



Wind Power North Two Limited

Balblair Wind Farm

Environmental Impact Assessment Report (Volume 2)

Chapter 12 – Traffic and Movement

663896



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12 TRAFFIC AND MOVEMENT

12.1 Introduction

12.1.1 This chapter considers the likely significant effects on receptors along the transport routes as a result of vehicle movements associated with the proposed Balblair Wind Farm ('the proposed Development').

12.1.2 The specific objectives of the chapter are to:

- Describe the assessment methodology and significance criteria used in the impact assessment;
- Describe the Traffic and Movement baseline conditions (including future baseline);
- Describe any likely significant impacts and effects of the proposed Development on the receptors identified in the baseline assessment;
- Describe the mitigation measures proposed to address any likely significant adverse effects;
- Assess the residual effects remaining following the implementation of applied mitigation; and
- Describe any likely cumulative effects of the proposed Development combining and interacting with the residual environmental effects of committed development/s.

12.1.3 This chapter is supported by the following EIA Report Figures and Technical Appendices:

12.1.4 EIA Report Figures (**Volume 3a**):

- **Figure 12.1: Traffic Study Area;**
- **Figure 12.2: Abnormal Load Route;**
- **Figure 12.3: Traffic Count Points;**
- **Figure 12.4: Traffic Accident Data; and**
- **Figure 12.5: Construction Traffic Distribution.**

12.1.5 EIA Report Technical Appendices (**Volume 4**):

- **Technical Appendix 12.1: Abnormal Loads Access Review; and**
- **Technical Appendix 12.2: Outline Construction Traffic Management Plan.**

12.1.6 The assessment has been informed by the embedded mitigation measures which form part of the proposed Development. Please refer to **Chapter 2: The Proposed Development** for further details.

12.2 Relevant legislation and guidance

12.2.1 This chapter has been prepared in line with the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations).

Legislation

12.2.2 There is no legislation specific to transport assessments that is required to be considered as part of this assessment.

Guidance

- 12.2.3 The following guidelines have been used to inform this assessment:
- Institute of Environmental Management and Assessment, Guidelines for the Environmental Assessment of Traffic and Movement (2023);
 - LA104, Environmental assessment and monitoring, Design Manual for Roads and Bridges (DMRB) (Standards for Highways, 2020);
 - The Highland Council, Roads and Transport Guidelines for New Developments (2013);
 - Scottish Government, Transport Assessment Guidance (2012); and
 - The Highland Council, Guidance on the Preparation of Transport Assessment (2014).

12.3 Consultation undertaken

- 12.3.1 **Table 12.1** summarises the EIA Scoping consultation responses regarding Traffic and Movement and provides information on where and/or how they have been addressed in this assessment. The following regulatory bodies made comment on Traffic and Movement matters during scoping discussions held in 2024:
- Scottish Ministers via the Energy Consents Unit;
 - The Highland Council; and
 - Transport Scotland.

Table 12.1: Summary of consultation responses relevant to this chapter

Consultee	Issues Raised	Response/Action Taken
Statutory Consultees		
Energy Consents Unit 28/06/2024	<p>The Scottish Ministers recommend that the Company discuss and agree the scope of the Abnormal Loads Assessment with Transport Scotland prior to it being undertaken.</p> <p>The Scottish Ministers recommend that the Company discuss and agree the scope of the construction traffic management plan with the Highland Council and Transport Scotland. Local communities which will be impacted by the proposed Development's construction traffic should also be involved in such discussions. The Highland Council also require a standalone Transport Assessment be included in support of the application and carried out in accordance with Highland Council's Guidance on the Preparation of Transport Assessments</p>	<p>Noted</p> <p>The Applicant undertook an access feasibility study to understand potential access route options for abnormal loads to the Site. Two options were established as potentially feasible for the delivery of abnormal loads from port of entry (either Invergordon or Nigg) to the A9 and then:</p> <ol style="list-style-type: none"> 1. A839 west through Rogart, A836 from Lairg (south) to Site entrance 2. A949 west through Spinningdale, A836 from Bonar Bridge (north) to Site entrance <p>It became apparent that a number of wind farm developers were co-operating on work to establish option 1 as a suitable transport route for wind turbine components. Option 1 was therefore selected as the preferred option. Turbine blades for the proposed Development will be shorter than the proposed blades for other developments proposed to use the route. It is therefore possible to rely on access studies undertaken for those windfarm which are proposing to use the route already. An Abnormal Loads Access Review undertaken by WSP is submitted as a Technical Appendix to this chapter (Technical Appendix 12.1).</p> <p>A Transport Assessment (TA) is provided within this chapter and an Outline Construction Traffic Management Plan (OCTMP) is provided as a Technical Appendix to this chapter (Technical Appendix 12.2).</p>

Consultee	Issues Raised	Response/Action Taken
<p>The Highland Council (THC) Planning Authority 27/05/2024</p>	<p>A Transport Assessment (TA), Construction Traffic Management Plan (CTMP) and an Abnormal Load Assessment will be required within the EIA Report. The following wording is the Council's generic advice.</p> <p>Transport Assessment Methodology</p> <p>The Transport Assessment Methodology below sets out what the Council requires, and further information is provided in our published Roads and Transport Guidelines for New Developments. When establishing a scope for the assessment consideration should be given to the use of the public roads in this area can be influenced significantly by tourist traffic.</p> <p>Transport Planning would expect a Transport Assessment to be submitted with any future planning application and a High National Traffic Forecast be applied. The information below is not exhaustive and should be used as a guide to submitting all relevant information in relation to roads, traffic, and transportation matters arising from the development proposals.</p> <p>Identify all public roads affected by the development and provide preferred and alternative access routes with a clear evaluation of their pros and cons.</p> <p>Establish current condition of the roads. This work which should be undertaken by a consulting engineer acceptable to the Council and will involve an engineering appraisal of the routes including the following:</p> <ul style="list-style-type: none"> assessment of structural strength of carriageway including construction depths and road formation 	<p>Transport Assessment Methodology</p> <p>Traffic and Movement will be Chapter 12 of the EIA Report.</p> <p>A Technical Appendix will be included within Chapter 12 of the EIA Report. A low traffic growth factor will be used to consider future traffic growth, as requested by The Highland Council Transport Planning Team in their Scoping Response (28/05/2024).</p> <p>Abnormal Load Assessment</p> <p>The Applicant undertook an access feasibility study to understand potential access route option for abnormal loads to Site. Two options were established as potentially feasible for the delivery of abnormal loads from port of entry (either Invergordon or Nigg) to the A9 and then:</p> <ol style="list-style-type: none"> A839 west through Rogart, A836 from Lairg (south) to site entrance A949 west through Spinningdale, A836 from Bonar Bridge (north) to site entrance <p>It became apparent that a number of wind farm developers were co-operating on work to establish option 1 as a suitable transport route for wind turbine components. Option 1 was therefore selected as the preferred option. Turbine blades for the proposed Development will be shorter than the proposed blades for other developments proposed to use the route. It is therefore possible to rely on access studies undertaken for those windfarm which are proposing to use the route already. An Abnormal Loads Access Review undertaken by WSP is submitted as a Technical Appendix to this chapter (Technical Appendix 12.1).</p> <p>Construction Traffic Management Plan</p>

Consultee	Issues Raised	Response/Action Taken
	<p>where this is likely to be significant in respect of proposed impacts, including non-destructive testing and sampling as required;</p> <ul style="list-style-type: none"> • road surface condition and profile; • assessment of structures and any weight restrictions; • road widths, vertical and horizontal alignment and provision of passing places; and • details of adjacent communities. <p>Determine the traffic generation and distribution of the proposals throughout the construction and operation periods to provide accurate data resulting from the proposed Development including:</p> <ul style="list-style-type: none"> • nos. of light and heavy vehicles including staff travel; • abnormal loads; and • duration of works. <p>Current traffic flows including use by public transport services, school buses, refuse vehicles, commercial users, pedestrians, cyclists and equestrians.</p> <p>Impacts of proposed traffic including:</p> <ul style="list-style-type: none"> • impacts on carriageway, structures, verges etc.; • impacts on other road users; • impacts on adjacent communities; • swept path and gradient analysis where it is envisaged that transportation of traffic could be problematic; and 	<p>An outline Construction Traffic Management Plan (OCTMP) is provided as Technical Appendix 12.2 to this chapter.</p> <p>Detailed Junction Design</p> <p>A preliminary access junction layout has been prepared for Chapter 2 as related to the proposed Garvary Wind Farm. The Indicative Access Junction Design is illustrated in Figure 2.5. Refer to EIA Report Chapter 2 paragraph 2.3.19 to 2.3.21.</p>

Consultee	Issues Raised	Response/Action Taken
	<ul style="list-style-type: none"> • provision of Trial Runs to be carried out in order to prove the route is achievable and/or to establish the extent of works required to facilitate transportation. <p>Cumulative impacts with other developments in progress and committed developments including other Renewable Energy projects, of which there are several which require to be accessed via the A82 and through Fort Augustus. Please share this with the Planning Authority for further comment.</p> <p>Proposed mitigation measures to address impacts identified in 5 above, including:</p> <ul style="list-style-type: none"> • carriageway strengthening; • strengthening of bridges and culverts; • carriageway widening and/or edge strengthening; • provision of passing places; • road safety measures; and • traffic management including measures to be taken to ensure that development traffic does not use routes other than the approved routes. <p>Details of residual effects.</p> <p>Abnormal Load Assessment</p> <p>The TA should include an Abnormal Load Assessment of the roads utilised to convey abnormal loads to the Site. The assessment will need to confirm the proposed port of entry for abnormal load components and justify the adequacy of the route for transporting them to the Site.</p>	

