's Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections PE-PAG-02017 October 2021;
- TII's Rural Road Link Design DN-GEO-03031;
- The UK Traffic Capacity of Urban Roads TA79/99;
- The Environmental Protection Agency Guidelines on the information to be contained in Environmental Impact Assessment Reports May 2022 (EPA EIAR Guidelines); and
- European Commission, Guidance on the preparation of the EIAR, 2017.

16.2.2 Study Area

A full description of the proposed development is included in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR.

The study area for this traffic and transport chapter assessment encompasses the road and transport network, likely to be affected by the proposed development. This includes the road and transport network in the vicinity of

the wind farm and substation site, grid connection route site, along the turbine delivery route and along the construction haul route. The roads assessed are included in **Section 16.3.1** and **Table 16-1**.

16.2.3 Scope of Assessment

The scope of the assessment in this chapter includes the following:

- Existing and expected future road and transport network;
- Existing and predicted future baseline traffic volumes on the surrounding local road network;
- Predicted proposed development construction, operational and decommissioning traffic volumes and likely impacts; and
- Proposed mitigation measures.

16.2.3.1 Assessment Criteria

Existing baseline traffic volumes on the surrounding local road network have been established based on on-site traffic surveys by MWP, and automatic traffic counter data from TII's online database for national roads.

The significance and duration of predicted impacts have been defined in accordance with the EPA EIAR Guidelines.

16.2.4 Statement on Limitations and Difficulties Encountered

The site inspection and road network inventory for the preparation of this chapter assessment was carried out during January 2025, which was prior to the introduction of the new, lower 80km/hour speed limit on Regional Roads and 60 km/hour speed limits on rural Local Roads on the 7th February 2025 by the Department of Transport. The lowering of the speed limit on the local roads does not affect the assessment approach.

There were no limitations and difficulties encountered during the preparation of this Assessment.

16.3 Baseline Environment

16.3.1 Existing Roads and Transport Network

The proposed wind farm development, substation, temporary access track at Tullovin and grid connection locations are shown in **Figure 16-1**. The site inspection and road network inventory for the preparation of this chapter assessment was carried out during January 2025, which was prior to the introduction of new reduced speed limits on Regional and Local roads by the Department of Transport.

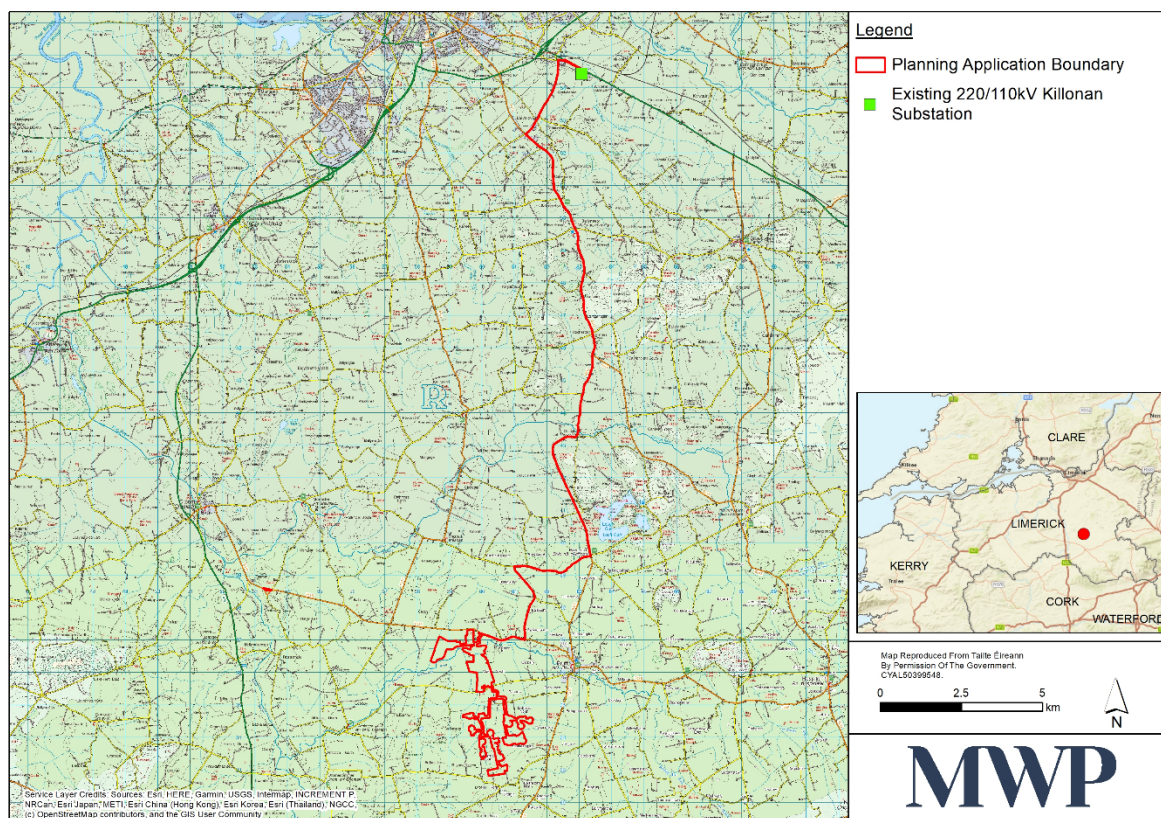


Figure 16-1: Proposed Development Location Map

The proposed wind farm development and substation site is located on the south side of the R516 Regional Road, between Croom and Bruff, approximately 11km east of the N20 National Primary Road at Croom. The proposed development grid connection extends from the site on the R516 to the existing Killonan Substation on the south side of the N24 National Primary Road on the southeast side of Limerick.

The R516 rural road between Croom and Bruff has typical road carriageway widths of 4.9 metres to 5.3 metres, with local reduced widths of 4.6 metres. The R516 regional road has centreline and hard strip road markings, and an 80 km/hour rural speed limit. The R516 has an alternating one-way traffic yield system at its River Camoge bridge, located circa 1.5km east of Croom.

At Croom, the R516 is located within its 50 km/hour urban speed limit zone and has a raised table surface priority junction on High Street with Main Street, with a Zebra crossing on High Street at the junction. West of its Main Street junction, the R516 along High Street has defined 2.0 metre wide on street parking along both sides, with a 6.1 metre road traffic carriageway. On the west side of Croom, the R516 forms roundabout junctions with the slip roads access to/from the N20 National Primary Road, on each side of its R516 overbridge.

At Bruff, the R516 is located within its 50 km/hour urban speed limit zone and forms a priority junction with the R512 Regional Road on the north side of the town centre. The R516 extends south along Main Street, its priority junction with the R512, which includes a raised surface table with Zebra crossings. Main Street includes defined 2.0 metre wide on street parking along both sides, with a 6.1 metre road traffic carriageway. Bus Éireann bus stops are provided on both sides of the R516, immediately on the north side of the town centre. A Pelican crossing is provided on the R516 on Main Street.

The proposed wind farm development and substation site access point locations are shown in **Figure 16-2**.

