12 TRAFFIC AND TRANSPORTATION

12.1 Introduction

12.1.1 This Traffic and Transportation Chapter assesses the potential effects of the Proposed Development on the highway network (in transport terms) and its users. This Chapter should be read in conjunction with **Chapter 2: Proposed Development**.

12.1.2 The Chapter describes the assessment methodology that has been adopted and identifies how baseline conditions have been established. The access, traffic and transport receptors have been identified within a defined assessment area (the 'Study Area') which has the potential to be adversely or positively impacted by the Proposed Development.

12.1.3 Potentially significant access, traffic and transport related environmental effects may result from two forms of potential impacts:

- Transport configurations made for the movement of turbines including blade, tower sections, and nacelle of the wind turbines that are transported as abnormal loads. Abnormal loads are those which exceed the length, weight or height criteria defined in 'Abnormal Load Movements – A brief guide to Notification and Authorisation requirements' (Transport Scotland, June 2007); and
- General construction traffic (personnel) and import of materials transported via 'conventional' heavy goods vehicles (HGVs) and low loaders.

12.1.4 The assessment detailed within this Chapter includes worst case assumptions made for the purpose of forming a robust assessment of the Proposed Development within the parameters identified in **Chapter 2: Proposed Development** in addition to a more realistic scenario.

12.1.5 For a worst-case assessment, the following assumptions have been made:

- All construction materials are assumed to be sourced from offsite locations (i.e., outside of the application boundary), including all aggregate required for track construction, thus ensuring that the estimated level of trip generation is considered as a maximum worst case. This is an unlikely situation as on-site borrow pits are likely to be used, but has been included as Scenario 1 to ensure a robust assessment; and
- Future traffic increases associated with the construction of the Proposed Development have been measured against baseline flows with a low National Road Traffic Forecast (NRTF) growth factor applied.

12.1.6 This Chapter does not focus on the transport configurations made for the movement of wind turbine components to the site entrance. The off-site delivery routes have been considered in the supporting Abnormal Indivisible Loads Route Assessment (**Appendix 12.1**), which includes swept path analysis and a detailed review of the preferred routes for access. Given that the identified routes have been used previously for the transport of abnormal loads associated with renewable energy developments, it is considered that there would be no major technical issues for the use of the routes, notwithstanding any mitigation that may be required.

12.1.7 An assessment has been made of the potential effects of the Proposed Development, with a focus on the construction phase on the basis that this will have the greatest impact

on the local transport network within the Study Area. Where required, mitigation measures have been defined to reduce any significant effects.

12.1.8 During operation, the Proposed Development would generate occasional maintenance trips, which would not lead to any variation in the baseline traffic flows beyond that of everyday fluctuation.

12.2 Scope and methodology

12.2.1 A desk study was undertaken to inform this assessment, which included reviews and identification of the following:

- Relevant transport planning policy;
- Accident data;
- Sensitive locations;
- Any other traffic sensitive receptors in the area (core paths, routes, communities, etc.);
- Ordnance Survey (OS) plans;
- Potential origin locations of construction staff and supply locations for construction materials to inform extent of local area roads network to be included in the assessment; and
- Constraints to the movement of Abnormal Indivisible Loads (AIL) through a Route Survey including swept path assessments.

12.2.2 The desk study was supplemented by field surveys including a site visit and route video survey for the transport of AIL.

12.2.3 The scope of the assessment has been informed by consultation responses summarised in **Table 12.4** and the following guidelines/policies:

- Institute of Environmental Assessment, Guidelines for the Environmental Assessment of Road Traffic (1993);
- LA104, Environmental assessment and monitoring, Design Manual for Roads and Bridges (DMRB) (Standards for Highways, 2020);
- Scottish Government, Transport Assessment Guidance (2012); and
- The Highland Council, Guidance on the Preparation of Transport Assessment (2014).

12.2.4 The following bullets outline the steps taken in the assessment to establish the effects on road users due to traffic associated with the construction of the Proposed Development:

- An assessment of the existing baseline conditions based on Department for Transport (DfT) traffic data;
- An assessment of the surrounding road network to determine its suitability to accommodate the anticipated volume of construction traffic e.g. HGVs;
- An assessment of the increase in traffic compared to baseline traffic flows for the opening year of construction, which is assumed to be 2024, for the roads included in the Study Area. The approach for this has been to define the level of traffic anticipated to access the Proposed Development during its construction phase, calculated from first principles and distributed over an anticipated construction programme of 21 months; and

- An assessment of operational traffic. This provides a brief summary of typical maintenance activities and the types of vehicles used as traffic impacts during the operation of the Proposed Development are minimal.

Study Area

12.2.5 The Study Area includes local roads that are likely to experience increased traffic flows resulting from the Proposed Development. The geographic scope was determined through the review of OS plans and an assessment of the potential origin locations of construction staff and supply locations for construction materials.

12.2.6 The Proposed Development would take access from the A836 via an existing access track leading to properties within the Dalnessie Estate.

12.2.7 Access for construction materials would be predominantly from the south via the A9, A836 and A839. Access via the B9176 Struie Road is not considered suitable for bulk materials deliveries due to the sinuous nature of the road and the natural constraints at the Allt Fearn Burn bridge, Strathrory River bridge and bends and at the River Avereon bridge.

12.2.8 Abnormal loads associated with the wind turbines only have one route available to access the site and this is via the A9(T), A839 and A836, with loads passing through the Mound, Rogart and Lairg. A full description of the route is described in later sections with details of the constraints.

12.2.9 The Study Area for the assessment has therefore been assumed as follows:

- From Port of Cromarty proceed on the B817 in a north-easterly direction to its junction with the road (un-named and un-classified) linking the B817 with Academy Road;
- Turn left onto the un-classified road and continue to its junction with Academy Road;
- Turn right and continue to the junction with the A9;
- At the A9/Academy Road junction turn right and head northbound on the A9;
- Turn left at Nigg Roundabout and continue northbound;
- At the Meikle Ferry Roundabout turn right and continue northbound (for AILs and general construction traffic) or continue ahead onto the A836 in the northbound direction towards site access via Edderton, Ardgay, Bonar Bridge, Achinduich and Lairg (for general construction traffic);
- Turn left at the A9/A839 (the Mound Junction) priority and continue on the A839 in a westbound direction;
- At the A839/A836 priority junction in Lairg turn right and continue in a northbound direction towards Dalmichy;
- Approximately 900m north of Dalmichy turn right onto the Dalnessie access track which forms a part of the Forestry and Land Scotland haul route and continue for approximately 6.5 km to the Proposed Development site entrance.

12.2.10 The Study Area is focused only on the immediate roads surrounding and leading to the Proposed Development, as it is expected that traffic flows outwith this area would be dissipated on the wider road network without any significant effect. This chapter therefore only considers the likely increases in traffic along these routes. The Study Area is shown on **Figure 12.1**.

Information and Data Sources

12.2.11 To determine the baseline conditions against which the effects of the Proposed Development have been assessed using data from the Department for Transport (DfT) website for the A9, A839 and A836. Annual traffic statistics are accrued via continuous data from permanent Automatic Traffic Counters (ATCs) maintained by the local and trunk road authorities. The location of the existing ATCs is shown on **Figure 12.2**.

12.2.12 In addition to the above, road traffic collision data for the most recent five-year period from 2015 – 2019 were obtained from the DfT. The locations of the accidents in the Study Area are illustrated by **Figure 12.3**.

Effects Scoped Out

12.2.13 It is estimated that the operational phase of the Proposed Development would not generate a significant amount of traffic. It is estimated that a team of several staff, including engineer fitters, would supervise the operation of the wind turbine installation, and would visit the Proposed Development to conduct routine maintenance.

12.2.14 Typical duties onsite would include routine maintenance, such as planned servicing, 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 and the frequency of these visits would depend on the turbine manufacturer.