Consultee	Issues Raised	Response/Action Taken
	<p>Early discussion with the Council's abnormal loads team and the Council's structures team is recommended.</p> <p>Construction Traffic Management Plan (CTMP) THC Transport Planning will require any application for planning permission associated with this proposal to submit a CTMP for the approval of the Planning Authority. A CTMP will normally detail the following issues, however this is not an exhaustive list and the CTMP should be tailored to reflect the issues pertinent to this development:</p> <p>Identification of all Council maintained roads likely to be affected by the various stages of the development,</p> <p>Predicted volume, type and duration of construction traffic.</p> <p>Location of site compound, staff parking and visitor parking.</p> <p>Proposed measures to mitigate the impact of general construction traffic and abnormal loads on the local road network following detailed assessment of relevant roads.</p> <p>Details of any traffic management signage required for the duration of the construction period.</p> <p>Measures to ensure that all affected public roads are kept free of mud and debris arising from the development.</p> <p>The developer may also be requested to enter into a Section 96 agreement with the Highland Council to cover any abnormal wear and tear to the Council roads. This will include a requirement for pre and post construction surveys to be</p>	

Consultee	Issues Raised	Response/Action Taken
	<p>undertaken and agreed with the Council and for the provision of a suitable bond.</p> <p>If the development involves any abnormal loads a detailed protocol, route and delivery programme will be required and agreed with any interested parties such as Highland Council, the Police, Transport Scotland, and community representatives. The protocol shall identify any requirement for convoy working and/or escorting of vehicles and include arrangements to provide advance notice of abnormal load movements in the local media.</p> <p>Detailed Junction Design</p> <p>Details of any new site access should be clearly set out on dimensioned drawings related to OS data and include confirmation of geometry, construction form, drainage details to prevent water running out onto the public road and evidence that appropriate visibility splays can be achieved.</p> <p>Vehicle swept paths should also be provided to evidence that the proposed junction form will be suitable for its intended use. Details of reinstatement of any temporary site access at its junction with the public road, post construction is also required.</p> <p>Appropriate junction arrangements and visibility splay information can be found in THC's published Roads and Transport Guidelines for New Developments.</p>	
<p>The Highland Council Transport Planning</p>	<p>Summary</p> <p>A transport assessment is required to support the application.</p>	<p>Site Access</p> <p>A preliminary access junction layout has been prepared for Chapter 2 as related to the proposed Garvary wind farm. The Indicative Access Junction Design is illustrated</p>

Consultee	Issues Raised	Response/Action Taken
<p>Team 28/05/2024</p>	<p>A detailed scoping report is required to be submitted and agreed in writing with Transport Planning prior to submission of the TA.</p> <p>The scope of the TA is required to be wider than that required for an EIA alone</p> <p>Guidance is given to the Applicant in this response to enable a comprehensive TA scoping document (and subsequent TA) to be prepared</p> <p>Site Access The location of the access shall be clearly identified. There shall be adequate land available and the required visibility splays shall be achievable as set out in the Council's 'Roads and Transport Guidelines for New Development'.</p> <p>Requirement for a Transport Assessment (TA) – Significant Affects A standalone Transport Assessment is required to support the application. this shall deal with the elements required by the EIA as set out in the submitted document the TA shall deal with the requirement to assess the traffic impact on the local road infrastructure as required by National Planning Policy 18 Infrastructure First. This shall include assessment of the impact on the remaining lifespan, structural integrity and the operational considerations of the local road asset (including road safety and road related structures).</p> <p>Operation and Decommissioning A condition may be required regarding maintenance works required which generate significant HGV or abnormal load movements. It is accepted that the decommissioning phase</p>	<p>in Figure 2.5. Refer to EIA Report Chapter 2 paragraph 2.3.19 to 2.3.21.</p> <p>Requirement for a TA – Significant Effects A TA will be prepared at detailed design stage.</p> <p>Operation and Decommissioning Noted.</p> <p>Study Area The study area includes the local road network proposed for haulage from suitable identified sources of bulk material for the development (quarries) to the Site. Refer to Figure 12.1.</p> <p>Sensitive Receptors Noted.</p> <p>Bridges and Significant Retaining Walls Noted.</p> <p>Public Transport and Active Travel Noted.</p> <p>Existing Traffic Conditions Noted.</p> <p>Traffic Growth Noted that the NRTF low growth rate should be used for local roads</p>

Consultee	Issues Raised	Response/Action Taken
	<p>will have a lower level of traffic and a lower impact than the construction phase and so it is not required to be separately assessed. A condition will be requested regarding the decommissioning phase</p> <p>Study Area The study area shall be agreed as part of the detailed scoping. The B9175, A839, A836 and A949 have been identified and are appropriate. However, the area shall also include the local road network proposed for haulage from suitable identified sources of bulk material for the development (quarries) to the Site.</p> <p>Sensitive receptors such as communities and schools shall be identified. Active travellers may be particularly sensitive to increases in HGV movements particularly where there are not segregated facilities for these modes.</p> <p>Bridges and Significant Retaining Walls shall be identified along the HGV and abnormal load haulage routes. Assessment will be required and may be required where there is a significant increase in HGV movements.</p> <p>Public Transport and Active Travel The TA shall consider the impact on all road users and modes of travel and shall identify public transport, footpath networks and cycle routes affected by the proposals</p> <p>Existing Traffic Conditions Highland's guidelines state that data should not be more than three years old. However, given the effect of the Covid</p>	<p>Safety Noted.</p> <p>Threshold Assessment Sensitivity of the links and junctions has been identified within this chapter.</p> <p>Mitigation Noted.</p> <p>Opportunities for Enhancement of transport and access Noted.</p> <p>Travel Plan and Monitoring Noted.</p>

Consultee	Issues Raised	Response/Action Taken
	<p>pandemic data from 2019 and 2022 as indicated in the scoping report will be acceptable (excluding 2020 and 2021).</p> <p>Traffic Growth The NRTF low growth rate should be used for the local roads.</p> <p>Safety The safety of the existing network should be investigated by reference to injury collision statistics for the previous 5 year period.</p> <p>Threshold Assessment The sensitivity of the links and junctions within the agreed study area shall be agreed in writing. It should be noted that most of the Council's rural network (even A and B class routes) is of historic construction without a significant road base</p> <p>Mitigation Reference should be made to Section 14 of the Council's Guidance on the preparation of the Transport Assessments (a link is given above); all modes shall be considered.</p> <p>Opportunities for Enhancement of transport and access The scoping assessment notes that no opportunities have been identified at this stage. These should be identified as part of the TA; different modes shall be considered. If a work-based travel plan and possible shared transport such as mini-buses is considered practical then there might be a possibility</p>	

Consultee	Issues Raised	Response/Action Taken
	<p>of long term enhancement of community transport options and vehicles</p> <p>Travel Plan and Monitoring</p> <p>The TA shall consider whether a Travel plan is appropriate mitigation for those travelling to work on the Site during the construction phase. Reference should be made to Section 16 of the Council’s Guidance on the preparation of the Transport Assessments</p> <p>They provide a Transport Statement/Assessment Methodology for Public Roads for which Highland Council is the Roads Authority</p>	
Internal Scottish Government Advisors		
<p>Transport Scotland 07/05/2024</p>	<p>Agree that the assessment be undertaken in accordance with the Guidelines for the Environmental Assessment of Traffic and Movement (Institute of Environmental Management and Assessment, 2023). These state that road links should be taken forward for further assessment where the following two rules are breached:</p> <ul style="list-style-type: none"> • Rule 1: Include road links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%) • Rule 2: Include road links of high sensitivity where traffic flows have increased by 10% or more. <p>Proposed methodology is considered appropriate.</p> <p>They are satisfied that survey data from the DfT Traffic Count database is to be utilised and would add that an alternative</p>	<p>An OCTMP has been prepared and is provided as Technical Appendix 12.2. .</p> <p>Proposed methodology is considered appropriate –noted</p> <p>Use of DfT Traffic Count database is considered appropriate – noted</p> <p>For the trunk road, 2022 traffic data should be used where available – noted. 2023 data was available at the time of writing.</p> <p>Operation and decommissioning scoped out – noted</p> <p>NRTF low growth factor to be used for roads where Transport Scotland are the Roads Authority – noted</p>

Consultee	Issues Raised	Response/Action Taken
	<p>source of traffic data is Traffic Scotland's National Traffic Data System.</p> <p>They request that for the trunk road, the more up to date 2022 data be used where available</p> <p>National Road Traffic Forecasts (NRTF) Low Growth should be used to factor base traffic to the peak construction year</p> <p>A copy of the CTMP be forwarded to the Area Manager when it becomes available.</p> <p>Abnormal Loads Assessment</p> <p>They 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.</p> <p>A full Abnormal Loads Assessment report should be provided with the Environmental Impact Assessment Report (EIA Report) that identifies key pinch points on the trunk road network.</p> <p>Swept path analysis should be undertaken and details provided with regard to any required changes to street furniture or structures along the route</p>	<p>A Technical Note for the Balblair Wind Farm Abnormal Loads Access Review is provided as Technical Appendix 12.1.</p>
Additional Consultees		
<p>Network Rail 09/05/2024</p>	<p>They request: A Traffic Assessment should be included. Preferred construction traffic routes should be indicated.</p>	<p>Noted - A TA will be prepared at detailed design stage. It will indicate preferred construction traffic routes and consider the named level crossings.</p>

Consultee	Issues Raised	Response/Action Taken
	<p>Detailed assessment should be carried out on the proposed use of:</p> <ul style="list-style-type: none"> • Nigg Level Crossing (British National Grid co-ordinates – X: 280191.20527, Y: 876411.43078) for abnormal loads • Lairg Level Crossing (British National Grid co-ordinates – X: 258412.51454, Y: 904121.24255) for abnormal loads/General construction traffic. <p>This will enable Network Rail to assess the possible impacts where/if the traffic crosses over/under our infrastructure and the suitability of these crossings.</p>	

12.4 Approach to Assessment

Scope of Assessment

- 12.4.1 The scope of this assessment has been established through an ongoing scoping process. Further information can be found in EIA Report **Chapter 4: EIA Approach and Methodology**.
- 12.4.2 This section provides an update to the scope of the assessment and re-iterates/updates the evidence base for scoping out matters following further iterative assessment.