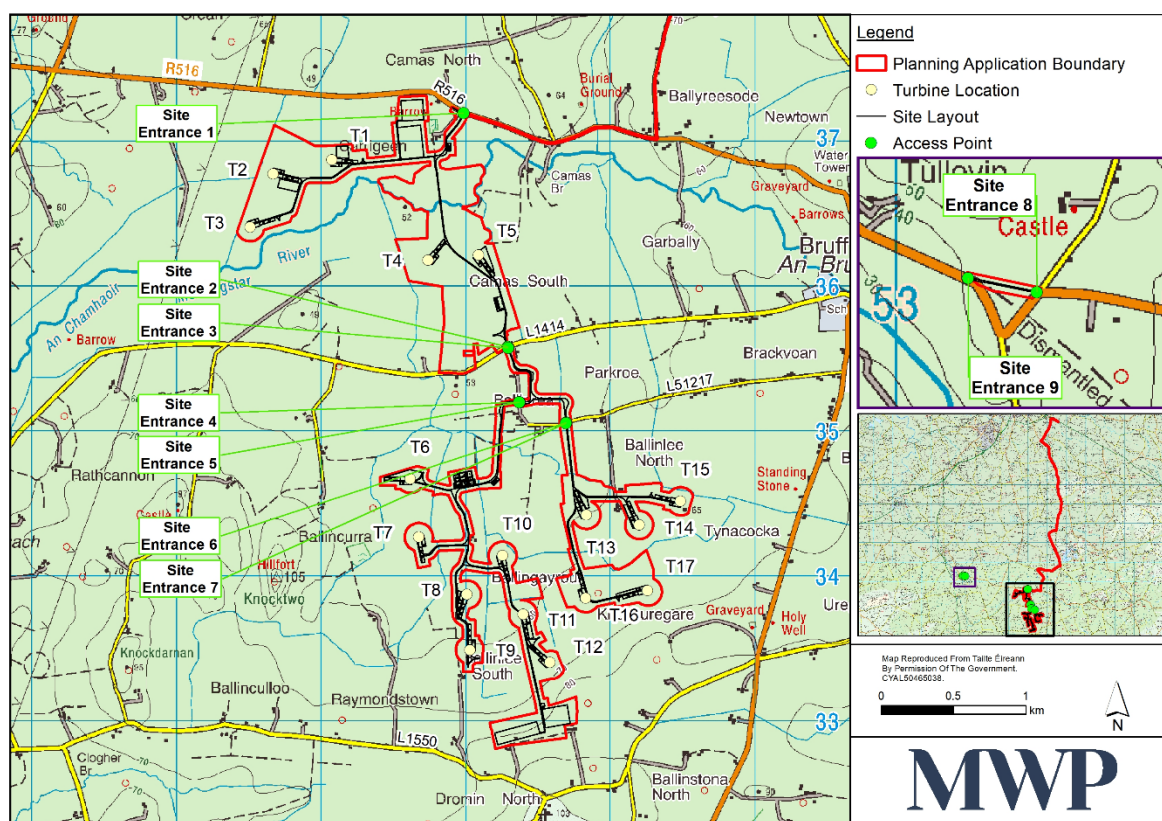


Figure 16-2: Proposed Site Access Points Location Map

The R512 has a priority junction with the L1414 Local Road on the south side of Bruff town centre, within its 50 km/hour urban speed limit zone, with Zebra crossings. Scoil Dean Cussen is located on the southwest side of the junction, with defined school bus parking. Footways are provided along the west side of the R512 and the south side of the L1414. A traffic calming speed ramp is provided on the R512 adjacent to the school's south boundary and the Zebra crossing on the R512 at the school is a raised table surface.

In proximity to Bruff, the L1414 has an urban road carriageway width of 7.0 metres with a south side footway. West of Bruff, the L1414 has a rural road carriageway width of 4.3 metres with no road markings, within its rural speed limit of 60 km/hour.

South of Bruff, the R512 has a priority junction with the cul-de-sac L51217 Local Road on its west side, within the Bruff 60 km/hour suburban speed limit zone. The R512 has a suburban road carriageway width of 6.6 metres with a grass verge and footway along its west side. The east section of the L51217 has a road carriageway width of 4.0 metres with no road markings, and the west section has a 3.0 metre wide road carriageway.

South of Bruff, the R512 has a rural road carriageway width of 7.0 metres, within its 80 km/hour rural speed limit zone and forms a priority junction on its west side with the L1550 Local Road. The L1550 has a rural road carriageway width of 3.8 metres with no road markings.

The existing roads along the proposed development grid connection are shown in the map provided in **Figure 16-3**. The proposed grid connection route extends along the R516 Regional Road; the L8012, L8011 and L1412 Local Roads; R512 Regional Road; the L1170 and L1171 Local Roads and the N24 National Primary Road. The grid connection extends north from the proposed windfarm and substation site through Holycross, Grange and Ballyneety to the existing 220/110Kv Killonan substation.

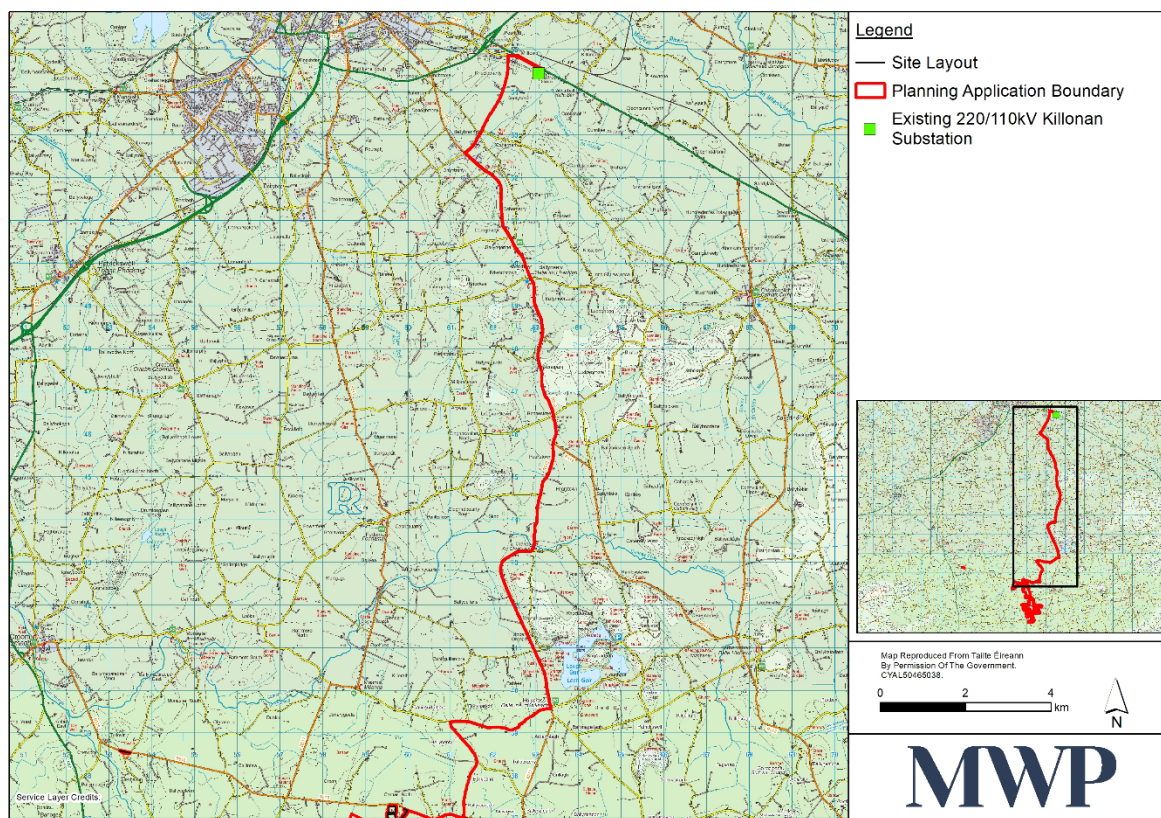


Figure 16-3: Proposed Development Grid Connection Roads Map

The L8012 Local Road has a typical rural road carriageway width of 3.7 metres, with no road markings and varying grass verges. The L8012 links with the L8011 Local Road at its north end. The L8011 has a rural road carriageway width of 4.2 metres with no road markings.