12.2.15 The trips generated by the operational activities onsite would be no greater than those expected to occur in the normal background daily variations to 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.

12.2.16 As the operational impacts of the Proposed Development on the Study Area is indiscernible, the operational cumulative effects have not been assessed.

12.2.17 The traffic generated from the replacement of wind turbines has also been scoped out. When wind turbines are replaced, it is currently expected that the following elements would lead to future traffic movements:

- Dismantling and removal of turbine components; and
- The installation of new turbines.

12.2.18 Trip generation associated with these activities would not exceed the levels presented in the assessment of construction impacts and therefore has been scoped out of this assessment.

12.2.19 As the application seeks planning consent for an operational life of the Proposed Development of 35 years decommissioning will be required, however any effects of decommissioning would be less than those resulting from construction of the Proposed Development.

Approach to Assessment of Effects

12.2.20 The approach to this assessment is based upon the IEMA guidelines, referring to the varying criteria depending on the type of impact being assessed. The assessment is primarily based upon the change in total traffic flows or the change in HGV flows along a specific section of road. Professional judgement must also be taken into account, particularly where the baseline traffic flow may be low and therefore a small increase in

traffic may result in a high relative increase. Hence, in these instances the absolute value must be considered in the overall assessment of significance.

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

12.2.22 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. Therefore, these are considered in the assessment of potential effects which may arise from changes in traffic flows resulting from the Proposed Development:

- Driver severance and delay – the potential delays to existing drivers and their potential severance from other areas;
- Community severance and delay – the potential delays to pedestrians in their movements and ability to crossroads;
- Pedestrian delay and amenity – the potential impact of local amenity and delay in movement around and between communities;
- Noise and vibration – the potential effect caused by additional traffic on sensitive receptors, which in this case relate to residential properties near the road. This is considered by separate assessment contained in **Chapter 11: Noise and Vibration**;
- Vulnerable road users and road safety – the potential effect on vulnerable users of the road (e.g. pedestrians and cyclists);
- Hazardous and dangerous loads – the potential effect on road users and local residents caused by the movement of abnormal loads; and
- Dust and dirt – the potential effect of dust, dirt and other detritus being brought onto the road.

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

12.2.24 The significance of likely effects 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

12.2.25 The potential sensitivity of receptors to change in traffic levels has been determined by considering the Study Area and the presence of receptors in relation to each potential impact.

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

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

12.2.27 In this context, the IEMA guidelines do not define the value placed on the receptors and therefore their sensitivity; therefore, the assessor makes a professional 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** below.

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
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 communities with existing severance (subjective assessment)
Noise	No sensitive receptors	Presence of sensitive receptors near to the road	Presence of sensitive receptors adjacent to the road
Road Safety	High sensitivity receptor		
Vulnerable Road Users	High sensitivity receptor		
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 generally 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)

Magnitude of Impact

12.2.28 The determination of magnitude has been undertaken by considering the parameters of the Proposed Development, establishing the scope of the receptors that may be affected and quantifying these effects utilising IEMA Guidelines and professional judgement. The magnitude of impact or change has been considered according to the criteria defined in **Table 12.2**.

Table 12.2: Magnitude of Impact

Impact	Negligible	Minor	Moderate	Major
Driver Severance & Delay	< 10% Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels		
Community Severance & Delay	< 10% Increase in traffic	< 30% Increase in traffic	30% - 60% Increase in traffic	> 60% Increase in traffic

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 11: Noise and Vibration**)		
Road Safety	< 10% Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels		
Vulnerable Road Users	< 10% Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels		
Wider Disruption due to dangerous loads	0% Increase in traffic	< 30% Increase in traffic	30% - 60% Increase in traffic	> 60% Increase in traffic
Dust & Dirt	< 10% Increase in traffic	< 30% Increase in traffic	30% - 60% Increase in traffic	> 60% Increase in traffic

Significance of Effect

12.2.29 Sensitivity and magnitude of change as assessed under the detailed criteria have then been considered collectively to determine the potential effect and their significance. The collective assessment is a considered assessment by the assessor, based on the likely sensitivity of the receptor to the change (e.g., is receptor present which would be affected by the change), and then the magnitude of that change. **Table 12.3** is used as a guide to determine the level of effect. 'major' and 'moderate' effects are considered to be 'significant' in terms of the relevant guidance.

Table 12.3: Significance of Effect

Sensitivity of receptor	Magnitude of effect			
	Negligible	Minor	Moderate	Major
Low	None	Slight	Slight	Moderate
Medium	Slight	Slight	Moderate	Major
High	Slight	Moderate	Major	Major

Potential Cumulative Effects

12.2.30 An assessment of the cumulative effect on the Study Area of all relevant developments, including local wind farms, within a 5 km radius of the site (either in planning system or under construction) which may utilise the same access routes as the Proposed Development has been undertaken.

Assessment Assumptions and Limitations

12.2.31 The assessment has been undertaken based on the assumption that good construction practices will be employed, including the following:

- All vehicles delivering plant and materials to the site would be roadworthy, maintained and sheeted, as required;
- Suitable traffic management would be deployed for the movement of HGVs and other site traffic;
- Banksmen and police escort would be deployed for the movement of abnormal loads as required; and
- HGV loads would be managed to ensure part-load deliveries would be minimised where possible, to limit the overall number of loads.

12.2.32 The predicted increases in traffic levels against the baseline levels have been calculated in this section, then an assessment of the significance of the effect has been made against the criteria described in **Table 12.3.**

12.2.33 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, and therefore the IEMA threshold of 30% has been applied.

12.2.34 The construction working hours for the Proposed Development would be 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays unless otherwise agreed with THC. Certain activities, such as electrical works in the substation or turbine erection in the event of delays due to high winds, may require to be undertaken outwith these hours. It should be noted that out of necessity some activities may need to occur outside the specified hours stated, e.g. abnormal load deliveries, during large concrete pours, and during lifting of the turbine rotors. However, they would not be undertaken without prior approval from THC.

12.2.35 The assessment is based upon an assumed construction programme for the Proposed Development and is based upon average traffic flows. There may be localised peaks with construction days where flows can be higher for a specific hour, such as shift change on site.

12.2.36 Assumption on the origin points for materials have been made to provide a worst-case assessment scenario.

12.2.37 Wide area review of traffic surveys was not undertaken due to the impact that COVID-19 restrictions have had on traffic flows and patterns.

12.3 Consultation Undertaken

12.3.1 **Table 12.4** summarises the consultation responses regarding transport and access matters and provides information on where and/or how they have been addressed in this assessment. The following regulatory bodies made comment on transport matters during Scoping discussion held in 2020:

- The Highland Council (THC) Transport Department (as local roads agency); and
- Transport Scotland (as trunk road agency).

Table 12.4: Consultation Summary

Consultee and Date	Summary of Key Issues	Action taken
THC 27/04/2020	An assessment in line with Transport Assessment Guidance should be undertaken with growth rates agreed with THC.	Noted and provided.
	Liaison with THC structures should be undertaken	Contact has been made with THC structures
	Timber extraction traffic must be considered.	Traffic associated with commercial forestry activity and clearance necessary during the construction of the wind farm has been included in the assessment.
	Operational traffic can be scoped out from the assessment.	Noted.
	An abnormal load assessment is required	An abnormal load route assessment has been carried out for the delivery of the candidate turbine components from the Port of Cromarty to the site utilising the following roads: B817, A9(T), A839 and A836. This is included with the EIA Report as **Appendix 12.1**.
	A Construction Traffic Management Plan (CTMP) should be provided	CTMP proposals have been presented in the submission for delivery to be secured via planning condition.
	A Wear and Tear agreement to cover local roads should be provided.	This is noted by the applicant. The applicant is committed to entering into a suitable agreement.
	The design guidance and TA guidelines to be used.	Reference has been made to these documents in the preparation of this EIA Report chapter and supporting technical appendices.
	Need to consider grid connection works and the associated traffic with these works.	Grid connection works will be considered by a separate planning application.
	Impact on A836 road structure	The scale of traffic associated with the Proposed Development is of a similar scale as that THC has consented for Creag Riabhach which uses the same access route on the A836. Any required mitigation will be similar to that proposed for Creag Riabhach.