Receptors/Matters Scoped Out of Further Assessment

- 12.4.3 **Table 12.2** presents the receptors/matters that are scoped out of further assessment, together with appropriate justification. Where a change has occurred since EIA scoping, this is clearly stated and justified.

Table 12.2 Receptor/matters scoped out of further assessment

Receptor/Matter	Phase	Justification	Change since EIA scoping?
Traffic associated with the Operational Phase	Operational Phase	Once operational, the level of traffic associated with the proposed Development would be minimal. Regular monthly or weekly visits would be made to the Site for maintenance checks. The vehicles used are likely to be 4x4 vehicles and there may also be the occasional need for an HGV to access the Site for maintenance and/or repairs. It is considered that the effects of operational traffic would be negligible and therefore no detailed assessment of the operational phase of the development is proposed.	No. The Scoping Opinion agreed that this matter should be scoped out of further assessment.
Traffic associated with the Decommissioning Phase	Decommissioning Phase	The traffic generation levels associated with the decommissioning phase would be less than those associated with the construction phase as some elements such as access tracks would be left in place and therefore not need to be constructed again. As such, the construction	No. The Scoping Opinion agreed that this matter should be scoped out of further assessment.

Receptor/Matter	Phase	Justification	Change since EIA scoping?
		phase is considered the worst-case assessment from the proposed Development. An assessment of the decommissioning phase will therefore not be undertaken, although a commitment to reviewing the impact of this phase will be made immediately prior to decommissioning works proceeding.	

Receptors/Matters Scoped In for Further Assessment

12.4.4 **Table 12.3** presents the receptors/matters that are scoped in for further assessment, together with appropriate justification. Where a change has occurred since EIA scoping, this is clearly stated and justified.

Table 12.3 Receptors/matters scoped in for further assessment

Receptor/Matter	Phase	Justification	Change since EIA scoping?
Local road users and local residents	Construction Phase	The increase in construction traffic associated with the proposed Development may lead to adverse effects on local road users and local residents. They are therefore included as receptors within this chapter.	No. The Scoping Opinion agreed that this receptor/matter should be scoped into further assessment.

Baseline methodology

Desk Study

12.4.5 The desk study included reviews and identification of the following:

- Relevant transport planning policy;
- Personal injury and 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 the extent of local area roads network to be included in the assessment; and

- Constraints to the movement of abnormal loads through a route survey including swept path assessments. Route survey included video data collection of the transport routes to the Site used in the preparation of the Abnormal Load Route Assessment.

Field Surveys

12.4.6 No surveys/site visits have been undertaken to inform the assessment.

Assessment Methodology

12.4.7 The methodology adopted in this assessment involved the following key stages:

- Determine baseline (and future baseline) conditions;
- Review the proposed Development to identify potential effects including any cumulative effects;
- Evaluate significance of effects on sensitive receptors;
- Identify mitigation where required; and
- Assess residual effects.

12.4.8 The use of Low National Road Traffic Forecast (NRTF) growth assumptions provides a robust future year assessment scenario to take account of trip generation that may occur as a result of future local development within the study area, defined in paragraph **12.4.11**.

12.4.9 The assessment is based on the proposed Development as described in **Chapter 2**.

Guidance

12.4.10 A high-level overview of the effects of traffic movements has been considered in accordance with the Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Traffic and Movement (2023) (the 'IEMA Guidelines').

Study area

12.4.11 The study area includes those roads that are expected to experience increased traffic flows associated with the construction of the proposed Development. The geographic scope was determined through a review of other developments in the area, OS mapping and an assessment of the potential origin locations of construction staff and supply locations for construction materials. Roads forming the study area, as set out in Scoping, are shown in **Figure 12.1** and include:

- The A839 between the A9 and Lairg;
- The A836 between the A9 and Larig town centre;
- The A949 between the A9 and A836; and
- The A9 between Tain and the Mound.

12.4.12 The following rules, also taken from the IEMA Guidelines, were used to determine which links within the study area should be considered for detailed assessment:

- Rule 1 – Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles (HGV) will increase by more than 30%); and

- Rule 2 – Include highway links of high sensitivity where traffic flows have increased by 10% or more.

12.4.13 Abnormal loads associated with the wind turbines will be delivered from the Port of Entry (PoE) at Invergordon or Nigg and would access the Site via the A9 and A839 to Lairg where the loads would turn left and follow southbound along the A836 before turning right into the Site access point.

12.4.14 This route is shown in **Figure 12.2**.

Value of receptors

12.4.15 In terms of Traffic and Movement impacts, the receptors are the users of the roads within the study area and locations through which those roads pass.

12.4.16 The IEMA Guidelines includes guidance on how the sensitivity of receptors should be assessed. Using that as a base, professional judgement was used to develop a classification of sensitivity for users based on the characteristics of roads and locations. This is summarised in **Table 12.4**.

Table 12.4: Receptor value and sensitivity

Receptor	Sensitivity			
	High	Medium	Low	Negligible
Users of Roads	Where the road is a minor rural road, not constructed to accommodate frequent use by HGVs. Includes roads with traffic control signals, waiting and loading restrictions, traffic calming measures.	Where the road is a local A or B class road, capable of regular use by HGV traffic. Includes roads where there is some traffic calming or traffic management measures.	Where the road is Trunk or A-road class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures.	Where roads have no adjacent settlements. Includes new strategic trunk roads that would be little affected by additional traffic and suitable for abnormal loads and new strategic road junctions capable of accommodating abnormal loads.
Users / Residents of Locations	Where a location is a large rural settlement containing a high number of community and public services and facilities.	Where a location is an intermediate sized rural settlement, containing some community or public facilities and services.	Where a location is a small rural settlement, few community or public facilities or services.	Where a location includes individual dwellings or scattered settlements with no facilities.

12.4.17 Where a road passes through a location, users are considered subject to the highest level of sensitivity defined by either the road or location characteristics.

Magnitude of impact (change)

- 12.4.18 The IEMA Guidelines identify the key impacts that are most important when assessing the magnitude of traffic impacts from an individual development. The impacts and levels of magnitude are discussed below.
- 12.4.19 Based on the IEMA guidelines, the following factors have been identified as being the most discernible potential environmental impacts likely to arise from changes in traffic movements. Therefore, these are considered in the assessment which may arise from changes in traffic flows resulting from the proposed Development:
- 12.4.20 **Severance of Communities** - The perceived division that can occur within a community when it becomes separated by major transport infrastructure. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by infrastructure.
- 12.4.21 **Road Vehicle Driver and Passenger Delay** - Traffic delays impacting non-development traffic can occur at points on the road network surrounding a development site including site entrance, roads passing a development site where there is likely to be additional traffic and the flow might be affected by additional parked cars, key intersections along a road and side roads where the availability of gaps between vehicles to circumvent delay are reduced.
- 12.4.22 **Non-motorised User Delay** - Changes in volume, composition or speed of traffic may affect the ability of people to cross a road. In general, increases in traffic levels are likely to lead to greater increases in delay. This is also dependent on existing level of activity, visibility and general physical conditions of the Site.
- 12.4.23 **Non-motorised Amenity** - Defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic.
- 12.4.24 **Fear and Intimidation On and By Road Users** - IEMA guidelines states that measuring the extent of fear and intimidation as a result of development traffic is dependent on the following factors:
- The total volume of traffic;
 - The heavy vehicle composition;
 - The speed these vehicles are passing; and
 - The proximity of traffic to people – and/or the feeling of the inherent lack of protection created by factors such as a narrow pavement median, a narrow path or a constraint (such as a wall or fence) preventing people stepping further away from moving vehicles.
- 12.4.25 IEMA guidelines suggest defining the degree of hazard to pedestrians in three stages:
1. Fear & Intimidation (F&I) Degree of Hazard - By calculating average (a) 18hr total traffic flow, (b) 18hr heavy vehicle flow and (c) average speed (Mph). Each with suggested thresholds of traffic number flows and average vehicle speeds. These thresholds in-turn sort the assessment results into a 'degree of hazard' score of 0-30. This is calculated for baseline traffic flows and baseline + development traffic flows.

2. Levels of F&I – Levels of F&I are categorized as: ‘Extreme’, ‘Great’, ‘Moderate’ or ‘Small’ according to a total hazard score provided by combining the elements of stage 1 - (a)+(b)+(c).
3. F&I Magnitude of Impact – The level of impact is then approximated with reference to the changes in the level of fear and intimidation from baseline conditions. Magnitude of impact is categorized according to ‘change in step/traffic flows from baseline conditions as:
 - ‘high’ (two step changes in level);
 - ‘medium’ (One step change in level with >400 vehicle increase in average 18hr all traffic flow and/or >500 increase in total 18hr HGV flow);
 - ‘low’ (one step change in level with <400 vehicle increase in average 18hr total vehicle flow and/or <500 HGV flow increase in total 18hr HGV flow); and
 - ‘negligible’ (no change in step changes).

12.4.26 **Road User and Pedestrian Safety** - Consists of an approximation of the potential for road safety impacts through the calculation of collision rates (slight, serious and fatal). Collision clusters are identified by a detailed review of the baseline characteristics to determine the road safety sensitivity of discrete areas of the road network.

12.4.27 **Hazardous/Large Loads** - Some developments may involve the transportation of dangerous or hazardous loads by road. Such movements may involve specialist loads that might be involved in the construction or decommissioning phases of the development (e.g. wind turbine generator components).