The L8012, L8011 and L1412 rural roads are located within the 60 km/hour rural speed limit zone. The L8011 links at its north end with the L1412, which has a rural road carriageway width of 4.6 metres, with varying width grass verges and no road marking, east of its L8011 junction.

The L1412 links with the R512 at Holycross, within its suburban speed limit zone of 60 km/hour. The R512 at Holycross has a 6.9 metre road carriageway width.

North of Holycross, the R512 regional road has a typical road carriageway width of 6.0 metres and an 80 km/hour rural speed limit, with varying width grass verges. The rural speed limit on the R512 is maintained at Grange.

A 50 km/hour urban speed limit is provided at Ballyneety, where the R512 has an urban road carriageway width of 7.0 metres, with an east side footway. A west side footway is also provided, locally, along the R512 within the Ballyneety urban centre, together with a Zebra crossing.

North of Ballyneety, the R512 regional road has a typical road carriageway width of 6.1 metres with hard strips, grass verges and an 80 km/hour rural speed limit.

The R512 has a priority junction with the L1170 within the 60 km/hour suburban speed limit on the south east environs of Limerick; with a 6.1 metre wide suburban carriageway, hard strips and west side footway along the R512 in the vicinity of its L1170 junction.

The L1170 links the R512 with the L1171 at Old Ballysimon Road, at its north end; and has a posted three tonnes' vehicle restriction, 60 km/hour suburban speed limit and suburban road carriageway width of 6.0 metres.

East of its junction with the L1170, the L1171 has a suburban road carriageway width of 6.8 metres, a south side footway and 60 km/hour suburban speed limit. The L1171 forms a suburban roundabout junction, at its east end, with the N24, approximately 180 metres east of its L1170 priority junction.

The existing 220/110kV Killonan substation access is located on the south side of the N24, approximately 650 metres east of its L1171 roundabout junction, within the 100 km/hour national speed limit zone on the N24, which commences circa 200 metres east of the L1171 roundabout. Near Killonan substation, the N24 has a road carriageway width of 7.0 metres, with 0.5 metre wide hard strips and circa 3.2 metre wide grass verges.

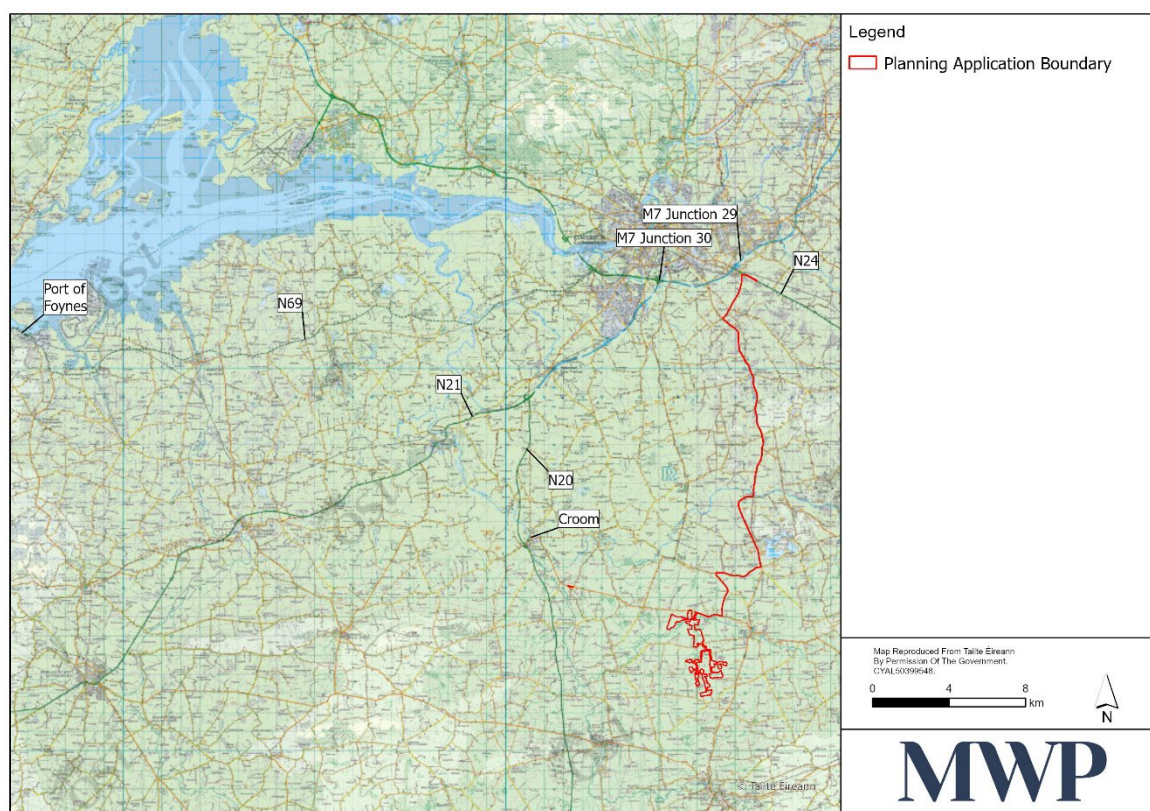


Figure 16-4: National Road Network Map

As shown in **Figure 16-4**, the N24 links with the M7 Limerick Southern Ring Road at the M7 Motorway Junction 29, which is located circa 1.4 kms west of the Killonan substation access. The N20 links with the N21 approximately 8.0 kms north and with the M20 Motorway. The M20 Motorway links with the M7/N18 Limerick Southern Ring Road circa 17.5 kms north of Croom, at M7 Junction 30. The M7/N18 Limerick Southern Ring Road links with the N69 at its N18 Junction 2 on the southwest of Limerick. The N69 links with Foynes Port in County Limerick.

Croom is served by the Bus Éireann number 320 public transport bus service; and Bruff, Grange and Ballyneety are served by the Bus Éireann number 329.

Croom is served by the Transport for Ireland (TFI) Local Link public transport bus service number 595; and Bruff is served by the TFI Local Link L7 service.

16.3.2 Existing Traffic Volumes

In accordance with best practice, the existing traffic volumes were determined as follows; On-site peak traffic hours' classified road traffic volumes were recorded by MWP on Wednesday 15th January 2025, on the existing local and regional public roads, in the vicinity of the proposed development site, including along the proposed underground grid connection route. The recorded peak traffic hour at each location occurred between the hours 4.00 p.m. to 6.00 p.m. The peak hour traffic volumes were factored based on TII's automatic traffic counter data, for the nearby N24 and N20, to establish typical Annual Average Daily Traffic (AADT) volumes for the latest full year, 2024, on the local road network. The equivalent TII automatic traffic counter data for the N24 and N20 are also provided. The existing baseline traffic volumes are provided in **Table 16-1**. These are total two-way vehicles at the road locations identified. The volumes of peak hour Heavy Goods Vehicles (HGVs) and the proportions (%) of AADT HGVs are also provided.