Consultee and Date	Summary of Key Issues	Action taken
Transport Scotland 21/02/2020	Potential trunk road related environmental impacts such as driver delay, pedestrian amenity, severance, safety etc construction traffic on the trunk road network be identified and assessed where appropriate (i.e. where IEMA Guidelines for further assessment are breached).	Environmental assessment of the trunk road network affected by the Proposed Development has been carried out in accordance with IEMA guidance and is summarised by this chapter.
	Transport Scotland will require to be satisfied that the size of turbines proposed can negotiate the selected route and that their transportation will not have any detrimental effect on structures within the trunk road route path. A full Abnormal Loads Assessment report will require to be provided with the EIA Report that identifies key pinch points on the trunk road network. Swept path analysis should be undertaken and details provided with regard to any required changes to street furniture or structures along the route.	An abnormal load route assessment has been carried out for the delivery of the candidate turbine components from the Port of Cromarty to the site utilising the following roads: B817, A9(T), A839 and A836. This is included with the EIA Report as **Appendix 12.1**
Scotways, 15/04/2020	It is advisable to set back all wind turbines a minimum distance, equivalent to the height of a blade tip, from the edge of any public highway (road or other public right of way) or railway line.	This is noted and acknowledged by the applicant in the design of the Proposed Development.

12.4 Statutory and Planning Context

12.4.1 This Chapter has been prepared taking cognisance of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations) and relevant documents set out in **Chapter 5**: **Planning Policy Context** of this EIA Report.

12.4.2 As noted previously, the following policy documents, data sources and guidelines have been used to inform this assessment:

- Guidelines for the Environmental Assessment of Road Traffic (institute of Environmental Management and Assessment, 2005a);
- Transport Assessment Guidance (Scottish Government, 2012);
- LA104, Environmental assessment and monitoring, Design Manual for Roads and Bridges (DMRB) (Standards for Highways, 2020); and
- Scottish Planning Policy (Scottish Government, 2017) paragraphs 269 – 291 on Promoting Sustainable Transport and Active Travel.

12.4.3 Relevant Local, National and Regional Policies are as follows:

Local Policy

12.4.4 The Highland Council Local Transport Strategy (LTS) aims to set direction of transport at a local level. The principal themes at the heart of the LTS are:

- Safety;
- Sustainability;
- Economic development; and
- Integration.

National Policy

12.4.5 The Scottish Government's vision for transport at a national and regional level is set out in National Policy Frameworks which include:

- Scotland's National Transport Strategy (2015): This strategy maps out the objectives, priorities and plans for the long-term future for transport in Scotland;
- Scottish Planning Policy (2017): This policy sets out national planning policies for operation of the planning system and for the development and use of land. It promotes consistency in the application of policy areas across Scotland (for further details please refer to **Chapter 5: Planning Policy Context**).

Regional Policy

12.4.6 The Highlands and Islands Regional Transport Strategy 2008 – 2022 (RTS) was approved by Scottish Ministers in 2008. It was informed and influenced by public and stakeholder consultation. The RTS, projects and horizontal themes form the associated delivery plan, set out the key policies and proposals required to deliver THC's vision for transport in the region.

12.4.7 The RTS Refresh published in 2017, captures the projects that are now committed to improve the transport of the region, and also highlights the further action that is required to support sustainable economic growth and to reduce barriers to participation in employment, learning, social, leisure, health and the wealth of cultural activities that the region has to offer.

12.5 Existing Environment

Baseline Traffic Surveys

12.5.1 Access to the site would be taken from the A836 via an upgraded junction as described in Paragraphs 12.2.6 to 12.2.9.

12.5.2 The A836 is a district distributor road that provides connections between Tain and Thurso via Lairg and Tongue. The road is of a good standard and varies between 6 m and 7 m in width and is subject to a 60 mph limit outwith settlements. A836 at a junction with the A838 narrows down to a single track with passing places.

12.5.3 The A839 connects The Mound and A9 through to Lairg and beyond to Invercassley. The road is generally a modern two-lane road with a speed limit of 60 mph, with 30 mph restrictions within settlements.

12.5.4 The A836 and A839 are maintained and operated by THC.

12.5.5 The A9 is the main trunk road in the area and connects Dunblane to Scrabster. The road is operated and maintained on behalf of Transport Scotland by BEAR Scotland. Within the Study Area, the road is subject to a 60 mph speed limit in the main.

12.5.6 The A9 and A836 within the study area form part of the North Coast 500 (NC500) tourist route. This 516-mile route is now a popular tourist sightseeing route around the north-west Highlands and Sutherland and has been responsible for an increase in traffic visiting the study network.

12.5.7 In order to assess the impact of development traffic on the study area, Annual Average Daily Traffic (AADT) flows were obtained from the UK Department for Transport (DfT) traffic database. It was not possible to collect new traffic flow data for the whole of the study network due to the ongoing impact on transport and access arising from COVID 19 travel restrictions.

12.5.8 The counts sites that have been used are as follows:

- A836 North of Lairg Lodge (10935);
- A836 Lairg Village (40936);
- A836 Achinduich (20934);
- A836 Bonar Bridge (50937);
- A836 Ardgay Village (80005);
- A836 North of Edderton (80004);
- A839 Pittentrail (20935);
- A9 The Mound (30722);
- A9 South of Clashmore (80002); and
- A9 Glenmorangie Distilery (80001).

12.5.9 The locations of the traffic count sites used in this assessment are illustrated in **Figure 12.2**. The DfT traffic data allows the traffic flows to be split in vehicle classes. The data has been summarised into Cars/Light Good Vehicles (LGVs) and HGV's).

12.5.10 **Table 12.5** summarises the baseline AADT traffic data collected for the purpose of this assessment.

Table 12.5: Existing Annual Average Daily Traffic (AADT) Traffic Conditions

Survey Location (Count Point ID)	Cars &LGVs	HGVs	Total
10935	287	32	319
40936	1806	140	1946
20934	984	89	1073
50937	1669	105	1774
80005	1692	129	1821
80004	531	165	696
20935	816	26	842
30722	3963	277	4240
80002	6718	361	7079

80001	7248	495	7743

Baseline Road Safety Review

12.5.11 Personal Injury Accident (PIA) data covering the study area was obtained from the DfT (available at https://www.gov.uk/government/collections/road-accidents-and-safety-statistics) for the five-year period between 2015 and 2019 (inclusive), which relates to the most recent period of available data. The locations of recorded accidents are shown on **Figure 12.3**.

12.5.12 The accident analysis is used to inform the review of the proposed route where any deficiencies in the road layout and condition identified. A total of 30 accidents were recorded across the study area during the five-year period. Of these, 17 resulted in slight injury (e.g. slight shock with occurrences of sprains or bruises) and 9 resulted in serious injury (e.g. breakages, lacerations, concussion, or hospital admittance) and 4 resulted in fatal injury (resulted in a mortality/death within 30 days after the accident).

12.5.13 For the purposes of the accidents review study area has been split into three sections of road network. These are:

- Section A - A9 (west of Glen Morangie) to Lairg along the A839;
- Section B - A9 (west of Glen Morangie) to Lairg along the A836; and
- Section C - Lairg to the Site along the A836.

12.5.14 The number and severity of accidents recorded in each of the three sections is provided in **Table 12.6** below:

Table 12.6: Number and Severity of Accidents Summary

Section	Slight	Serious	Fatal
A	11	6	2
B	1	5	1
C	1	0	1
Total	17	9	4

Baseline Sustainable Travel Infrastructure Review

12.5.15 There are no Core Paths recorded by THC near the proposed site access point for the Proposed Development. The A836 does not have any pedestrian or cyclist infrastructure near the site access junction, although the A836 is listed as part of the National Cycle Route 1 (NCR1).