12.4.28 The magnitude of impact or change has been considered according to the criteria defined in **Table 12.5**.

Table 12.5: Definition of impact magnitude

Impact	Negligible	Low	Medium	High
Severance of Communities	Changes in total traffic flow of less than 30%	Changes in total traffic flow of 30%-60%	Changes in total traffic flow of 60%-90%	Change in total traffic flow over 90%
Road Vehicle Driver and Passenger Delay	< 10 % Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels.		
Non-Motorised User Delay	< 10 % Increase in traffic	An increase in total hourly traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross a road. Whether or not the increase in traffic results in a significant effect should be determined using professional judgement.		
Non-Motorised Amenity	Assessment of this link is based on a desktop review of non-motorised user facilities on links used by construction traffic.			
Fear and Intimidation on and by road users	Negligible - No change in step changes.	Low - One step change in level, with • <400 vehicles increase in	Medium - One step change in level, but with • >400 vehicles increase in	High - Two step changes in level.

Impact	Negligible	Low	Medium	High
		average 18hr all vehicle two-way all vehicle flow; and/or • <500 heavy vehicle increase in total 18hr HV flow	average 18hr all vehicle two-way all vehicle flow; and/or • >500 heavy vehicle increase in total 18hr HV flow	
Road User and Pedestrian Safety	< 10 % Increase in traffic	Professional judgement would be used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents. Collision cluster analysis is required. A cluster corresponds to a high concentration of accidents in a specific location (e.g. a specific junction) within the analysed time frame. In this assessment, a collision cluster = 3 accidents within a 100m radius are assumed as specific criteria for collision cluster analysis is not provided in the Council's 'Guidance on the reparation of Transport Assessments'. It should be noted a commonly used criterion is 5 accidents within a 100m radius over a five-year period).		
Hazardous/Large Loads	< 30 % increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels.		

Determination of Significance

12.4.29 The approach to determine the significance of effects has been as follows:

- Identify the relevant receptors;
- Derive their value (sensitivity) based on the criteria set out in **Table 12.4**;
- Identify and consider the likely impacts from each activity as set out in paragraph **12.4.19** and **12.4.19**;
- Determine the magnitude of impact (change) based on the criteria identified in **Table 12.5**;
- Assess the significance of any effects. Where likely significant effects are identified, develop secondary mitigation measures to reduce effects such that they are no longer significant; and
- Assess the significance of any residual effects following the implementation of secondary mitigation measures.

12.4.30 To determine the overall significance of effects, the results from the receptor sensitivity and magnitude of impact assessments are correlated and classified using a scale set out in LA 104 Revision 1 of the Design Manual for Roads and Bridges (DMRB) and summarised in **Table 12.6**.

Table 12.6: Significance of effect matrix

Sensitivity	Magnitude			
	High	Medium	Low	Negligible
High	Major	Major / Moderate	Moderate / Minor	Minor
Medium	Major / Moderate	Moderate	Minor	Minor
Low	Moderate / Minor	Minor	Minor	Minor / Negligible
Negligible	Minor	Minor	Minor / Negligible	Negligible

12.4.31 In terms of the EIA Regulations, effects are considered significant where they are assessed to be Major, Major / Moderate or Moderate. Where an effect could be one of Major / Moderate or Moderate / Minor, professional judgement is used to determine which classification should be applicable.

Nature of Effect

12.4.32 In addition to determining the significance of the effect, the assessment process also includes a qualitative description regarding the nature of the effect. These terms add additional information about how the effect would affect receptors.

Table 12.7: Assessment descriptors

Term	Nature of effect descriptors
Adverse	An effect which has the potential to decrease receptor value or status relative to baseline conditions.
Beneficial	An effect which has the potential to increase receptor value or status relative to baseline conditions.
Short-term	Effects that persist only for a short time, e.g. during the construction (or decommissioning) phase only; includes reversible effects.
Medium-term	Effects that may persist until additional mitigation measures have been implemented and become effective.
Long-term	Effects that persist for a much longer time, e.g. for the duration of the operational phase (essentially until the development ceases or is removed/ reinstated); includes effects which are permanent (irreversible) or which may decline over longer timescales.
Temporary	A reversible effect where recovery is possible and for which effects would persist only for a short or medium-term.
Frequent	Refers to a recurring effect that occurs repeatedly; in some cases a lower level of impact may occur with sufficient frequency to reduce the ability of a receptor to recover effectively.

Residual Effects

- 12.4.33 Additional environmental mitigation measures are necessary to address likely significant adverse environmental effects. The identification of residual effects should assume only mitigation measures that are incorporated (i.e. embedded) in proposed Development design and/or can be readily (cost effectively) applied; these being the measures for which delivery and implementation can be secured.
- 12.4.34 An effect is considered to be significant if it meets any of the following criteria:
- it could lead to an exceedance of defined guidelines or widely recognised levels of acceptable change;
 - it is likely that the consenting authority will reasonably consider applying a planning condition, requirement or legal agreement to the consent to require specific additional mitigation to reduce or overcome the effect;
 - it threatens or enhances the viability or integrity of a receptor or receptor group of concern; or
 - it is likely to be material to the ultimate decision about whether the application should be approved.
- 12.4.35 The significance of effects are discussed below in **Table 12.8**.

Table 12.8: Generic significance criteria

Level of effect	Description
Major	These effects are considered to be material in the decision-making process.
Moderate	These effects may be important but are not likely to be material factors in decision-making. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a receptor.
Minor	These effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in improving the subsequent design of the project.
Negligible	No effects or those that are imperceptible.

Cumulative Effects

- 12.4.36 An assessment of the cumulative effect on the study area of all relevant developments, including local wind farms, in respect to either submitted planning applications or consented developments pending construction, which may utilise the same access routes as the proposed Development, has been undertaken.

Limitations and Assumptions

- 12.4.37 The assessment is based upon average traffic flows during the peak month of construction. During the peak month, activities at the Site may fluctuate between one day and another. Therefore it is not possible to fully develop a day-by-day traffic flow estimate. Furthermore, external factors can impact upon activities on a day-by-day basis, such as the weather conditions, availability of materials, time of year, etc. However, to provide a

robust assessment, a reasonable worst-case scenario of material import during construction, described in **Section 12.7.6**, is assumed within the chapter.

12.5 Existing environment

Access

- 12.5.1 The proposed access for Balblair Wind Farm comes off the A836 and is the same access and access track for the Proposed Garvary Windfarm (see **Figure 2.5**). This assumes the proposed Garvary wind farm will be consented and constructed before the proposed Development. Garvary's site entrance and access track will be designed for the purpose of wind farm construction and delivery of abnormal indivisible loads, based upon a blade length of 73.7 m. This would accommodate Balblair's proposed turbine blade length of 68 m. On the assumption that Garvary will be built first, there would be no further impact from road construction or upgrading from the use of Garvary's site entrance and access track.
- 12.5.2 In the event that Garvary wind farm is not consented or the site entrance and access track is not constructed in advance of Balblair Wind Farm commencing construction, the Applicant / developers of Balblair Wind Farm will construct the site entrance and access. This is the worst case scenario considered in the assessments contained in this chapter.

Existing Traffic Conditions

- 12.5.3 The distribution of general construction traffic from potential material sources to the Site is considered throughout the study area. Beyond these routes, general construction traffic would be more dispersed.
- 12.5.4 The A9 is a strategic trunk road managed by Transport Scotland and its managing agent Bear Scotland. The A839, A836 and A949 are local roads managed by THC.
- 12.5.5 The A839 is a two-way rural single carriageway road subject to the national speed limit except where it passes through settlements including Lairg and Pittentrail, where the speed limit reduces to 30 mph. The road provides access to small hamlets and dwellings in the study area and provides access to Lairg from both the east and west. West of Lairg between the junction with the B864 and the junction with the A837, the A839 is of varying width including sections of single track with passing places.
- 12.5.6 The A836 is a two-way rural single carriageway road subject to the national speed limit except where it passes through settlements including Ardgay, Bonar Bridge and Lairg where the speed limit reduces to 30 mph. The road provides access to small hamlets and dwellings in the study area and provides access to Lairg from both the north and south.
- 12.5.7 Annual traffic statistics for the study area have been extracted from the Department for Transport (DfT) traffic count point database which comprises estimations using previous year's Annual Average Daily Traffic flows (AADT), manual counts or permanent Automatic Traffic Counters (ATCs). These are all maintained by the local and Trunk Road authorities. The use of this data was deemed suitable during Scoping with THC and Transport Scotland.
- 12.5.8 The locations of the DfT traffic count sites used in this assessment are illustrated in **Figure 12.3**. The extracted data allows the traffic flows to be split into vehicle classes and

has been summarised into light goods vehicles (LGVs) and heavy goods vehicles (HGVs).

12.5.9 **Table 12.9** summarises the AADT flows for the baseline 2023 for the study area.

Table 12.9: Baseline Traffic Data

No.	Link Description	Count Point ID	Cars/LGVs	HGVs	Total Vehicles
1	A836 between A839 and A839	40936	1690	151	1841
2	A836 between A949 and A837	50937	1583	110	1693
3	A836 between B9176 and A949	80005	1629	136	1765
4	A836 between A9 and B9176	80004	500	151	651
5	A839 between A9 and A836	20935	788	36	824
6	A9 between A949 and A839	30722	3838	333	4171
7	A9 between A836 and A949	80002	6488	356	6844
8	A9 between B9174 and A836	80001	7326	640	8002
9	A949 between A836 and A9	80006	910	52	962
10	A9 between A949 and A949	80003	6441	377	6818
11	A836 between A837 and A839	20934	933	82	1015

Abnormal Loads

12.5.10 The route from the Port of Invergordon (or Nigg) to the Site is considered suitable for the movement of assumed abnormal loads (wind turbine generator components – nacelles, tower sections, blades, etc.), 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 THC and the necessary consents and permits would be obtained in advance of any works or delivery periods.