Table 16-1: Existing Traffic Volumes

Road Location	Total Vehicles (HGVs)	
	2025 PM Peak Hour	2024 AADT (% HGVs)
N20 north of Croom (TII counter 20202)	1,798 (33)	16,224 (5.5%)
N20 south of Croom (TII counter 1202)	1,035 (39)	11,535 (8.4%)
R516 at Croom	460 (9)	4,508 (2.1%)
R516 between Croom and Bruff	288 (6)	2,822 (2.2%)
R512 @ Bruff	454 (6)	4,744 (1.6%)
L1414 @ R512	76 (2)	794 (1.7%)
L51217 @ R512	27 (1)	282 (1.4%)
L1550 @ R512	52 (1)	543 (1.1%)
N24 @ Killonan (TII counter 20243)	1,668 (147)	17,441 (5.3%)
L1171 between N24 and L1170	668 (5)	6,981 (1.5%)
L1170 between L1171 and R512	366 (0)	3,825 (0.0%)
R512 south @ L1170	756 (8)	7,900 (2.1%)
L1412 between R512 and L8011	44 (1)	460 (2.2%)
L8011 between L1412 and L8012	34 (0)	355 (0.5%)
L8012 @ R516	22 (0)	230 (0.5%)

The TII Rural Road Link Design DN-GEO-03031 rural road link capacities for road carriageway widths of 6.0 metres and 7.0 metres, respectively, are provided in **Table 16-2**. The TII rural road link capacities are an AADT capacity at Level of Service (LOS) D¹. TII does not provide rural road link capacities for rural roads with road carriageway widths of less than 6.0 metres.

¹ An LOS of D indicates that the junction or road is approaching capacity, with noticeable congestion and delays, but still generally operating within acceptable limits

Table 16-2: TII Rural Road Link Capacities

TII Rural Road Link		
Type	Carriageway Width (m)	AADT Capacity (Vehicles)
Type 3 Single	6.0	5,000
Type 2 Single	7.0	8,600

The estimated existing rural road link AADT volume/capacity ratios for the R516 and R512 rural roads in the vicinity of the proposed development, including along the proposed underground grid connection route and along the proposed turbine delivery route, are provided in **Table 16-3**, based on the TII Rural Road Link Design, for the latest full year, 2024.

Table 16-3: Estimated TII Regional Rural Road Link 2024 AADT Volume/Capacity Ratios

Rural Road with Rural Speed Limit	2024 AADT Vehicles	AADT Capacity (Vehicles) @ LOS D	AADT Volume/Capacity Ratio
R516 between Croom and Bruff	2,822	< 5,000	>57%
R512 north and south of Bruff	4,744	>5,000 <8,600	<95% >55%

The R516, between Croom and Bruff, is operating within its estimated rural road link AADT capacity, with a 2024 volume/capacity ratio of higher than circa 57%. The R512, north and south of Bruff, is operating within its estimated rural road link AADT capacity range, with a 2024 volume/capacity ratio of higher than 55% and less than 95%.

The urban road link capacity of the R516 at Croom and R512 at Bruff, within their 50 km/hour urban speed limit zones; and the suburban road link capacities of the L1170 and L1171 within their 60 km/hour suburban speed limit zones, estimated based on the Traffic Capacity of Urban Roads TA79/99, are provided in **Table 16-4**. The capacity has been assessed as per direction based on a 60/40 directional split.

Table 16-4: Estimated Urban and Suburban Road Link Capacity

Urban/Suburban Road	Urban/Suburban Road Link			
	Type	Lanes	Carriageway Width (m)	Capacity/Hour/Direction (Vehicles)
R516 @ Croom	UAP4	2	6.1	750
R512 @ Bruff	UAP4	2	6.1	750
L1170 @ 60 km/hour zone	UAP2	2	6.0	1,020
L1171 @ 60 km/hour zone	UAP2	2	6.8	1,260

The estimated existing urban and suburban road link peak hour volume/capacity ratios for the R516 at Croom, R512 at Bruff, the L1170 and the L1171, are provided in **Table 16-5**, based on the Traffic Capacity of Urban Roads TA 79/99.

Table 16-5: Estimated Existing Urban and Suburban Road Link 2025 Peak Hour Volume/Capacity Ratios

Urban/Suburban Road	Highest Direction Peak Hour Vehicles	Capacity/Hour/ Direction (Vehicles)	Volume/Capacity Ratio
R516 @ Croom	276	750	37%
R512 @ Bruff	273	750	37%
L1170 @ 60 km/hour zone	220	1,020	22%
L1171 @ 60 km/hour zone	401	1,260	32%

The urban R516 at Croom and R512 at Bruff, within their 50 km/hour urban speed limit zones, are operating well within their estimated urban road link capacities, with highest volume/capacity ratios during the peak hour of 37% and 37%, respectively.

The suburban L1170 and L1171, within their 60 km/hour suburban speed limit zones, are operating well within their estimated suburban road link capacities, with highest volume/capacity ratios during the peak hour of 22% and 32%, respectively.

16.3.3 Future Conditions

The roads and transportation objectives and policies of Limerick City and County Council are set out in their Limerick Development Plan 2022-2028, including Chapter 7: Sustainable Mobility and Transport; and the Croom Local Area Plan 2020-2026.

Limerick City and County Council's Strategic Roads Infrastructure Objectives include the N/M20 Cork to Limerick Project and the Foynes to Limerick (including Adare Bypass) Road.

It is a policy of the Council to safeguard the carrying capacity and safety of the non-national road network throughout Limerick.

The Development Plan identifies a Strategic Regional Road Network that includes the R512. It is a policy of the Council to protect the investment in the Strategic Regional Road Network and maintain and improve road safety and capacity. The R516 is not included in the Development Plan Strategic Regional Road Network.

The Council's Development Plan Bruff Settlement Objectives include the improvement of the public realm in the village, especially along the Main Street; the preparation of a Traffic Management Plan for the Main Street; and to explore the potential for the development of a distributor road in Bruff.

The Council's Croom Local Area Plan 2020-2026 key developments include to rationalise the parking along Main Street and carry out junction improvement works between Main Street and High Street and the junction of Main Street and the L1408; and to promote the use of the Market Square as a Civic Plaza and gathering space.

Subject to planning permission, it is envisaged that work would commence at the proposed development site during Q1 2028, with a construction duration of approximately 24 months, followed by six months of commissioning. Accordingly, the proposed development is scheduled to be fully complete and operational during Q3 2030.

The TII Traffic and Transport Assessment Guidelines recommend that the opening year of a development proposal and plan years, five and 15 years after the opening year, should be considered for assessing a development proposal. In this case, the opening year is 2030 and the plan years are 2035 and 2045. The peak construction and

commissioning year is 2029, which will align with concrete deliveries for turbine foundations and with turbine deliveries.

In order to establish future baseline traffic volumes, TII in their Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections October 2021 envisage that car and light vehicle volumes on Limerick national roads would increase by an annual factor of 1.0215 during the period to 2030, and by a factor of 1.0323 for heavy vehicles, based on their central growth rates. The equivalent factors for the periods 2030 to 2040 and 2040 to 2050 are 1.0092 and 1.0130, respectively, and 1.0088 and 1.0177, respectively.

The predicted peak hour and AADT volumes on the existing local, regional and national roads in the vicinity of the proposed development site, including along the proposed underground grid connection route and the turbine delivery route, with the foregoing TII predicted traffic growth rates, are provided in **Table 16-6**.