Future Baseline

12.5.16 Construction of the Proposed Development could commence during 2024 if consent is granted and is anticipated to take up to 21 months depending on weather conditions and ecological considerations.

12.5.17 To assess the likely effects during the construction, base year traffic flows were determined by applying a National Road Traffic Forecast (NRTF) low growth factor to the surveyed traffic flows.

12.5.18 The NRTF low growth factor for 2019 to 2020 is 1.008 and 2020 to 2024 is 1.024. These factors were applied to the 2019 survey data to estimate the 2024 Base traffic flows shown in **Table 12.7**. This will be used in the Construction Peak Traffic Impact Assessment.

Table 12.7: Baseline 2024 Traffic Conditions

Survey Location (Count Point ID)	Cars &LGVs	HGVs	Total
10935	296	33	329
40936	1864	145	2009
20934	1016	92	1108
50937	1723	108	1831
80005	1746	133	1879
80004	548	170	718
20935	842	27	869
30722	4091	286	4377
80002	6934	373	7307
80001	7481	511	7992

12.5.19 In the scenario that the Proposed Development did not proceed, traffic growth will still occur.

12.6 Predicted Impacts

Proposed Development Parameters – Traffic and Transport

12.6.1 The Proposed Development is described fully in **Chapter 2: Proposed Development**. A summary is provided here highlighting those features pertinent to the assessment of traffic and transport.

Site Access and Onsite Tracks

12.6.2 Access to the site will be provided via an existing opening from the A836 south of Feith Osdail Bridge, which forms a T-junction and currently provides access to Dalnessie Estate. The access will require minor upgrade to allow for access by construction traffic and abnormal load transporters from the south, specifically widening of the access road to accommodate vehicle overrun of the larger vehicles transporting the Wind Turbine Generator (WTG) component abnormal loads. Upgrade of the existing junction is to be undertaken in 2022 in connection with the consented Creag Riabhach Wind Farm (THC Planning Reference: 14/00004/S36).

12.6.3 This access will serve both inbound and outbound construction traffic. All loaded vehicles are required to approach from the south and will not be permitted to cross the listed Feith Osdail Bridge. A total of 5.8 km of existing tracks and watercourse crossings will be upgraded.

12.6.4 New access tracks, including some which will be of floating construction, will be required to provide access to the proposed turbine locations, Substation and Battery Energy Storage System (BESS) as well as the onsite borrow pits. A total of 11.12 km of new tracks will be constructed.

Construction Traffic

12.6.5 During the 21-month construction period, the following traffic will require access to the site:

- Staff transport (cars or staff minibuses);
- Construction equipment and materials, deliveries of machinery and supplies such as crushed rock and concrete; and
- Abnormal loads consisting of the wind turbine sections and also heavy lift crane, transported to site in sectional loads.

12.6.6 Average monthly traffic flow data were used to establish the construction trips associated with the site.

Abnormal Load Access Route

12.6.7 AIL deliveries associated with the turbine components will access the Proposed Development from Invergordon via the A9, A839 and A836, as shown on **Figure 12.4**.

12.6.8 Given that the proposed route is a key route for both local and national traffic movements, movement of abnormal loads at night or on a Sunday when traffic flows are lower may be proposed subject to approval by Police Scotland and other stakeholders.

Construction Materials

12.6.9 The Proposed Development would require the transportation of a range of construction materials to the site. The key elements of construction work which would result in the generation of vehicular trips have been summarised in **Table 12.8**.

Table 12.8: Construction Activities Requiring Vehicle Trips

Key work element	Details and assumptions	Conventional HGVs	Abnormal loads
Site establishment	Delivery of site cabins and plant for construction activities at commencement of construction and later removal from site	Yes	No
Import of material from quarry	Delivery of materials that are not able to be extracted from within the site	Yes	No
Borrow pit	Delivery of plant associated with establishing borrow pit	Yes	No
Access track upgrade and construction	Delivery of materials related ot the upgrade of existing track and new onsite track	Yes	No

Turbine foundations and crane hardstandings	Delivery of plant associated with construction of crane hardstandings. Delivery of plant and materials including concrete, aggregate and reinforcement materials for turbine foundations	Yes	No
Control building and control building compound/substation	Delivery of material for construction of building foundations, structure and finishings. Delivery of electrical equipment and storage of batteries	Yes	No
Electrical installation	Delivery of sand and cables to connect turbines to substation	Yes	No
Wind turbine delivery	Delivery of turbine components to Site. Delivery of crane equipment to erect turbines. Includes escort vehicles associated with movement of abnormal loads	Yes	Yes

12.6.10 The precise quantities of construction materials required for the Proposed Development would depend on the presence of on-site borrow pits.

12.6.11 Whilst borrow pits are proposed on site, a robust assessment of a worst-case scenario has been included in the assessment. Therefore, the potential impact of the transportation of construction materials to the site has been assessed using two scenarios:

- Scenario 1: All construction materials are assumed to be sourced from off-site locations, including all aggregate required for track construction and upgrade, thus ensuring that the estimated level of trip generation is considered as a worst case; and
- Scenario 2: Aggregates used for formation, capping and subbase materials are assumed to be sourced from proposed on-site borrow pits with all remaining construction materials, specifically concrete for turbine and met mast bases, are assumed to be sourced from off-site locations.

12.6.12 An estimation of the material quantities for all elements of the Proposed Development has been made. **Table 12.9** provides a summary of the material quantities (aggregates only) required to be imported should resources not be available from borrow pits.

Table 12.9: Estimated Aggregate Material Quantities – Scenario 1: Worst Case

Infrastructure		Material quantities	
		m^3	tonne
Access tracks	New on-site access track	148,813	296,626
Construction compound	Substation and BESS	12,901	25,802
	Met mast working area	810	1,620
	Main Compound 1	2,259	4,518
	Contractors Compound	7,683	15,366
	Main Compound 2	14,200	28,400

Infrastructure		Material quantities	
		m^3	tonne
	Mobilisation Compound 1	1,845	3,690
	Mobilisation Compound 2	2,475	4,950
Turbine foundations	Turbine bases – formation only	2,556	5,112
	Fill above turbine bases	32,947	65,894
	Crane pads	125,441	250,882
	Crane pad boom support		
	Blade laydown and ancillaries		
	Turning heads		
Total		**351,930**	**702,860**

12.6.13 Scenario 2 is considered the most likely scenario whereby onsite borrow pits are taken into account with aggregate extraction. The onsite borrow pits identified are anticipated to provide material won exceeding the amount required for importation in the worst-case scenario (Scenario 1). Notwithstanding some imported aggregate would be required for Scenario 2 in order to reach the nearest borrow pit to the site access.

12.6.14 In addition to the aggregates required as summarised in **Table 12.3**, **Table 12.10** provides material quantities for all materials other than aggregates.

Table 12.10: Estimated Material Quantities – Excluding Aggregates (both scenarios)

Infrastructure		Material quantities	
		m^3	tonne
Turbine bases	Concrete	9,680	19,360
Substation, Control Building and Met Masts	Concrete	290	580
Turbine foundations	Installation 6N structural fill	4,082	8,164
	Blinding	1,570	3,140
	Reinforcement	1,040	
	Plinth shutter	50	99
	Foundation slab perimeter shutter	70	140
	Ducts	48 no.	
	Transformer plinths	16 no.	
	Step plinth	16 no.	
Electrical connection	Sand layer	4,137	8,276
	Cable	17,000 m	34
Control building	Reinforcement	288	0.288
Turbine Delivery, Erection and Commissioning		10 no.	