Accident History

12.5.11 The time period for the accident analysis includes the five-year period between 2018 and 2022 (inclusive) and is applicable to the current publicly available data from the DfT accident statistics website. ESRI ArcGIS software has been used to interrogate and map the accident locations and severity within the study area. Road safety data from 2023 was published in September 2024, however at the time of writing, this was not yet available on the ESRI ArcGIS software. The locations of recorded accidents are shown on **Figure 12.4**.

- 12.5.12 The accident analysis is used to inform the review of the proposed route for all construction traffic where any deficiencies in the road layout and condition are identified.
- 12.5.13 Injuries are classed under the following categories:
- ‘Slight’ injury – e.g., slight shock with occurrences of sprains or bruises;
 - ‘Serious’ injury – e.g., breakages, lacerations, concussion, or hospital admittance; and
 - ‘Fatal’ injury – e.g., resulted in a mortality / death within 30 days after the accident.
- 12.5.14 The number and severity of accidents recorded in the study area is provided in **Table 12.10**.

Table 12.10: Number and Severity of Accidents Summary 2018 - 2022

Link	Slight	Serious	Fatal
A9 between Tain and The Mound	11	5	1
A836 between the A9 at Dornoch Bridge and the A837 at Invershin	4	2	2
A836 between A837 at Invershin and A839 at Lairg	0	0	1
A949 between the A9 at Clashmore and A836 at Bonar Bridge	1	1	0
A839 between A836 at Lairg and the A9 at The Mound	1	4	0

Pedestrian and Cyclist Networks

- 12.5.15 There are limited pedestrian facilities in the immediate vicinity of the Site, reflecting its rural nature.
- 12.5.16 Further away from the Site in the wider study area, there are pedestrian facilities within the larger settlements, including Lairg, Ardgay and Bonar Bridge, where there are footways on one side or both sides of the road carriageways. The level of pedestrian infrastructure is commensurate with the scale of the local settlements and their relative rural setting.
- 12.5.17 A review of foot and cycle paths that may be affected by the movement of construction traffic was undertaken. The Highland Council’s (the Council’s) Interactive Core Paths Map indicates that there are no Core Paths recorded by THC near the proposed Site access. Core Path SU16.04 (Station – Gruids Road) is located approximately 4.5 km to the north of the proposed Site access. To the south, Core Path SU08.01 (Culrain – Invershin) and SU05.06 (Balblair Wood – Invershin) are located 4 km from the proposed Site access.
- 12.5.18 The A836 does not have any pedestrian or cyclist infrastructure near the site access junction, although the A836 is listed as part of National Cycle Route 1.

Sensitive receptors

- 12.5.19 A review of the potential receptors has been undertaken and a summary of receptor sensitivities based upon various criteria noted in **Table 12.4**. This summary is shown in **Table 12.11**.

Table 12.11: Summary of sensitive receptors in the study area

Section	Sensitivity	Justification
Users of A9	Low	Where the road is Trunk or A-class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures.
Users of A836	Low	Where the road is Trunk or A-class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures.
Users of A949	Medium	Where the road is a local A or B class road, capable of regular use by HGV traffic.
Users of A839	Medium	Where the road is a local A or B class road, capable of regular use by HGV traffic.
Residents in Lairg	Low	Where a location is a small rural settlement, few community or public facilities or services.
Residents in Bonar Bridge	Medium	Where a location is an intermediate sized rural settlement, containing some community or public facilities and services.
Residents in Ardgay	Low	Where a location is a small rural settlement, few community or public facilities or services.

Future baseline

- 12.5.20 To assess the likely effects during the construction period, the construction year future baseline traffic flows were determined by applying a National Road Transport Forecast (NRTF) growth factor to the 2023 flows assuming low growth.
- 12.5.21 Construction of the proposed Development is anticipated to commence at the earliest in 2029 if consent is granted and is anticipated to take approximately 24 months to complete, depending on weather conditions and ecological considerations.
- 12.5.22 **Table 12.12** summarises the AADT flows for the year of construction 2029 with a low growth factor (1.031) applied to the 2023 baseline for the future baseline

Table 12.12: Future year baseline traffic flows

No.	Link Description	Count Point ID	Cars/LGVs	HGVs	Total Vehicles
1	A836 between A839 and A839	40936	1742	156	1898
2	A836 between A949 and A837	50937	1632	113	1745
3	A836 between B9176 and A949	80005	1679	140	1820
4	A836 between A9 and B9176	80004	516	156	671
5	A839 between A9 and A836	20935	812	37	850
6	A9 between A949 and A839	30722	3957	343	4300
7	A9 between A836 and A949	80002	6689	367	7056
8	A9 between B9174 and A836	80001	7590	660	8250

No.	Link Description	Count Point ID	Cars/LGVs	HGVs	Total Vehicles
9	A949 between A836 and A9	80006	938	54	992
10	A9 between A949 and A949	80003	6641	389	7029
11	A836 between A837 and A839	20934	962	85	1046

12.6 Embedded mitigation

Design Considerations

- 12.6.1 The assessment has been informed by the embedded mitigation measures which form part of the proposed Development. Please refer to **Chapter 2** for further details.
- 12.6.2 Borrow pits will be located on-site and are expected to meet 100% of material requirements for the access tracks, hardstandings and compound sub-bases. To provide a robust and maximum worst case assessment, it has been assumed that 100% of the material requirements will be imported to Site.

Best Practice Measures

- 12.6.3 As part of this chapter, an Outline Construction Traffic Management Plan (OCTMP) has been prepared (**Technical Appendix 12.2**) and it is expected that a pre-construction planning condition will be applied to the planning consent for a final CTMP to be submitted.
- 12.6.4 The CTMP will be tailored to suit the requirements of the proposed Development. Embedded mitigation includes best practice measures which would be detailed in the CTMP, regardless of the outcomes of the Traffic and Movement assessment and are included in the proposed Development when determining the sensitivity of receptors. Where traffic effects are assessed as being significant, then additional mitigation measures will be considered to reduce the effects. Additional mitigation measures will then be detailed in the CTMP in addition to the adopted embedded mitigation.
- 12.6.5 The mitigation measures adopted in the CMTP are outlined in **Section 12.8**.

12.7 Predicted effects

Potential construction effects

- 12.7.1 During the construction phase, the following traffic would require access to the Site:
- Staff transport, either cars or staff minibuses;
 - Construction equipment and materials, deliveries of machinery and supplies such as concrete raw materials;
 - Components relating to the BESS element, substation components, construction compounds and associated infrastructure;
 - Abnormal loads consisting of the wind turbine sections and a heavy lift crane(s); and
 - Escort vehicles for AIL deliveries.

- 12.7.2 Apart from the turbine components, most traffic would be normal construction plant and would include graders, excavators, high-capacity cranes, forklifts and dumper trucks. Most would arrive at the Site as a load on an articulated HGV (low loader).
- 12.7.3 The turbines would be delivered in component sections and assembled on-site. The nacelle, hub, drive train, blade sections and tower sections are classified as abnormal loads due to their weight and/or length, width and height when loaded.
- 12.7.4 In addition to the turbine deliveries, two or more high-capacity erection cranes would be needed to offload some components and erect the turbines. The cranes are likely to be mobile cranes with a capacity up to 1,000 tonnes that would be escorted by boom and ballast trucks to allow full mobilisation on-site. Smaller erector cranes would also be used to allow the assembly of the main cranes and to facilitate overall erection of the turbines.

Construction traffic movements

- 12.7.5 The greatest number of vehicle movements are associated with the import of materials associated with construction of new access tracks, substation and BESS foundations and crane hardstandings.
- 12.7.6 The Garvary Indicative Borrow Pit shown on **Figure 2.1**, is a borrow pit (BP) search area noting that, subject to further investigations, some aggregate may be required to be imported for initial track and mobilisation works at the start of the programme. It is also proposed that material would be won from excavations at turbine positions T2 and T3. Based on the information available from an initial assessment of available stone, it is therefore likely that the majority of stone material would be obtained from the on-site borrow pit. However, an assessment of a worst-case scenario has been included in the environmental assessment of Traffic and Movement effects, where it is assumed that 100% of the required aggregate is sourced from off-site locations. As a result, the actual effects are expected to be less than the worst-case scenario and would similarly be subject to mitigation measures.
- 12.7.7 To enable comparison of the estimated future year baseline traffic movements with total volumes including predicted construction traffic, average daily two-way movements for each month assuming a 22-day working month for deliveries were determined. Traffic movements were also split by vehicle type, in line with the baseline data and the identified peak period for construction traffic. The final daily construction profile is shown in **Table 12.13**.

Table 12.13: Daily construction traffic movements (weekday average two-way flows)

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Site establishment	1529	1529	1529																						
Construction of new access tracks and crane hardstandings			1599	2338	2338	1599	1599	1599	1599	1599	1599	1599													
Turbine foundation construction						272	272	272	272	272	272	272	272	272											
Substation, BESS and electrical works						81	81	81	81	81	81	81	81	81	81	81									
Cable trenching and installation								34	34	34	34	34	34	34	34	34									
Crane delivery											24														
Turbine delivery, erection and commissioning											16	16	16	16	16	16	16	16	16	16					
Site reinstatement				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	26	2	2	2	2
General Site Traffic (Personnel)	660	660	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	660	660

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monthly ALL Total	2189	2189	4228	3440	3440	3054	3054	3088	3088	3088	3128	3104	1505	1505	1233	1233	1118	1118	1118	1142	1102	1102	662	662
Daily ALL Total	100	100	194	158	158	140	140	142	142	142	144	142	70	70	58	58	52	52	52	52	52	52	32	32
Monthly HGV Total	1529	1529	3128	2340	2340	1954	1954	1988	1988	1988	2028	2004	405	405	133	133	18	18	18	42	2	2	2	2
Daily HGV Total	70	70	144	108	108	90	90	92	92	92	94	92	20	20	8	8	2	2	2	2	2	2	2	2

12.7.8 The maximum traffic movements associated with construction of the proposed Development are predicted to occur in month 3 in **Table 12.13**. The average daily movements during the peak month are summarised for HGV, LGV and AIL movements in **Table 12.14**. It should be noted that turbine components will be delivered on AIL vehicles. After delivery, when the AIL vehicle leaves the Site, it is classed as an HGV. However, no AIL deliveries are anticipated during the peak month of construction.