Table 16-6: Predicted Traffic Volumes with TII Growth

Road Location	Year	Total Vehicles (HGVs)	
		Peak Hour	AADT (% HGVs)
N20 north of Croom (TII counter 20202)	2029	1,960 (38)	18,094 (5.8%)
	2030	2,002 (39)	18,496 (5.8%)
	2035	2,095 (41)	19,382 (5.9%)
	2045	2,295 (48)	21,272 (6.3%)
N20 south of Croom (TII counter 1202)	2029	1,129 (44)	12,885 (8.8%)
	2030	1,154 (46)	13,176 (8.9%)
	2035	1,208 (49)	13,814 (9.1%)
	2045	1,325 (57)	15,192 (9.6%)
R516 at Croom	2029	501 (10)	5,018 (2.2%)
	2030	513 (11)	5,128 (2.2%)
	2035	536 (11)	5,370 (2.3%)
	2045	587 (13)	5,880 (2.4%)
R516 between Croom and Bruff	2029	314 (7)	3,142 (2.3%)
	2030	321 (7)	3,210 (2.3%)
	2035	336 (8)	3,362 (2.4%)
	2045	368 (9)	3,681 (2.8%)
R512 @ Bruff	2029	495 (7)	5,280 (1.7%)
	2030	505 (7)	5,395 (1.7%)
	2035	530 (8)	5,648 (1.7%)
	2045	579 (9)	6,182 (1.8%)
L1414 @ R512	2029	83 (2)	883 (1.8%)
	2030	84 (2)	903 (1.9%)
	2035	89 (3)	945 (1.9%)
	2045	97 (3)	1,035 (2.0%)
L51217 @ R512	2029	29 (1)	314 (1.6%)
	2030	30 (1)	321 (1.6%)

	2035	31 (1)	336 (1.6%)
	2045	35 (2)	367 (1.6%)
L1550 @ R512	2029	57 (1)	604 (1.2%)
	2030	58 (1)	617 (1.2%)
	2035	60 (1)	647 (1.2%)
	2045	66 (2)	707 (1.3%)
N24 @ Killonan (TII counter 20243)	2029	1,823 (167)	19,450 (5.6%)
	2030	1,863 (172)	19,881 (5.6%)
	2035	1,954 (184)	20,832 (5.7%)
	2045	2,150 (214)	22,861 (6.1%)
L1171 between N24 and L1170	2029	728 (6)	7,769 (1.6%)
	2030	743 (6)	7,938 (1.6%)
	2035	778 (6)	8,312 (1.6%)
	2045	851 (7)	9,097 (1.7%)
L1170 between L1171 and R512	2029	399 (0)	4,253 (0.0%)
	2030	407 (0)	4,345 (0.0%)
	2035	426 (0)	4,548 (0.0%)
	2045	466 (0)	4,973 (0.0%)
R512 south @ L1170	2029	824 (9)	8,684 (2.2%)
	2030	841 (9)	8,873 (2.3%)
	2035	881 (10)	9,293 (2.3%)
	2045	964 (12)	10,174 (2.5%)
L1412 between R512 and L8011	2029	48 (1)	512 (2.3%)
	2030	49 (1)	523 (2.3%)
	2035	51 (1)	548 (2.4%)
	2045	57 (2)	600 (2.5%)
L8011 between L1412 and L8012	2029	37 (0)	395 (0.5%)
	2030	38 (0)	403 (0.5%)
	2035	40 (0)	423 (0.7%)
	2045	43 (0)	462 (0.7%)
L8012 @ R516	2029	24 (0)	256 (0.4%)
	2030	25 (0)	261 (0.4%)
	2035	26 (0)	273 (0.4%)
	2045	28 (0)	300 (0.7%)

The estimated rural road link AADT volume/capacity ratios for the existing R516 and R512 rural roads in the vicinity of the proposed development, including along the proposed underground grid connection route and along the proposed turbine delivery route, are provided in **Table 16-7**, on the basis of the TII Rural Road Link Design, for the predicted 2029, 2030, 2035 and 2045 AADT volumes, with the TII predicted traffic growth rates.

Table 16-7: Predicted TII Rural Regional Road Link AADT Volume/Capacity Ratios with TII Growth

Rural Road with Rural Speed Limit	Year	AADT Vehicles	AADT Capacity (Vehicles) @ LOS D	AADT Volume/Capacity Ratio
R516 between Croom and Bruff	2029	3,142	< 5,000	>63%
	2030	3,210		>64%
	2035	3,362		>67%
	2045	3,681		>74%
R512 north and south of Bruff	2029	5,280	>5,000 <8,600	<106% >61%
	2030	5,395		<108% >63%
	2035	5,648		<113% >66%
	2045	6,182		<124% >72%

The R516, between Croom and Bruff, would continue to operate within its estimated rural road link AADT capacity at Level of Service (LOS) D, in 2029, 2030, 2035 and 2045, with volume/capacity ratios of higher than circa 63%, 64%, 67% and 74%. The R512, north and south of Bruff, would operate with estimated rural road link AADT volume/capacity ratios of higher than 61% and less than 106% in 2029 – the proposed development peak construction year; and estimated rural road link AADT volume/capacity ratios of higher than 63% and less than 108% in 2030 – the proposed development operational opening year.

The predicted 2029, 2030, 2035 and 2045 urban and suburban road link peak hour volume/capacity ratios for the R516 at Croom, R512 at Bruff, the L1170 and the L1171 are provided in **Table 16-8**, based on the Traffic Capacity of Urban Roads TA 79/99, with the TII predicted traffic growth rates.

Table 16-8: Predicted Urban and Suburban Road Link Peak Hour Volume/Capacity Ratios with TII Growth

R420 Urban/Suburban Road	Year	Highest Direction Peak Hour Vehicles	Capacity/Hour/ Direction (Vehicles)	Volume/Capacity Ratio
R516 @ Croom	2029	301	750	40%
	2030	308		41%
	2035	322		43%
	2045	352		47%
R512 @ Bruff	2029	297	750	40%
	2030	303		41%
	2035	318		43%
	2045	348		47%
L1170 @ 60 km/hour zone	2029	240	1,020	24%
	2030	244		24%

R420 Urban/Suburban Road	Year	Highest Direction Peak Hour Vehicles	Capacity/Hour/ Direction (Vehicles)	Volume/Capacity Ratio
L1171 @ 60 km/hour zone	2035	256	1,260	25%
	2045	280		28%
	2029	437		35%
	2030	446		36%
	2035	467		37%
	2045	511		41%

The urban R516 at Croom and R512 at Bruff, within their 50 km/hour urban speed limit zones, would continue to operate well within their estimated urban road link capacities, with the predicted 2029, 2030, 2035 and 2045 peak hour traffic volumes on the basis of the TII predicted traffic growth rates, with highest volume/capacity ratios during the peak hour of 47% and 47%, respectively, in 2045. The highest volume/capacity ratios during the proposed development peak construction year, 2029, would be 40% and 40%, respectively.

The suburban L1170 and L1171, within their 60 km/hour suburban speed limit zones, would continue to operate well within their estimated suburban road link capacities, with the predicted 2029, 2030, 2035 and 2045 peak hour traffic volumes on the basis of the TII predicted traffic growth rates, with highest volume/capacity ratios during the peak hour of 28% and 41%, respectively, in 2045. The highest volume/capacity ratios during the proposed development peak construction year, 2029, would be 24% and 35%, respectively.