Total	**20,167**	**40,834**

Traffic Generation

HGV Trip Generation Calculations

12.6.15 The total number of HGV trips predicted to arise during the construction phase of the Proposed Development has been calculated based on the estimated material quantities provided in **Table 12.9** and **Table 12.10**. These have then been doubled to provide the two-way vehicle movements that would occur with each delivery and returning vehicle, as shown in **Table 12.11.**

Table 12.11: Total Number of HGV Trips (conventional HGVs)

Infrastructure item		Load size	Scenario 1		Scenario 2	
			No of loads	Two-way movements	No of loads	Two-way movements
Access tracks	New on-site access track	20 t	14,831	29,662	1,200	2,400
Construction compound	Substation and BESS	20 t	1,290	2,580	-	-
	Met Mast Working Area	20 t	81	162	-	-
	Main Compound 1	20 t	226	452	-	-
	Contractors Compound	20 t	768	1,538	-	-
	Main Compond 2	20 t	1,420	2,840	-	-
	Mobilisation Compound 1	20 t	185	370	185	370
	Mobilisation Compound 2	20 t	248	496	248	496
Turbine Foundations	Turbine Bases – formation only	20 t	256	512	-	-
	Fill above turbine bases	20 t	3,295	6,590	-	-
	Crane pads, additional laydown areas and turning heads	20 t	12,544	25,088	-	-
	Installation 6N structural fill	20 t	408	816	408	816
	Blinding	20 t	157	314	157	314
	Reinforcement	20 t	52	104	52	104
	Plinth shutter	20 t	5	10	5	10
	Base slab perimeter shutter	20 t	7	14	7	14
	Ducts	-	2	4	2	4
	Transformer plinths	-	1	2	1	2
	Step plinth	-	1	2	1	2

Infrastructure item		Load size	Scenario 1		Scenario 2	
			No of loads	**Two-way movements**	No of loads	Two-way movements
Turbine Bases	Concrete	20 t	968	1,936	968	1,936
Substation, Control Building and Met Masts	Concrete	20 t	29	58	29	58
Electrical	Sand layer	20 t	414	828	414	828
	Cable	-	23	46	23	46
Control Building	Reinforcement	20 t	0	0	0	0
Turbine Delivery, Erection and Commissioning		-	160	320	160	320
Reinstatement and Restoration		-	20	40	20	40
Total			**37,390**	**74,780**	**3,879**	**7,758**

Programme

12.6.16 The two-way movements for HGVs have been distributed over the anticipated 21-month construction programme according to the relevant site activity. The total two-way trip generation has been divided by the number of operational days in each month (22 in any one month) to provide daily two-way trip generation for both scenarios. Scenario 1 is shown in **Table 12.12** and Scenario 2 in **Table 12.13**.

12.6.17 For both scenarios, the month with the highest volume of traffic has been highlighted. For Scenario 1, month 3 is predicted to generate the most traffic, with 372 two-way vehicle movements daily, with months 7 to 12 generating similar volume of traffic with 370 two-way vehicle movements daily. For Scenario 2, month 3 is also expected to generate the most traffic, with 86 two-way vehicle movements daily.

Table 12.12: Scenario 1 – Two-way Movements by Construction Vehicles

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Site establishment	1899	1899	1899																		
Construction of access tracks and crane hardstandings			5491	5491	5491	5491	5491	5491	5491	5491	5491	5491									
Turbine foundation construction				1145	1145	1145	1145	1145	1145	1145	1145	1145									
Substation, energy storage and electrical works				235	235	235	235	235	235	235	235	235	235	235							
Cable trenching and installation						97	97	97	97	97	97	97	97	97							
Crane delivery						16															
Turbine delivery, erection and commissioning							32	32	32	32	32	32	32	32	32	32					
Site reinstatement							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
General Site Traffic (Personnel)	550	550	**770**	1100	1100	1100	1100	1100	1100	1100	1100	1100	550	550	550	550	550	550	550	550	550
Monthly ALL Total	2449	2449	**8160**	7971	7971	8084	8103	8103	8103	8103	8103	8103	916	916	585	585	553	553	553	553	553
Daily ALL Total	112	112	**372**	364	364	368	370	370	370	370	370	370	42	42	28	28	26	26	26	26	26
Monthly HGV Total	1899	1899	**7390**	6871	6871	6984	7003	7003	7003	7003	7003	7003	366	366	35	35	3	3	3	3	3
Daily HGV Total	88	88	**336**	314	314	318	320	320	320	320	320	320	18	18	2	2	2	2	2	2	2

Table 12.13: Scenario 2 – Two-way Movements by Construction Vehicles

Activity	1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	16	17	18	19	20	21
Site establishment	1089	1089	1089																		
Construction of access tracks and crane hardstandings																					
Turbine foundation construction				356	356	356	356	356	356	356	356	356									
Substation, energy storage and electrical works				0	0	0	0	0	0	0	0	0	0	0							
Cable trenching and installation						97	97	97	97	97	97	97	97	97							
Crane delivery						16															
Turbine delivery, erection and commissioning							32	32	32	32	32	32	32	32	32	32					
Site reinstatement							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
General Site Traffic (Personnel)	550	**550**	**770**	1100	1100	1100	1100	1100	1100	1100	1100	1100	550	550	550	550	550	550	550	550	550
Monthly ALL Total	1639	1639	**1859**	1456	1456	1569	1588	1588	1588	1588	1588	1588	682	682	585	585	553	553	553	553	553
Daily ALL Total	76	76	**86**	68	68	72	74	74	74	74	74	74	32	32	28	28	26	26	26	26	26
Monthly HGV Total	1089	1089	**1089**	356	356	469	488	488	488	488	488	488	132	132	35	35	3	3	3	3	3
Daily HGV Total	50	50	**50**	18	18	22	24	24	24	24	24	24	6	6	2	2	2	2	2	2	2

HGV Trip Generation Summary

12.6.18 The maximum level of two-way trips generated for the construction programme and the two construction material sourcing scenarios are as follows:

- Scenario 1: the maximum number of daily two-way HGV movements is 336; and
- Scenario 2: the maximum number of daily two-way HGV movements is 50.

Light Vehicle Trip generation

12.6.19 Light vehicles (i.e. 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.

12.6.20 Light vehicle trips would be generated by the approximately 50 workers who would be working on the site during the construction phase. As a worst case, there would be a maximum of 50 two-way movements daily based on an average vehicle occupancy of 2 people.

Total Trip Generation

12.6.21 The total trip generation (maximum daily and average) for a 21-month construction programme for HGV and LGV is set out in **Table 12.14**.

12.6.22

Table 12.14: Maximum and Average Daily Two-way Vehicle Movements

	Scenario 1			Scenario 2		
	HGV	LGV	Total	HGV	LGV	Total
Maximum	336	35	371	50	35	85
Average	164	38	202	18	38	56

12.6.23 Construction HGV traffic flows would be spread across the working day (07:00-19:00), which at peak would equate to a maximum of 37 two-way trips per hour, or 19 HGVs in each direction, equivalent to one every 3 minutes. On average across the 21-month programme this reduces to 18 two-way trips per hour, or 9 HGVs in each direction, equivalent to one every 6.5 minutes.

Trip Distribution

12.6.24 The distribution of construction trips on the network will vary depending on the types of loads being transported. All trips will approach from the south using the A836.

12.6.25 For Scenario 1 it is assumed that aggregates and ready-mix concrete will be supplied from local sources and the assessment has assumed the facilities located to the east of Ardgay for the supply of these materials.

12.6.26 General construction, building supply deliveries, geotextile, cable and reinforcement deliveries will be made from the A9 via the A839 and A9.

12.6.27 It has been assumed that staff working at the construction site would either live locally, based at both Lairg and Bonar Bridge, or stay in bed and breakfast, guest houses or hotels for the duration of the construction programme. Therefore, it has been assumed

that all traffic would arrive from the south along the A836 for the purpose of the assessment.