Table 12.14: Peak daily construction traffic movements

Cars/LGVs (two-way)	HGV (two-way)	AIL	
		To Site as AILs	From Site as HGVs
50	144	0	0

Construction Traffic Distribution

12.7.9 The origin of vehicle traffic would depend on the location of staff accommodation and the source of materials being imported. It is likely that staff would be accommodated across a wide area and the origin of car/LGV traffic would depend on the location of staff accommodation. The highest volume of traffic would be generated by the requirement for concrete source materials for the turbine foundations and other permanent structures, and aggregate associated with the access track construction. Information on the potential sources of suitable materials near the Proposed Development is provided in **Table 12.15**.

Table 12.15: Nearby quarries

Quarry	Location	Distance from Site	Materials
Breedon Ardchronie Quarry	Ardchronie, access from the A836	24.3 km by road to the southeast	Aggregates Ready-mixed concrete
Pat Munro – Dornoch Bridge Quarry	Clashmore, access from the A9	37.5 km by road to the southeast	Aggregates

12.7.10 The choice of HGV route was based upon identifying the most suitable route between the access to the proposed Development and the primary Trunk or A-class road network. The choice of LGV route (staff origins) has been based on the locations of population centres outside the study Area. The assumed distribution of construction traffic is summarised in **Table 12.16** and illustrated in **Figure 12.5**.

Table 12.16: Distribution of construction traffic

No.	Link Description	Count Point ID	Cars/LGVs	HGVs	Abnormal Loads	
					To site as Abnormal Loads	Away from site as Abnormal Loads
1	A836 between A839 and A839	40936	20%	0%	50%	50%
2	A836 between A949 and A837	50937	80%	100%	0%	0%
3	A836 between B9176 and A949	80005	40%	50%	0%	0%
4	A836 between A9 and B9176	80004	40%	50%	0%	0%
5	A839 between A9 and A836	20935	20%	0%	50%	50%
6	A9 between A949 and A839	30722	0%	0%	50%	50%
7	A9 between A836 and A949	80002	40%	50%	50%	50%
8	A9 between B9174 and A836	80001	80%	100%	50%	50%
9	A949 between A836 and A9	80006	40%	50%	0%	0%
10	A9 between A949 and A949	80003	0%	0%	50%	50%
11	A836 between A837 and A839	20934	20%	0%	50%	50%

Predicted Construction Effects

- 12.7.11 To estimate the total trips on the road network within the study area during the construction phase, daily construction traffic flows were combined with the future year baseline traffic data. The resulting figures were compared with the weekday future year baseline traffic.
- 12.7.12 **Table 12.17** shows the increase in total traffic over future year baseline traffic, as a result of construction traffic.

Table 12.17: Increase in total traffic generation (daily average two-way flows)

Link Description			2029 Baseline		2029 Baseline + Development Traffic		Percentage Increase	
No.	Link Description	Count Point ID	HGVs	Total	HGVs	Total	HGVs	Total
1	A836 between A839 and A839	40936	156	1898	156	1908	0.00%	0.53%
2	A836 between A949 and A837	50937	113	1745	257	1929	126.97%	10.54%
3	A836 between B9176 and A949	80005	140	1820	212	1912	51.35%	5.06%
4	A836 between A9 and B9176	80004	156	671	228	763	46.25%	13.71%
5	A839 between A9 and A836	20935	37	850	37	860	0.00%	1.18%
6	A9 between A949 and A839	30722	343	4300	343	4300	0.00%	0.00%
7	A9 between A836 and A949	80002	367	7056	439	7148	19.62%	1.30%
8	A9 between B9174 and A836	80001	660	8250	804	8434	21.82%	2.23%
9	A949 between A836 and A9	80006	54	992	126	1084	134.30%	9.28%
10	A9 between A949 and A949	80003	389	7029	389	7029	0.00%	0.00%
11	A836 between A837 and A839	20934	85	1046	85	1056	0.00%	0.96%

12.7.13 Any results in **Table 12.17** that are subject to 'Rule 1' or 'Rule 2' of the IEMA Guidelines, which requires a full assessment of effects if the locations breach these rules, are highlighted.

12.7.14 Whilst the predicted increase in construction traffic would be temporary and short-term in duration, the following receptors, summarised in

12.7.15 **Table 12.18**, have been taken forward to an assessment of the significance of effect.

Table 12.18: Receptors for further assessment

No.	Receptor	Sensitivity
2, 3 and 4	Users of A836	Low
9	Users of A949	Medium
2	Residents in Bonar Bridge	Medium
3	Residents in Ardgay	Low

12.7.16 In this assessment, a review of the existing road capacity has been undertaken using the Design Manual for Roads and Bridges, Volume 15, Part 5 “The NESAs Manual”. The theoretical road capacity has been estimated for each of the road links taken forward for further assessment for a 12-hour period. The results are summarised in **Table 12.19**.

Table 12.19: Peak traffic flow capacity review

Link No.	Link description	2029 Baseline	2029 Baseline + Construction	Theoretical Road Capacity (12 hr)	Spare Road Capacity (%)
2	A836 between A949 and A837	1745	1929	19200	90%
3	A836 between B9176 and A949	1820	1912	19200	90%
4	A836 between A9 and B9176	671	763	21600	96%
9	A949 between A836 and A9	992	1084	21600	95%

12.7.17 The results indicate there are no road capacity issues with the addition of construction traffic associated with the construction of the proposed Development and ample spare capacity exists within the local road network to accommodate all construction phase traffic.

12.7.18 The significance of the predicted effects on the above receptors has been determined using the rules and thresholds previously outlined in **Section 12.4**.

12.7.19 **Table 12.20** summarises the significance of effect on the identified receptors for the construction phase.

Table 12.20: Construction phase effects assessments

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
Users of A836	Low	Severance	High	Moderate (Significant)	Percentage change in HGV traffic is over 90% on the A836 between the A949 and A837. Elsewhere on the A836 the percentage change in HGV traffic is between 30-60% and 60-90%
		Driver Delay	Medium	Minor (Not Significant)	The IEMA Guidelines note that delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. No existing capacity issues, however parked cars in Bonar Bridge could affect traffic flow. During the peak of construction, there would be an additional 144 two-way HGVs using this link each day. This is equivalent to approximately an additional 12 two-way HGVs per hour. This is unlikely to lead to a significant delay for existing road users.
		Pedestrian Delay	Medium	Minor (Not Significant)	Relatively wide pedestrian footpaths at one side of the road as a minimum in Bonar Bridge and Ardgay. Good quality footpath between Bonar Bridge and Ardgay on one side. No formal pedestrian crossings in Bonar Bridge or Ardgay. The majority of the A836 has no footpaths and no dedicated cycling infrastructure. During the peak of construction, there would be an additional 144 two-way HGVs using this link in Bonar Bridge each day. This is equivalent to approximately an additional 12 two-way HGVs per hour. Based on professional judgement, it is considered that this would not result in a perceivable issues to existing users or in a material change to the provision offered to pedestrians.
		Non-motorised User Amenity	Medium	Minor (Not Significant)	Maximum percentage increase in HGV traffic on the A836 is 127% in Bonar Bridge. The majority of the A836 has no footpaths and no dedicated cycling infrastructure. Minimal amenity destinations that non-motorised users would travel to on this link as a whole. No formal pedestrian crossings present.
		Fear and Intimidation	Negligible - No change in step changes.	Minor (Not Significant)	No change in F&I level from baseline

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
		Road Safety	High	Moderate (Significant)	<p>One fatal accident at the A836 / Rheguile Branch Road.</p> <p>One fatal accident at the Manse Road / A836 junction</p> <p>One fatal accident to the south of Lairg Station</p> <p>4 'slight' accidents recorded on the A836 between the A9 and A836 / A837 junction.</p> <p>2 'serious' accidents recorded on the A836 between the A9 and A836 / A837 junction.</p> <p>No clusters identified on the A836 between the A9 and A836 / A837 junction.</p>
Users of A949	Medium	Severance	High	Moderate (Significant)	Percentage change in HGVs is over 90%, however this is undoubtedly due to the fact that baseline HGV levels are fairly low rather than there being high traffic volumes associated with the construction of the proposed Development
		Driver Delay	Low	Minor (Not Significant)	No existing capacity issues, however parked cars are present within Bonar Bridge. During the peak of construction, there would be an additional 72 two-way HGVs using this link each day. This is equivalent to approximately an additional 6 two-way HGVs per hour. This is unlikely to lead to a significant delay for existing road users.
		Pedestrian Delay	Low	Minor (Not Significant)	Relatively wide footpaths present along one side in Clashmore and Spinningdale. Wide footpaths present along each side of the carriageway in Bonar Bridge. No formal pedestrian crossings within Bonar Bridge, where amenities are present on either side of the road. During the peak of construction, there would be an additional 72 two-way HGVs using this link each day. This is equivalent to approximately an additional 6 two-way HGVs per hour. Based on professional judgement, it is considered that this would not result in a perceivable issues to existing users or in a material change to the provision offered to pedestrians.