16.4 Assessment of Construction Phase Impacts and Effects

A detailed description of the proposed development construction is provided in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR. The Turbine Delivery Route Assessment report is provided in **Volume III, Appendix 2C** of this EIAR.

Subject to planning permission, it is envisaged that works would commence at the proposed development site during Q1, 2028, with a construction duration of approximately 24 months, followed by six months of commissioning. The proposed development is scheduled to be fully complete and operational during Q3, 2030. The peak construction and commissioning year is late 2028-early 2029.

16.4.1 Access

Construction access for the proposed windfarm and substation site, its temporary construction compounds, windfarm collector cable, and associated internal site access tracks, is via a proposed access on the south side of the R516, at the north of the site.

Public road crossings, with associated accesses, are proposed during construction at two locations on the L1414 and two locations on the L51217 as well as two entrances on the private laneway at the end of the L51217.

16.4.2 Temporary Construction Compounds

Three temporary construction compounds will be provided at the proposed site, and will include materials' storage/laydown areas, parking and staff facilities.

Temporary construction materials' storage for the grid connection route along the circa 24.4 km route on the public road network may be provided at existing site locations convenient to the works' locations, as the works progress, which would be subject to the pre-approval of the planning authority prior to the works.

16.4.3 Hours and Duration

The proposed construction hours are 7.00 a.m. to 7.00 p.m., Monday to Saturday inclusive. On occasion, the working day may extend outside normal working hours when critical elements of the works need to be advanced.

Public road working hours are 7.00 a.m. to 7.00 p.m. Monday to Friday inclusive and 9.00 a.m. to 2.00 p.m. on Saturdays.

The construction duration for the proposed windfarm and substation site is 24 months, followed by six months of commissioning.

The expected construction duration for the proposed grid connection works along the public road network, which will be carried out concurrently with the proposed substation works, is six months. The proposed grid connection works will be carried out on a linear basis, from the proposed windfarm and substation to the existing 220/110kV Killonan substation, by up to two construction crews.

16.4.4 Staff

The expected peak staff would be up to 80 construction personnel, which would generate approximately 60 car and van trips, both to and from the site each working day, based on an average vehicle occupancy rate of 1.33 personnel per vehicle, including staff that travel in contractor vehicles.

Canteen facilities for personnel will be provided on-site. Site personnel would travel to site prior to 7.00 a.m. and depart from site from 7.00 p.m., on weekdays, outside the peak traffic hours.

It is envisaged that the construction crew for the proposed grid connection works would include 15 to 25 construction personnel, which are included in the foregoing expected peak construction staff.

16.4.5 Delivery Vehicle Volumes

The 24 months construction would require the importation of a total of up to 14,714 loads of construction materials plus the removal of 3,105 loads from the grid connection works along the public road network to a licensed waste facility. All construction materials would be transported using standard heavy vehicle delivery trucks with capacities of 8 m³ and 20 tonnes for aggregate, and 7 m³ for concrete trucks. The peak daily imported loads would occur during the hardstand formation and access tracks' works, and during the turbine bases' concrete works. The proposed on-site borrow pits will provide 99,852 m³ (61%) of aggregate materials required for the proposed development. Construction excavated material for the proposed windfarm and substation site and associated proposed access tracks will be retained on-site.

The proposed construction works heavy vehicle loads are provided in **Table 16-9**.

Table 16-9: Proposed Construction Works Heavy Vehicle Loads

Works	Total Number of Heavy Vehicle Loads		
	Total Construction (24 months)	Peak Daily	Highest Hour
Windfarm and Substation Site Works (24 months)	11,405	142	16
Public Roads' Grid Connection Works (6 months)	6,414	42	6
Total (24 months)	17,819	142	16

The wind turbine abnormal loads would be delivered in consultation with Limerick City and County Council and An Garda Síochána, during off-peak traffic periods. A total of 170 delivery vehicles would be required for the seventeen turbines in delivery convoys during nights. This could result in temporary delays for other local traffic during the off-peak traffic delivery periods.

16.4.6 Delivery Vehicle Routes

The potential material sources for the proposed development construction are detailed in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR, and include suppliers located in the northeast, east, west and south of the proposed development site.

It is envisaged that the delivery of construction materials would be typically circa 50% via the R516 east of the proposed windfarm and substation site access, and circa 50% via the R516 west of the proposed windfarm and substation access but could be up to 100% via either direction during specific periods of construction (this worst case scenario is assessed).

The routing for the delivery of windfarm components is summarised in **Volume II, Chapter 02** and detailed in Turbine Delivery Route Assessment Report (EIAR **Volume III, Appendix 2C**) and would be via the N69, N18, M20, N20 and R516.

All construction deliveries and construction traffic will access the windfarm and substation site via the proposed site access on the R516 at the north of the site; and use the public road crossings, and associated accesses, on the L1414 and on the L51217 from within the site, as required.

Construction access for the construction grid connection works along the R516, L8012, L8011, L1412, R512, L1170, L1171 and N24 public roads would be via the existing associated public roads' network.

16.4.7 Traffic Volumes

The predicted AADT volumes, peak daily traffic volumes and highest peak hour traffic volumes generated by the proposed development construction are provided in **Table 16-10**, including heavy vehicles (HGVs).

Table 16-10: Proposed Construction Works Traffic Volumes

Total Two-Way Vehicles (HGVs)		
AADT	Peak Daily	Highest Peak Hour
154 (50)	388 (284)	32 (32)

The predicted 2029 AADT, peak daily and highest peak hour traffic volumes, on the existing local, regional and national roads in the vicinity of the proposed development site, with the proposed construction works' traffic volumes are provided in **Tables 16-11** and **16-12**, respectively.

Table 16-11: Predicted 2029 AADT Traffic Volumes with Proposed Construction

Road Location	Total Vehicles (HGVs)	
	AADT	Change (%)
N20 north of Croom	18,133 (1,058)	+39 (13) (0.2%)
N20 south of Croom	12,923 (1,148)	+38 (12) (0.3%)
R516 at Croom	5,095 (136)	+77 (25) (1.5%)
R516 between Croom and Bruff	3,219 (98)	+77 (25) (2.5%)
R512 @ Bruff	5,319 (102)	+39 (13) (0.7%)
N24 @ Killonan	19,470 (1,090)	+20 (7) (0.1%)
L1171 between N24 and L1170	7,795 (129)	+26 (6) (0.3%)
L1170 between L1171 and R512	4,279 (0)	+26 (0) (0.6%)
R512 south @ L1170	8,723 (208)	+39 (13) (0.5%)

Table 16-12: Predicted 2029 Peak Traffic Volumes with Proposed Peak Construction

Road Location	Total Vehicles (HGVs)			
	Peak Daily	Change (%)	Peak Hour	Change (%)
N20 north of Croom	18,191 (1,116)	+97 (71) (0.5%)	1,968 (46)	+8 (8) (0.4%)
N20 south of Croom	12,982 (1,207)	+97 (71) (0.8%)	1,137 (52)	+8 (8) (0.7%)
R516 at Croom	5,212 (253)	+194 (142) (3.9%)	517 (26)	+16 (16) (3.2%)
R516 between Croom and Bruff	3,336 (215)	+194 (142) (6.2%)	330 (23)	+16 (16) (5.1%)
R512 @ Bruff	5,377 (160)	+97 (71) (1.8%)	503 (15)	+8 (8) (1.6%)
N24 @ Killonan	19,499 (1,119)	+49 (36) (0.3%)	1,827 (171)	+4 (4) (0.2%)
L1171 between N24 and L1170	7,800 (141)	+31 (18) (0.4%)	732 (10)	+4 (4) (0.6%)
L1170 between L1171 and R512	4,266 (0)	+13 (0) (0.3%)	399 (0)	+0 (0) (0.0%)
R512 south @ L1170	8,781 (266)	+97 (71) (1.1%)	832 (17)	+8 (8) (1.0%)

During the proposed 24 months construction period, the proposed construction works would increase AADT volumes on the R516 by 77 vehicles, including 25 heavy vehicles, which equates to an AADT increase of up to 2.5%. Elsewhere, on other existing local, regional and national roads in the vicinity of the proposed development site, the proposed construction works would increase AADT volumes by up to 0.7%.