12.6.28 Given that the peak traffic generation associated with the Proposed Development is predicted to occur in the construction year 2024, a forecast year of 2024 is assumed. As noted above, the NRTF was utilised to generate a growth factor of 1.008 for 2019 to 2020 based on 'low' growth and a growth factor of 1.024 for 2020 to 2024 based on 'low' growth.

12.6.29 The 2024 forecast future baseline traffic flows are presented in **Table 12.7** previously.

12.7 Assessment of Effects

12.7.1 The Proposed Development has been designed to include a range of measures to mitigate potential effects. Included within this are the design of the site entrance to include radii and width suitable for ease of abnormal indivisible load access. All such measures are described fully in **Chapter 2: Proposed Development**.

Construction Effects

12.7.2 The impact of the Proposed Development has been assessed using Annual Average Daily Traffic flows on the principal road links in the study area that would be utilised by the general construction traffic – cars/LGVs, and HGVs involved in the delivery of construction materials and plant to/from the site.

12.7.3 The increase in traffic flow along the A836 and A839 (for vehicle movements other than the abnormal loads) has been calculated for both scenarios 1 and 2 for the following two cases:

- The maximum trip generation occurring over the construction period; and
- The average trip generation throughout the entire active construction period.

12.7.4 **Table 12.15** and **Table 12.16** show the predicted daily total and HGV traffic increases for the two cases above. The baseline traffic flows are those presented in **Table 12.8**.

Table 12.15: Predicted Increases in Traffic – Scenario 1

Link		2024 Baseline		2024 Baseline+ Construction		Increase %	
		Total	HGVs	Total	HGVs	Total	HGVs
A836 North of Lairg Lodge	Max	329	33	700	369	113	1017
	Avg			531	197	61	497
A836 Lairg Village	Max	2077	145	2262	313	9	116
	Avg			2178	227	5	57
A839 Pittentrail	Max	896	27	1081	195	21	626
	Avg			997	109	11	306
A836 Bonar Bridge	Max	1861	108	2047	276	10	155
	Avg			1962	190	5	76
A836 Ardgay Village	Max	1910	133	2095	301	10	126
	Avg			2011	215	5	62

Link		2024 Baseline		2024 Baseline+ Construction		Increase %	
		Total	HGVs	Total	HGVs	Total	HGVs
A9 the Mound	Max	4445	286	4630	454	4	59
	Avg			4546	368	2	29
A9 Glenmorangie Distillery	Max	8196	511	8567	847	5	66
	Avg			8398	675	2	32
A9 South of Clashmore	Max	7381	373	7567	541	3	45
	Avg			7482	455	1	22
A836 North of Edderton	Max	735	170	920	338	25	99
	Avg			836	252	14	48
A836 Achinduich	Max	1110	92	1295	260	17	183
	Avg			1211	174	9	89

Table 12.16: Predicted Increases in Traffic – Scenario 2

Link		2024 Baseline		2024 Baseline+ Construction		Increase %	
		Total	HGVs	Total	HGVs	Total	HGVs
A836 North of Lairg Lodge	Max	329	33	414	83	26	151
	Avg			385	51	17	54
A836 Lairg Village	Max	2077	145	2119	170	2	17
	Avg			2105	154	1	6
A839 Pittentrail	Max	896	27	938	52	5	93
	Avg			924	36	3	34
A836 Bonar Bridge	Max	1861	108	1904	133	2	23
	Avg			1889	117	2	8
A836 Ardgay Village	Max	1910	133	1952	158	2	19
	Avg			1938	142	1	7
A9 the Mound	Max	4445	286	4487	311	1	9
	Avg			4473	295	1	3
A9 Glenmorangie Distillery	Max	8196	511	8281	561	1	10
	Avg			8252	529	1	4
A9 South of Clashmore	Max	7381	373	7424	398	1	7
	Avg			7409	382	0	2
A836 North of Edderton	Max	735	170	777	195	6	15
	Avg			763	179	4	5
A836 Achinduich	Max	1110	92	1152	117	4	27

Link		2024 Baseline		2024 Baseline+ Construction		Increase %	
		Total	HGVs	Total	HGVs	Total	HGVs
	Avg			1138	101	3	10

Scenario 1: Traffic Increase Summary

12.7.5 The results above show that the majority of the percentage increases in total traffic volumes are below the IEMA thresholds (i.e. an increase of 30%) with the exception of the A836 North of Lairg Lodge where a total percentage increase is over the IEMA guideline threshold. The increase in HGV traffic along the A836, A839 and A9 (T) are in exceedance of the IEMA thresholds.

12.7.6 The largest increase would be where the total traffic flows increase by 113% (1017% HGV increase) for a worst-case day.

12.7.7 The average day during the construction period would see a 61% increase to total traffic flows but a significant 497% increase in HGVs.

12.7.8 In summary, while total traffic levels are mostly within the IEMA thresholds of a 30% increase to traffic flows on the A836, A839 and the A9(T) to the south of Lairg Village (both directions), HGV trip generation is significantly increased for both the worst-case scenario and the average day.

12.7.9 The relative traffic flow increases for Scenario 1 are realised due to the existing low baseline traffic flows. However, traffic flow levels remain within the practical working capacity of the respective road links.

Scenario 2: Traffic Increase Summary

12.7.10 The results above show that all percentage increases in total traffic volumes are well below the IEMA thresholds (i.e. an increase of 30%); however, the increase in HGV traffic along the A836 North of Lairg Village and A839 Pittentrail are in exceedance of the IEMA thresholds.

12.7.11 Under Scenario 2, the largest increase would be where the total traffic flows increase by 26% (151% HGV increase) for a worst-case day.

12.7.12 The average day during the construction period would see only a 17% increase to total traffic flows and a 54% increase to HGVs.

12.7.13 In summary, while total traffic levels are within the IEMA thresholds of a 30% increase to traffic flows (both directions), HGV trip generation is significantly increased for both the worst-case scenario and the average day.

12.7.14 The relative traffic flow increases for Scenario 2 are realised due to the existing low baseline traffic flows. However, traffic flow levels remain within the practical working capacity of the respective road links.

12.8 Potential Effects

Effect on Driver Severance and Delay

12.8.1 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 cars parked 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.

12.8.2 The principal road network in the study area consists of high-quality A839 and A836 trunk road suitable of carrying HGVs. The use of well-established quarried material suppliers (where required) to the south-west of the Proposed Development location will assist in reducing excess mileage used to transport materials to the site. Accordingly, these receptors are of low and medium sensitivity. Magnitude of impact by the construction phase HGV traffic is typically minor to moderate, resulting in a significance of effect of '**slight**' to '**moderate**' impact respectively, therefore not significant.

12.8.3 The main potential impact of driver severance and delay would relate to the transportation of abnormal loads, which are set out in Paragraphs 12.6.7 to 12.6.8.

Effect on Road Safety

12.8.4 **Table 12.2** and **Table 12.3** define road safety as a high sensitivity receptor with a magnitude of impact based on the volume of accidents along the routes used to the site. An increase, or decrease, in accidents may result from changes in traffic flows and the composition of traffic on the local highway network.

12.8.5 The accidents recorded within the study area are set out in Paragraphs 12.5.11 to 12.5.14. A total of 30 injury accidents were recorded within the Study Area: 17 resulting in a slight injury, 9 resulting in serious injury and 4 resulting in fatal injuries.

12.8.6 There would be a large increase in HGVs against baseline HGV flows: however, these would be spread evenly throughout the working hours of 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on a Saturday.

12.8.7 Deliveries of abnormal loads will be delivered to site under police escort. Other large components would be moved in accordance with an agreed CTMP.

12.8.8 The movement of abnormal loads has the potential to create a general hazard on the highway. All turbine components would be transported from the Port of Cromarty, and along the A9, A839 and A836 to the site. The Abnormal Loads must be delivered to the site under controlled conditions and under suitable escort. The manner in which abnormal loads are transported along the public highway/trunk road network would be subject to the approval of Transport Scotland, THC and Police Scotland in advance and would be planned to ensure road safety is not compromised.