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
		Non-motorised User Amenity	Low	Minor (Not Significant)	Percentage increase in HGV traffic is 134% on the A949. Relatively wide footpaths present along one side in Clashmore and Spinningdale. Wide footpaths present along each side of the carriageway in Bonar Bridge. No formal pedestrian crossings within Bonar Bridge, where amenities are present on either side of the road. However, minimal amenity destinations that non-motorised users would travel to on this link as a whole.
		Fear and Intimidation	Negligible - No change in step changes.	Minor (Not Significant)	No change in F&I level from baseline
		Road Safety	Low	Minor (Not Significant)	No accident clusters. One 'slight' accident and one 'serious accident' occurred in the 5-year study period. No fatal accidents.
Residents in Bonar Bridge	Medium	Severance	Medium	Moderate (Significant)	Percentage change in HGV traffic is over 90%
		Driver Delay	Medium	Moderate (Significant)	No existing capacity issues, however parked cars in Bonar Bridge. During the peak of construction, there would be an additional 144 two-way HGVs using this link each day. This is equivalent to approximately an additional 12 two-way HGVs per hour. This is unlikely to lead to a significant delay for existing road users.

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
		Pedestrian Delay	Medium	Moderate (Significant)	Relatively wide pedestrian footpaths at one side of the road as a minimum in Bonar Bridge. Amenities present on either side of the carriageway with no formal pedestrian crossing infrastructure. During the peak of construction, there would be an additional 144 two-way HGVs using this link in Bonar Bridge each day. This is equivalent to approximately an additional 12 two-way HGVs per hour. Based on professional judgement, it is considered that this would not result in a perceivable issues to existing users or in a material change to the provision offered to pedestrians.
		Non-motorised User Amenity	Medium	Moderate (Significant)	Percentage increase in HGV traffic on the A836 is 127% in Bonar Bridge. No formal pedestrian crossings within Bonar Bridge, where amenities are present on either side of the road.
		Fear and Intimidation	Negligible - No change in step changes.	Minor (Not Significant)	No change in F&I level from baseline
		Road Safety	Low	Minor (Not Significant)	No accidents recorded in Bonar Bridge
Residents in Ardgay	Low	Severance	Low	Minor (Not Significant)	Percentage change in HGV traffic is between 30-60%

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
		Driver Delay	Low	Minor (Not Significant)	No existing capacity issues. During the peak of construction, there would be an additional 72 two-way HGVs using this link each day. This is equivalent to approximately an additional 6 two-way HGVs per hour. This is unlikely to lead to a significant delay for existing road users.
		Pedestrian Delay	Low	Minor (Not Significant)	Relatively wide pedestrian footpaths at one side of the road as a minimum in Ardgay. Amenities present on either side of the carriageway with no formal pedestrian crossing infrastructure. During the peak of construction, there would be an additional 72 two-way HGVs using this link each day. This is equivalent to approximately an additional 6 two-way HGVs per hour. Based on professional judgement, it is considered that this would not result in a perceivable issues to existing users or in a material change to the provision offered to pedestrians.
		Non-motorised User Amenity	Medium	Minor (Not Significant)	Percentage increase in HGV traffic is 51% in Ardgay. Relatively wide pedestrian footpaths at one side of the road as a minimum in Ardgay. Amenities present on either side of the carriageway with no formal pedestrian crossing infrastructure.
		Fear and Intimidation	Negligible - No change in step changes.	Minor (Not Significant)	No change in F&I level from baseline

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
		Road Safety	Medium	Minor (Not Significant)	Fatal accident occurred to the north of Ardgay on the A836
Abnormal Loads Route	Medium	Hazardous / large loads	Medium	Moderate (Significant)	<p>The route from the Port of Invergordon/Nigg to the proposed Development site is considered suitable for the movement of assumed abnormal loads (wind turbine generator components – nacelles, tower sections, blades etc.), subject to the potential need for localized 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 Transport Scotland and the necessary consents and permits would be obtained in advance of any works or delivery periods.</p> <p>Transportation of wind turbine generator components would lead to the following effects:</p> <ul style="list-style-type: none"> • 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. <p>The severity of these impacts is considered as follows:</p> <ul style="list-style-type: none"> • Delays due to lane/road closures would be inevitable, although abnormal loads would be timed to avoid peak hours and, therefore, abnormal loads would have a temporary minor adverse effect; and • The perceived effect to residents is subjective and it is possible that the transport of abnormal loads close to properties could lead to local objection, fear and intimidation. <p>Although not taking place during the peak month of construction, it is estimated that the delivery of turbines will generate 8 AIL deliveries per month on the A9, A839 and A836 during months 11 to 20.</p> <p>Consideration should be given to abnormal load deliveries being</p>

Receptor	Receptor Sensitivity	Potential Impact	Magnitude	Significance of Effect	Notes
					<p>undertaken overnight to reduce the potential for disruption and delay, subject to approval by TS, THC and local police. However, this would depend on the type of transport vehicle used and only by agreement with the relevant authorities. At night, the impact of transporting the abnormal loads would not be significant. An Abnormal Loads Access Review has been submitted as a Technical Appendix to this chapter and can be found in Technical Appendix 12.1 and illustrated in Figure 12.2.</p>

Level Crossings

- 12.7.20 As requested by Network Rail in their scoping response, the following level crossings should be assessed:
- Nigg Level Crossing (British National Grid co-ordinates – X: 280191.20527, Y: 876411.43078) for abnormal Loads; and
 - Lairg Level Crossing (British National Grid co-ordinates – X: 258412.51454, Y: 904121.24255) for abnormal loads/general construction traffic.
- 12.7.21 If the Port of Nigg is used for the delivery of wind turbine components, Nigg Level Crossing will be used by abnormal load vehicles during months 11 to 20 of the construction programme. During this time, it is estimated that there will be 8 abnormal load deliveries each month. No general construction traffic is anticipated to use this route.
- 12.7.22 Lairg Level Crossing is situated on the A836 to the south of Lairg and will be used by both abnormal load vehicles and general construction traffic. As for Nigg Level Crossing, Lairg Level Crossing will be used by abnormal load vehicles during months 11 to 20 of the construction programme. During this time, it is estimated that there will be 8 abnormal load deliveries each month. During the peak of construction (month 3), 10 two-way LGVs (staff/visitors) are anticipated to cross Lairg Level Crossing each day. No HGVs are anticipated to use this route for the delivery of construction materials.

Cumulative Effects Assessment

- 12.7.23 The assessment of cumulative Traffic and Movement effects only considers wind farms and other major developments that are consented but not yet under construction, and submitted as planning applications but pending decision or at appeal. There is no potential for significant cumulative effects to occur from those wind farms which are operational due to the minimal vehicle trips attributed to the operational phase of a wind farm development.
- 12.7.24 This assessment has identified the following potential cumulative developments identified for the Landscape and Visual Impact Assessment (LVIA) (see **Chapter 6: Landscape and Visual Impact Assessment**), summarised in **Table 12.21**.
- 12.7.25 A review of THC planning portal and Scottish Government's Consents Unit (ECU) portal was undertaken to identify any developments within the vicinity of the proposed Development which would generate significant traffic. Details of the estimated construction vehicle trip generation, the affected road links and construction programmes were extracted for each development from the relevant EIA Report chapter.
- 12.7.26 Due to a number of the identified cumulative developments being consented but delayed post-consent, an assumption has been made that construction of these developments would commence prior to the timescales of the proposed Development. These developments have therefore been excluded from the cumulative assessment.
- 12.7.27 Only developments which would impact on the same study area (road network) as the proposed Development have been included in the cumulative assessment.
- 12.7.28 Several developments with the potential for producing cumulative effects were identified during this process. Details of the estimated peak construction vehicle trip generation and affected road links were extracted for the cumulative developments from the relevant EIA Report chapters from the ECU online portal.

- 12.7.29 Combining these with the respective links flows from the Assessment of Effects provides the following cumulative assessment, summarised in **Table 12.22**.
- 12.7.30 When considering the cumulative construction phase, both the total traffic and HGV traffic flows assessment results indicate an increase on all links within the study area, including large increases on the links previously taken forward for assessment of effect significance, namely the A836 and A949. Sections of the A839 and A9 would also experience a temporary significant increase in HGV traffic.
- 12.7.31 It is highly unlikely that the peak construction period associated with the cumulative developments in the area would overlap with the peak construction period of the proposed Development. This is because of several factors, including: the applications are at different stages of the planning process; it is unlikely all applications will be consented, or all consented developments will be constructed; developments have differing grid connection dates dictating their respective construction periods; and each development has varying lengths of construction periods. Furthermore, during the construction phase the high traffic generating activities, such as the importation of stone and concrete, tend only to occur over a few months of the whole construction period. It is also unlikely that the local capacity for concrete and stone production could supply several developments under construction at once, therefore, high traffic generating activities would inevitably be staggered.
- 12.7.32 It should be noted that the construction period of a renewable development is transitory in nature and all impacts are short lived and temporary. The inclusion of additional traffic flows in the baseline would dilute the potential impact that the proposed Development would have. The approach taken is therefore considered to be a suitably robust assessment. Should the construction of cumulative developments take place at the same time as the proposed Development, it would be mitigated through the use of an overarching Traffic Management Plan (TMP) for all of the sites as well as by introducing a phased delivery plan which would be agreed with the Council's roads department Transport Scotland and Police Scotland. Police escort arrangements are a major limiting factor on the frequency and timing of abnormal load deliveries. Currently experienced issues with police escort capacity mean it is not possible for more than one abnormal load convoy to be on the same road network in any 24-hour period.