During the peak construction heavy vehicle traffic generation phase, the peak daily increase in daily traffic volumes on the R516 generated by peak construction would be up to 194 vehicles, including up to 142 heavy vehicles, which equates to an increase of up to 6.2%. Elsewhere, on other existing local, regional and national roads in the vicinity of the proposed development site, the peak daily increase in daily traffic volumes during the proposed peak construction heavy vehicle traffic generation phase would be up to 1.8%.

During the grid connection route works along public roads, the grid connection construction works would generate up to 42 daily heavy vehicle loads to and from the works (as seen in **Table 16-9**), including on the R516, L8012, L8011, L1412, R512, L1170, L1171 and N24 public roads.

The predicted increases in traffic volumes generated during the proposed development construction could result in increased journey times for other road users, including at the alternating one-way traffic yield system at the River Camoge bridge on the R516, located circa 1.5 kms east of Croom.

16.4.8 TII TTA Assessment Thresholds

The predicted increases in AADT volumes on the existing local, regional and national roads in the vicinity of the proposed development site, during the proposed development 24 months construction phase, are less than the volumetric threshold (5%) identified by TII in their TTA Assessment Guidelines for sensitive locations.

The predicted increases in peak daily and peak hour traffic volumes, during peak construction, would be highest on the R516 at up to 6.2% and 5.1%, respectively. However, the R516 is not considered a sensitive location based on the RRA Assessment Guidelines. There are increases of up to 1.8% and 1.6%, respectively, elsewhere, on other existing local, regional and national roads in the vicinity of the proposed development site.

16.4.9 Volume/Capacity Ratios

The estimated rural road link AADT volume/capacity ratios for the existing R516 and R512 rural roads in the vicinity of the proposed development, are provided in **Table 16-13**, based on the TII Rural Road Link Design, for the predicted 2029 AADT volumes, with the TII predicted traffic growth plus the proposed development construction.

Table 16-13: Predicted TII Rural Regional Road Link AADT Volume/Capacity Ratios with TII Growth Plus Proposed Construction

Rural Road with Rural Speed Limit	Year	AADT Vehicles	AADT Capacity (Vehicles) @ LOS D	AADT Volume/Capacity Ratio
R516 between Croom and Bruff	2029	3,336	< 5,000	>67%
R512 north and south of Bruff	2029	5,377	>5,000 <8,600	<108% >63%

The R516, between Croom and Bruff, would continue to operate within its estimated rural road link AADT capacity at Level of Service (LOS) D, in 2029, with the proposed development construction, with a volume/capacity ratio of higher than circa 67%. This compares to a ratio of higher than circa 63%, in 2029, without the proposed development construction.

The R512, north and south of Bruff, would operate with an estimated rural road link AADT volume/capacity ratio of higher than 63% and less than 108%, in 2029, with the proposed development construction. This compares to an estimated ratio of higher than 61% and less than 106%, in 2029, without the proposed development construction.

The predicted 2029 urban and suburban road link peak hour volume/capacity ratios for the R516 at Croom, R512 at Bruff, the L1170 and the L1171 are provided in **Table 16-14**, based on the Traffic Capacity of Urban Roads TA 79/99, with the TII predicted traffic growth plus the proposed development construction.

Table 16-14: Predicted Urban and Suburban Road Link Peak Hour Volume/Capacity Ratios with TII Growth Plus Proposed Construction

R420 Urban/Suburban Road	Year	Highest Direction Peak Hour Vehicles	Capacity/Hour/ Direction (Vehicles)	Volume/Capacity Ratio
R516 @ Croom	2029	311	750	42%
R512 @ Bruff	2029	302	750	41%
L1170 @ 60 km/hour zone	2029	240	1,020	24%
L1171 @ 60 km/hour zone	2029	440	1,260	35%

The urban R516 at Croom and R512 at Bruff, within their 50 km/hour urban speed limit zones, would continue to operate well within their estimated urban road link capacities, in 2029, with the proposed development construction, with highest volume/capacity ratios during the peak hour of 42% and 41%, respectively. These compare to highest volume/capacity ratios without the proposed development construction, in 2029, of 40% and 40%, respectively as seen in **Table 16-8**.

The suburban L1170 and L1171, within their 60 km/hour suburban speed limit zones, would continue to operate well within their estimated suburban road link capacities, in 2029, with the proposed development construction, with highest volume/capacity ratios during the peak hour of 24% and 35%, respectively. These compare to highest volume/capacity ratios without the proposed development construction, in 2029, of 24% and 35%, respectively.

16.4.10 Temporary Traffic Management

A Traffic Management Plan for the proposed development is provided in **Volume III, Appendix 16A** of this EIAR.

A stop/go alternating direction temporary traffic management arrangement would be provided during grid connection works along the public road network, to facilitate the grid connection construction works. Local access will be maintained. Temporary traffic diversions on public roads are proposed for the grid connection works along the L8012 and L8011 public roads, via the R516, R512 and L1412.

The temporary construction traffic management arrangements would be provided in accordance with the DoT Traffic Signs Manual Chapter 8 Temporary Traffic Measures and Signs for Roadworks, with the prior approval of the planning authority.

The expected construction duration for the proposed grid connection works along the public road network, which will be carried out concurrently with the proposed substation works, is six months. The proposed grid connection works would be carried out on a linear basis, from the proposed windfarm and substation site to the existing Killonan substation, by a single construction crew.

The grid route along the public roads is approximately 24.4 kms long with an expected 165 metres of works to be completed each day.

The expected durations of the proposed grid connection construction works along the public road network are provided in **Table 16-15**.

Table 16-15: Proposed Grid Connection Route Construction Durations Along Public Roads

Grid Connection Public Road Section	Length	Construction Duration
Section within R516 to L8012	1.4 kms	1-2 Weeks

Grid Connection Public Road Section	Length	Construction Duration
Section within L8012 to L8011	1.4 kms	1-2 Weeks
Section within L8011 to L1412	1.1 kms	1 Week
Section within L1412 to R512	2.5 kms	2-3 Weeks
Section within R512 to L1170	14.5 kms	15 Weeks
Section within L1170 to L1171	2.6 kms	3 Weeks
Section within L1171 to N24	0.2 kms	2 Days
Section within N24 to Killonan Substation	0.7 kms	4-5 Days
Total	24.4 kms	26 Weeks (6 Months)

The temporary traffic management arrangements would increase journey times for users during the proposed construction working hours along the proposed grid connection route, for the predicted construction durations.

The proposed grid connection cable will extend across the L1414 public road at the proposed site public road crossing, during construction. The expected duration of the grid connection construction works at this public road crossing is one to two days.

16.4.11 Road Pavements Monitoring

Heavy vehicle traffic volumes generated by the proposed development construction could result in damage to existing and proposed road pavements on public roads, including at vehicle turning, accelerating and decelerating locations. Road pavements would be regularly monitored and reinstated in accordance with the requirements of the planning authority.