12.8.9 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. The number of accidents recorded for the study area are low over the five-year study period. Therefore, the significance of effect is assessed to be '**slight'** and '**not significant'**.

Effect on Community Severance and Delay

12.8.10 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 amenities may be 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.

12.8.11 There are local amenities directly fronting the A839 in Pittentrail and Lairg as well as A836 in Bonar Bridge, although the majority of these are close to a sharp bend in the road, where traffic will be travelling at low speeds. Additionally, there are informal crossing facilities at these locations.

12.8.12 In accordance with significance criteria in **Table 12.3** community severance has been classified as a medium sensitivity receptor and the magnitude of change of the Proposed Development on Community Severance would be **'minor'** (<30% increase in traffic). Therefore, the significance of effect is assessed **'slight'** and therefore **'not significant'**, for both Scenarios 1 and 2.

Effects on Noise and Vibration

12.8.13 The effects of noise can be high in relation to sensitive receptors such as those residential properties which are sparsely present within the study area. A noise assessment has been undertaken for the Proposed Development and is presented in **Chapter 11: Noise and Vibration.**

12.8.14 As discussed in **Table 12.2**, the IEMA Guidelines state that an increase in noise due to an increase in total traffic of less than 25% is deemed a **'negligible'** noise impact to receptors, with anything greater than 25% requiring a quantitative assessment.

12.8.15 The maximum traffic increase predicted for the proposed development is 372 two-way vehicle movements per day for Scenario 1 on A836 North of Lairg Lodge and A9 Glenmorangie Distillery and 86 two-way vehicle movements per day for Scenario 2 on the A836 North of Lairg Lodge and A9 Glenmorangie Distillery.

12.8.16 This is 113% of the current number daily vehicle movements along A836 North of Lairg Lodge and only 5% along the A9 Glenmorangie Distillery in Scenario 1 and 26% and 1% for Scenario 2 and hence, the traffic noise significance of effects are assessed to be **'slight'** and **'not significant'**. This corresponds with the findings of the noise assessment which describes the full environmental effects of noise and vibration in **Chapter 11: Noise and Vibration,** Section 11.6 – Predicted Impacts.

Effects on Vulnerable Users

12.8.17 Vulnerable road users are considered to be a high sensitivity receptor according to the assessment criteria detailed in **Table 12.3**.

12.8.18 The impact of traffic on vulnerable road users would be most noticeable within settlements along the proposed access routes where the presence of vulnerable road users, such as pedestrians and cyclists are highest.

12.8.19 The percentage increase in traffic would be >10% for both scenarios. The majority of trip generation from the Proposed Development would arise from 20 tonne HGVs. Consequently, there would be a potential worsening of conditions for vulnerable users during the construction period. This magnitude of effect is considered to be **'moderate'** and the effect on vulnerable road users for both Scenario 1 and 2 is, assessed to be **'major'** during the construction period and **'significant'** in terms of the EIA regulations.

Effects Due to Dust and Dirt

12.8.20 The movement of construction traffic to and from the site would have the potential to bring dust and dirt and other detritus onto the highway. Sensitive receptors within the study area include residential properties, B&Bs, local shops and other facilities, which may experience dust and dirt and have been classified as low to medium sensitivity receptors.

12.8.21 HGVs are likely to create the greatest impact in terms of dust and dirt with an anticipated significant increase of HGV traffic on the A836 North of Lairg Lodge for the worst-case day for both scenarios with a predicated maximum increase of 969% (Scenario 1) and 151% (Scenario 2) and average day increases of 497% for Scenario 1 and 54% for Scenario 2.

12.8.22 Given that the magnitude of effect of dust and dirt have been classified as **'major'** (>60% increase) and would affect **'low'** sensitivity receptors, the potential effect would be **'moderate'** and therefore **'significant'**. However, due to the rural nature of the affected corridor and a considerable distance between site and nearest village it is noted that the effect of Dust and Dirt can be classed as **'not significant'**.

Impact Caused by Movement of Abnormal Loads

12.8.23 The route from the Port of Cromarty to the site is considered suitable for such movements, subject to the potential need for localised temporary works at junctions to facilitate movements. Any modifications to junction layouts would be confirmed through trial run and further surveys, and any modifications or works required to accommodate abnormal loads would be discussed with the Roads Authority and the necessary consents and permits would be obtained in advance of any works or delivery periods.

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

- The rolling closures of roads and footways causing temporary driver and pedestrian delay;
- The perceived effect to pedestrians and vulnerable road users caused by the movement of large turbine components in proximity to property and infrastructure.

12.8.25 The severity of these impacts is considered as follows:

- Delays due to lane/road closures would be inevitable, although abnormal loads would be timed to avoid the peak hours and therefore abnormal loads 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.

12.8.26 The residential properties, B&Bs, local shops and other facilities within the Study Area are classed as medium receptors.

12.8.27 The magnitude of change of transporting the abnormal loads during the day would be '**major'** and therefore consideration could be given to abnormal load deliveries being undertaken overnight to reduce the potential for disruption and delay, subject to approval. However, this will depend on the type of transport vehicle used and only by agreement with the relevant authorities.

Cumulative Effects

12.8.28 **Table 6.6 in Chapter 6** of this EIA Report provides further information on the potential cumulative sites within the Study Area.

12.8.29 There are several proposed wind farm developments in the Highlands which may have overlapping construction periods with the Proposed Development. For the purposes of the cumulative assessment only wind farms which are still in the planning process have been considered. Those that are consented are deemed to have the potential to be under construction or nearing completion by the time development is commenced on the Proposed Development and have therefore been excluded from the assessment. Accordingly, the following wind farm projects have been considered in this cumulative assessment:

- Garvary Wind Farm;
- Strath Tirry Wind Farm;
- Achany Extension Wind Farm;
- Lairg II Wind Farm;
- Kintradwell Wind Farm;
- Strathrory Wind Farm;
- Sallachy Wind Farm; and
- Meall Buidhe Wind Farm

12.8.30 Details of the estimated construction vehicle trip generation and affected road links were extracted for each cumulative wind farm development from the relevant EIA Report Chapter found on the THC Planning / ECU portals. Only developments which would impact on the same study network as the Proposed Development have been included in the cumulative assessment.

12.8.31 Combining these with the respective link flows from Scenario 1, as the worst-case, provides the following cumulative assessment, summarised in **Table 12.17** below.

Table 12.17: Cumulative Construction Trip Assessment

Link	Baseline 2024		Garvary WF		Strath Tirry WF		Achany Ext WF		Lairg 2 WF		Meall Buidhe WF		Kintradwell WF		Strathrory WF		Sallachy WF		Chleansaid		Cumulative		% Change	
	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGV	Total	HGV
A836 North of Lairg Lodge	329	33			66	46											100	52	371	336	866	467	163%	1314%
A836 Lairg Village	2077	145	22	0	60	44			30	3	39	5					74	50	186	168	2487	415	20%	187%
A839 Pittentrail	896	27	6	0	8	2	16	4	30	3	39	5					26	2	186	168	1206	211	35%	686%
A836 Bonar Bridge	1861	108	106	39	54	44	138	93	30	27							74	50	186	168	2449	529	32%	388%
A836 Ardgay Village	1910	133	106	39	44	44	138	93	30	27							62	50	186	168	2475	554	30%	316%
A9 the Mound	4445	286	0	0	2	2	8	4	30	3			131	93			2	2	186	168	4803	558	8%	95%
A9 Glenmorangie Distillery	8196	511	49	27	2	2	138	93	30	29			131	93	90	90	6	6	371	336	9013	1187	10%	132%
A9 South of Clashmore	7381	373	0	0			8	4	30	3			131	93			2	2	186	168	7738	643	5%	72%
A836 North of Edderton	735	170	49	27			138	93	30	27					90	90			186	168	1227	575	67%	238%
A836 Achinduich	1110	92	22	0	54	44	138	93	30	27							74	50	186	168	1613	474	45%	416%

12.8.32 **Table 12.17** shows, with the cumulative worst-case, although highly unlikely scenario, of the maximum vehicular traffic associated with the construction of the Proposed Development and cumulative windfarms occurring simultaneously. The maximum impact on the baseline traffic flows on the A836 North of Lairg Lodge is 163%, which is in exceedance of the 30% identified in the IEMA guidelines.