16.4.12 EPA Guidelines

The proposed construction works will occur over an envisaged 24-month period. Interactions between the works and the existing roads infrastructure will be varied and temporary. For example, grid connection works will progress along the route at a typical pace of 100m to 200m per day, whereas site entrances will take in the region of a month to complete.

Based on the EPA Guidelines and the nature of the effects, the proposed construction works would have slight to moderate, temporary to short-term adverse effects. The works will be constructed over a defined timeline of 24 months and are short-term and temporary.

16.4.13 Cumulative Impacts and Effects

The grid connection and substation are included as elements of the project and have been assessed in this chapter assessment. Therefore they do not need to be considered again under cumulative effects.

The foregoing assessment includes TII's predicted traffic growth, which includes traffic generated by proposed other developments. No additional traffic volumes are expected to be generated by other developments during the proposed development construction. A detailed description of other developments, including other wind farm developments, is provided in **Volume II, Chapter 01** Introduction of this EIAR.

The proposed Garrane Windfarm development, subject to planning permission, is located southwest of the proposed development adjacent to the east side of the N20, south of Bruree. It is envisaged that the turbine delivery periods for the developments would not coincide, as both would be delivered to the Port of Foynes during different periods. Other construction traffic generated along the N20 by both developments could coincide but would not be significant given the volume of traffic that currently use the road. The proposed development would increase predicted AADT traffic volumes along the N20 by up to 0.3%.

On the basis of the EPA EIAR Guidelines, the cumulative impacts with other proposed developments have been assessed as slight to moderate adverse effects and temporary to short term.

16.5 Assessment of Operational Phase Impacts and Effects

A detailed description of the proposed operational phase is provided in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR.

The proposed development will have up to two operational staff and will generate negligible operational traffic volumes. Occasional traffic will be generated by routine inspection and maintenance.

On the basis of the EPA EIAR Guidelines, the proposed development will have imperceptible to not significant long term to permanent neutral effects.

16.6 Decommissioning

A detailed description of the proposed decommissioning phase is provided in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR.

The grid cable and substation will remain a permanent part of the national grid infrastructure and, therefore, their decommissioning is not expected. At the end of the 35-year lifespan of the proposed development, the Developer will make the decision whether to repower or decommission the turbines. Any further proposals for proposed development at the site during or after this time will be subject to a new planning permission application. If planning permission is not sought after the end of life of the turbines, the site will be decommissioned and reinstated with all 17 wind turbines removed. Traffic and transportation effects would be similar to the construction phase albeit at a lesser extent should decommissioning occur.

On the basis of the EPA EIAR Guidelines, decommissioning of the proposed development will have slight temporary short term adverse effects.

Table 16-16: Summary of the Potential Effects: Traffic and Transportation

Phase	Impact	Quality of Effect	Significance	Spatial Extent	Duration
Construction Phase	Increased traffic volumes on local road networks	Adverse	Slight-moderate	local	Temporary-short-term
Operational Phase	Operational traffic	Neutral	Imperceptible – not significant	local	Long-term - permanent
Decommissioning Phase	Increased traffic volumes on local road networks	Adverse	Slight	local	Temporary-short-term

16.7 Mitigation Measures

16.7.1 Construction Phase

All traffic management and road signage will be in accordance with the Department of Transport (DoT) Traffic Signs Manual Chapter 8: Temporary Traffic Measures and Signs for Road Works; and in agreement with Limerick City and County Council.

A pre-construction bridge and road survey will be carried out on the haul routes on the R516, which will be monitored on a regular basis and any damage rectified promptly. Once construction has been completed a post construction road and bridge survey will be carried out. Any sections identified as damaged after the preconstruction survey will be reinstated.

A Traffic Management Plan outlining the required traffic management procedures to be implemented on the public roads during the construction of the proposed development is provided in **Volume III, Appendix 16A** of this EIAR. The Traffic Management Plan will be updated, as appropriate, following the proposed project detailed design/tendering stage, and submitted for the approval of Limerick City and County Council, prior to construction.

The proposed grid connection will require a Road Opening License (ROL) prior to the commencement of any grid connection works on the public road. The road surface of the public roads will be reinstated to the standards set out by the Department of Transport (DoT) Guidelines on the Opening, Backfilling and Reinstatement of Trenches on Public Roads (April 2017). All road permanent reinstatement works will be in accordance with the requirements of Limerick City and County Council.

Construction wheel wash facilities will be provided at the construction entrances to wash truck tyres leaving the construction site.

16.7.2 Operational Phase

The proposed development will not generate regular operational traffic, and no mitigation measures are required.

16.7.3 Decommissioning Phase

The access tracks and hardstands will be left in place. Access tracks will be utilised by the landowner for farm access and ongoing agricultural activities. Underground services will be left in place, and cables will be cut at the interface to the onsite substation and turbine locations. All drainage features will be left in situ to the benefit of the landowner and their farm management.

The substation is a valuable grid asset and will remain in situ and functioning as an ESB/Eirgrid asset.

The removal of the wind turbines during any decommissioning phase will be on a similar basis to the delivery of the wind turbines for the construction phase, with similar traffic volumes and impacts.

Therefore, the proposed decommissioning works would have slight to moderate short-term adverse effects.

16.8 Residual Impacts and Effects

The assessment of any residual impacts and effects have taken into consideration the EPA Guidelines, any potential effects as detailed in **Table 16-16**, and the nature and duration of the project as detailed in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR.

On the basis of the EPA EIAR Guidelines, it has been assessed that the proposed development construction phase will have slight to moderate temporary to short term adverse residual effects.

On the basis of the EPA EIAR Guidelines, it has been assessed that the proposed development operational phase will have imperceptible to not significant long term to permanent adverse effects.

On the basis of the EPA EIAR Guidelines, it has been assessed that the proposed development decommissioning phase will have slight to moderate short term adverse effects.

Table 16-17 Residual Effects: Traffic and Transport

Phase	Quality	Significance	Spatial Extent	Duration
Construction	Adverse	Slight to Moderate	Local	Temporary to Short Term
Operational	Adverse	Imperceptible	Local	Long Term to Permanent
Decommissioning	Adverse	Slight to moderate	Local	Temporary to short term

16.9 Risk of Major Accidents and Disasters

Road traffic accidents on public roads used by traffic volumes generated by the proposed construction works, could result in delays to traffic generated by the proposed works and to other traffic. Traffic generated by the proposed works could be involved in road traffic collisions. Traffic subject to the proposed temporary traffic management measures along the grid connection construction works could be involved in road traffic collisions.

The risk of collisions will be minimised by the Traffic Management Plan for the proposed development. The risk of any occurrence is low, and the significance of any effect is imperceptible.

16.10 References

Limerick City and County Council's Limerick Development Plan 2022-2028;

Limerick City and County Council's Croom Local Area Plan 2020-2026;

The Transport Infrastructure Ireland (TII) Traffic and Transport Assessment (TTA) Guidelines PE-PDV-02045 May 2014;

TII's Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections PE-PAG-02017 October 2021;

TII's Rural Road Link Design DN-GEO-03031;

The UK Traffic Capacity of Urban Roads TA79/99;

The Environmental Protection Agency Guidelines on the information to be contained in Environmental Impact Assessment Reports May 2022 (EPA EIAR Guidelines); and

European Commission, Guidance on the preparation of the EIAR, 2017.