12.8.33 **Table 12.17** shows the worst-case cumulative impact of an increase in HGVs against baseline HGVs. The highest percentage increase of the listed locations is 1314% at A836 North of Lairg Lodge which represents a cumulative magnitude of impact of **'high'** on these **'low'** sensitivity receptors resulting in a significance of effect of **'moderate'**, which may be reduced to **'slight'** as the baseline traffic flows along this route are low and therefore **'not significant'**.

12.8.34 The assessment of the cumulative impact of abnormal loads has not been undertaken as the simultaneous movement of these loads to different sites would not be permitted and would be planned fully in an Abnormal Load Traffic Management Plan (ATMP) for each development and approved by Police Scotland.

Residual Effects

12.8.35 Given the temporary nature of construction programme (21 months) and with the implementation of mitigation measures through a CTMP and ATMP, all effects can be effectively managed and are assessed to be '**minor**' or '**negligible**'. No residual effects remain after mitigation measures have been implemented.

12.9 Mitigation

Construction Phase Mitigation

12.9.1 A Construction Traffic Management Plan (CTMP) would be in place to actively mitigate the effects as discussed above and an outline CTMP has been prepared at this stage and submitted as part of the Planning Application to outline the mitigation measures recommended during the construction stage. This is provided as **Appendix 12.2: CTMP**.

12.9.2 The following measures would be implemented through a CTMP during the construction phase. The CTMP would be agreed with THC prior to construction works commencing:

- Where possible, further detailed design processes would minimise the volume of material to be imported to site to help reduce HGV numbers;
- A site worker transport and travel arrangement plan, including transport modes to and from the worksite (including pick up and drop off times);
- A Traffic Management Plan to control the operation of the access junctions;
- All materials delivery lorries (dry materials) should be sheeted to reduce dust and stop spillage on public roads;
- Specific training and disciplinary measures should be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
- Wheel cleaning facilities will be provided at access junction(s);
- Normal site working hours would be limited to between 07:00 and 19:00 (Monday to Friday and 08:00 and 13:00 on Saturday though component delivery and turbine erection may take place outside these hours;

- Provide construction updates on the project website and or a newsletter to be distributed to residents within an agreed distance of the site.
- All drivers would be required to attend a detailed induction prior to undertaking any works on the Proposed Development site.

12.9.3 Advance warning signs will be installed on the approaches to the affected road network. Information signage could be installed to help improve driver information and allow other road users to consider alternative routes or times for their journey (where such options exist).

12.9.4 The location and numbers of signs will be agreed post consent and would form part of the wider traffic management proposals for the Proposed Development.

12.9.5 The applicant will also ensure information would be distributed through its communication team via the project website, local newsletters and social media.

12.9.6 Post-consent, the applicant will establish a Community Liaison Forum, in collaboration with THC and local Community Councils. The forum will allow the community to be kept up to date with project progress and allow communication on the provision of transport-related mitigation and publicise the timings of turbine component deliveries. The Community Liaison Forum will be maintained until construction is compete and the Proposed Development is operational.

Abnormal Load Transport Management Plan

12.9.7 An Abnormal Load Transport Management Plan will be prepared to cater for all movements to and from the Proposed Development site. This would include:

- Procedures for liaising with the emergency services to ensure that police, fire and ambulance vehicles are not impeded by the loads. This is normally undertaken by informing the emergency services of delivery times and dates and agreeing communication protocols and lay over areas to allow overtaking.
- A diary of proposed delivery movements to liaise with the communities to avoid key dates such as popular local events etc.
- A protocol for working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic.
- Proposals to establish a construction liaison committee to ensure the smooth management of the project / public interface with the applicant, the construction contractors, the local community, and if appropriate, the police forming the committee. This committee would form a means of communicating and updating on forthcoming activities and dealing with any potential issues arising.

12.9.8 A police escort will be required to facilitate the delivery of the predicted loads. The police escort would be further supplemented by a civilian pilot car to assist with the escort duty. It is proposed that an advance escort would warn oncoming vehicles ahead of the convoy, with one escort staying with the convoy at all times. The escorts and convoy would remain in radio contact at all times where possible.

12.9.9 The abnormal loads convoys will be no more than three AILs long, or as advised by the police, to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic where it is safe to do so.

12.9.10 The times in which the convoys would travel will need to be agreed with Police Scotland who have sole discretion on when loads can be moved.

Operational Phase Mitigation

12.9.11 The site entrance will be well maintained and monitored during the operational life of the proposed development. Regular maintenance will be undertaken to keep the site access track drainage systems fully operational and the road surface in good condition and to ensure there are no adverse issues affecting the public road network.

12.10 Summary of Effects

12.10.1 **Table 12.18** provides a summary of the construction environmental effects, in terms transport and access, of the Proposed Development prior to mitigation.

Table 12.18: Summary of Access, Traffic and Transport Effects

Potential Impact	Duration	Sensitivity	Magnitude	Effect	Significance
Driver severance and delay	Temporary	Low to Medium	Minor to Moderate	Slight to Moderate	Not Significant
Community severance and delay	Temporary	Medium	Minor	Minor to Moderate	Not Significant
Vulnerable Road Users	Temporary	High	Moderate	Major	Significant
Noise and vibration	Temporary	Medium	Negligible	Slight	Not Significant
Road Safety	Temporary	High	Moderate	Slight	Not Significant
Abnormal loads	Temporary	High	Minor	Moderate	Not Significant
Dust and dirt	Temporary	Low to Medium	Major	Moderate	Not Significant

12.10.2 **Table 12.19** provides a summary comparing the significance of the effects during the construction period before and after the proposed mitigation.

Table 12.19: Summary of Pre/Post Mitigation Access, Traffic and Transport Effects

Potential Impact	Pre-mitigation		Proposed Mitigation	Post-mitigation residual effects	
	Effect	Significance		Effect	Significance
Driver severance and delay	Slight to Moderate	Not Significant	TMP for the movement of abnormal loads. Trial Run for abnormal loads prior to	Minor	Not Significant
Community severance and delay	Minor to Moderate	Not Significant		Minor	Not Significant

Potential Impact	Pre-mitigation		Proposed Mitigation	Post-mitigation residual effects	
	Effect	Significance		Effect	Significance
Vulnerable Road Users	Major	Significant	commencement of construction. Road condition survey (including assessment of existing structures as appropriate) prior to the commencement of construction and a similar assessment following completion of the works. Provision of information to local residents and users of amenities, to involve the community in the safe operation of the CTMP and to alleviate stress and anxiety. Good construction practices including wheel wash and careful loading.	Minor	Not Significant
Noise and vibration	Negligible	Not Significant		Minor	Not Significant
Road Safety	Moderate	Not Significant		Minor	Not Significant
Abnormal loads	Moderate	Not Significant		Minor	Not Significant
Dust and dirt	Moderate	Not Significant		Minor	Not Significant

12.11 References

Institute of Environmental Management and Assessment, 1993 – Guidelines for the Environmental Assessment of Road Traffic

Design Manual for Roads and Bridges, Standard for Highways, 2020 – LA 104: Environmental assessment and monitoring.

Scottish Government (Transport Scotland), 2012 – Transport Assessment Guidance

The Highland Council, 2014 – Guidance on the Preparation of Transport Assessments