Table 12.21: Cumulative developments

Cumulative Development	Planning reference	Development details	Distance from Site ¹	Application Stage	Comments
Developments that are in planning / consented and are included in the Cumulative Assessment					
Achany Extension	21/03695/S36	20 turbine extension with a maximum ground to blade tip height of 149.9 m	17.4 km	Consented – May 2023	The EIA Report identifies that construction of Achany Extension could potentially commence in 2025 and would last for 18 months. Construction of this development is therefore likely to be completed before the timescales of the proposed Development, however, as construction is yet to commence it is therefore included within the cumulative assessment.
Acheilidh wind farm (Lairg III)	24/02094/S36	12 turbines with a maximum tip height of 230 metres, battery storage and various ancillary infrastructure	3.5 km	Application submitted	The EIA Report identifies that construction could potentially commence in 2027 and would last for 18 months. As the construction period is anticipated to overlap with that of the proposed Development, Acheilidh wind farm has been included within the cumulative assessment.
Chleansaid wind farm	22/01635/S36	16 turbines with a maximum tip height of 200 m, battery storage and various ancillary infrastructure	18.5 km	Consented – December 2023	The EIA Report identifies that construction may commence in 2025 and would last for 21 months. Construction of this development is therefore likely to be completed before the timescales of the proposed Development, however, as construction is yet to commence it is therefore included within the cumulative assessment.
Garvary wind farm	21/01921/S36	25 turbines each with a blade tip height of 180 m, battery storage and various ancillary infrastructure	2.1 km	Appeal / Public inquiry	In the Transport Assessment submitted as a Technical Appendix to the Additional Information Report, it was anticipated that construction could potentially take place in 2025 and last for 24 months. Construction of this development is therefore likely to be completed before the timescales of the proposed Development, however, as construction is yet to commence it is therefore included within the cumulative assessment.
Lairg II wind farm	21/00849/FUL	10 turbines with a maximum blade tip height of 200 m	4.9 km	Consented – November 2021	The EIA Report did not identify when construction could commence, however it was anticipated that it would last for 12 months. Construction is yet to commence and is therefore included within the cumulative assessment.

¹ Distance between nearest turbine of proposed Development to nearest turbine of proposed Development

Cumulative Development	Planning reference	Development details	Distance from Site ¹	Application Stage	Comments
Meall Buidhe wind farm	20/02659/FUL	8 turbines with a maximum tip height of 149.9 m and various ancillary infrastructure	14.7 km	Consented – June 2023	The EIA Report identifies that construction would last for 18 months. However, it is unknown which year construction would commence. Construction is yet to commence and is therefore included within the cumulative assessment.
Strathroy wind farm	22/02442/FUL / 22/00054/REF RC	7 turbines with a maximum blade tip height of 180 m	18.3 km	Consented – August 2023	The EIA Report identifies that construction was anticipated to commence in 2022 and would last for 12 months. Construction is yet to commence and is therefore included within the cumulative assessment.
Strath Oykel wind farm	22/02717/S36	11 turbines each with a blade tip height of 200 m, battery storage and various ancillary infrastructure	15.7 km	Consented – January 2025	The EIA Report identifies that construction could potentially take place during 2025 and would last for 18 months. Construction of this development is therefore likely to be completed before the timescales of the Proposed Development, however, as construction is yet to commence it is therefore included within the cumulative assessment.
Strath Tirry wind farm	20/05067/FUL	4 turbines with a maximum blade tip height of 135 m and various ancillary infrastructure	17.3 km	Consented – June 2022	The EIA Report identifies that construction was potentially due take place in 2022 and would last for 12 months. Construction is yet to commence and is therefore included within the cumulative assessment.
Developments that are in planning / consented and are not included in the Cumulative Assessment					
N/A					
Developments in Screening/Scoping that are not included in the Cumulative Assessment					
Allt an Tuir wind farm – 23/06043/SCOP Braelangwell wind farm – 19/03179/SCOP Collie Beith wind farm – 24/03235/SCOP Creachan wind farm - 24/03825/SCOP Inveroykel wind farm - 24/04326/SCOP					

Table 12.22: Cumulative construction trip assessment

Link	Baseline		Proposed Development		Achanay Extension wind farm		Acheillidh wind farm		Chleansaid wind farm		Garvary wind farm		Lairg II wind farm		Strathroy wind farm		Strath Tirry wind farm		Meall Buidhe wind farm		Strath Oykel wind farm		Cumulative		% Change	
	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs
A836 between A839 and A839	1898	156	10	0	0	0	105	45	44	26	15	0	33	3	0	0	60	44	39	5	32	22	2236	301	17.81%	93.14%
A836 between A949 and A837	1745	113	216	176	0	0	105	45	44	26	84	38	57	27	0	0	54	44	0	0	95	74	2400	543	37.53%	379.16%
A836 between B9176 and A949	1820	140	108	88	0	0	105	45	44	26	84	38	0	0	0	0	44	44	0	0	74	74	2279	455	25.22%	224.65%
A836 between A9 and B9176	671	156	108	88	138	93	105	45	44	26	0	0	0	0	82	82	0	0	0	0	0	0	1148	490	71.07%	214.54%
A839 between A9 and A836	850	37	10	0	16	4	52	22	44	26	4	0	33	3	0	0	8	2	39	6	0	0	1056	100	24.25%	169.74%
A9 between A949 and A839	4300	343	0	0	8	4	52	22	44	26	0	0	33	3	0	0	2	2	0	0	22	22	4461	422	3.74%	23.01%

Link	Baseline		Proposed Development		Achany Extension wind farm		Acheilidh wind farm		Chleainsaid wind farm		Garvary wind farm		Lairg II wind farm		Strathroy wind farm		Strath Tirry wind farm		Meall Buidhe wind farm		Strath Oykel wind farm		Cumulative		% Change	
	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs
A9 between A836 and A949	7056	367	108	88	0	0	52	22	44	26	0	0	33	3	0	0	2	2	0	0	22	22	7317	530	3.70%	44.41%
A9 between B9174 and A836	8250	660	216	176	0	0	52	22	86	50	41	26	59	29	82	82	2	2	0	0	22	22	8810	1069	6.79%	61.98%
A949 between A836 and A9	992	54	108	88	137	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1237	234	24.70%	335.75%
A9 between A949 and A949	7029	389	0	0	0	0	52	22	44	26	0	0	33	3	0	0	2	2	0	0	22	22	7182	464	2.18%	19.30%
A836 between A837 and A839	1046	85	10	0	138	93	105	45	44	26	100	38	57	27	0	0	66	46	0	0	0	0	1566	360	49.69%	325.28%

12.8 Additional mitigation

Construction Phase Mitigation

- 12.8.1 A CTMP would be in place during the construction period to actively mitigate the effects as discussed above. An outline CTMP has been prepared as part of the Application which identifies the mitigation measures proposed during the construction stage. This is provided as **Technical Appendix 12.2**.
- 12.8.2 The following measures would be implemented through a CTMP during the construction phase. The CTMP would be agreed with the Council 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 Site (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;
 - Should there be evidence of this following this commencement of construction, suitable measures would be implemented within the Site to ensure deleterious materials are not transferred onto the highway;
 - Road cleaning would take place, if required, to remove any deleterious materials that are carried from the Site;
 - Normal Site working hours would be limited to between 07:00 - 19:00 Monday to Friday and 08:00 – 13:00 on Saturdays, unless otherwise agreed with the Council, 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; and
 - All drivers would be required to attend a detailed induction prior to undertaking any works on the Site.
- 12.8.3 Advance warning signs would be installed on the approaches to the affected road network. Information signage would 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).
- 12.8.4 The location and numbers of signs would be agreed post-consent and would form part of the wider traffic management proposals for the proposed Development.
- 12.8.5 The Applicant would also ensure information would be distributed through its communication team via project website, local newsletters and social media.
- 12.8.6 Post-consent/Pre-Construction, the Applicant would establish a Community Liaison Forum, in collaboration with the Council and local Community Councils. The forum would 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 would be maintained until construction is complete and the proposed Development is operational.

- 12.8.7 The Applicant would enter into a Section 96 (wear and tear) Agreement or a suitable alternative for the local adopted roads / routes to be used by construction vehicles. A pre-construction works inspection of the roads would be carried out with both parties in attendance with their condition recorded. Following completion of construction of the proposed Development, a further inspection would be carried out by both parties with repairs being agreed to return the roads to their pre-construction condition, to be carried out in a timely manner for approval by the Council. Notwithstanding this, the Applicant would carry out regular monitoring of the carriageway condition during the construction of the proposed Development. Necessary repair works would be carried out in a timely manner to prevent further deterioration of the carriageway during the works. Priority would be given to any damage which would be dangerous to users of the road affected.

Abnormal Load Transport Management Plan

- 12.8.8 An Abnormal Load Transport Management Plan (ATMP) would be prepared in advance of construction to cater for all abnormal load movements to and from the 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; and
 - Proposals to establish a Community Liaison Group 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.
- 12.8.9 A police escort would be required to facilitate the delivery of the abnormal 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.
- 12.8.10 The abnormal load convoys would be no more than three vehicles 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.
- 12.8.11 The times in which the convoys would travel would need to be agreed with Police Scotland who have sole discretion on when loads can be moved.

Residual Effects

- 12.8.12 Given the temporary nature of the construction programmes and with the implementation of mitigation measures through a CTMP and ATMP, all effects can be effectively managed, and no significant residual effects remain.

12.9 Summary of effects

12.9.1 The following provides a summary of the conclusions of the impact assessment with respect to each significant effect taking into consideration embedded and any additional mitigation measures.

Table 12.23: Summary of significant effects

Potential Impact	Significance of Effect Pre Mitigation	Proposed Mitigation	Residual Effects
Severance	Users of A836 – Moderate	Implementation of mitigation measures in CTMP. 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)
	Users of A949 – Moderate		Minor (Not Significant)
	Residents in Bonar Bridge – Moderate		Minor (Not Significant)
Driver Delay	Residents in Bonar Bridge – Moderate		Minor (Not Significant)
Pedestrian Delay	Residents in Bonar Bridge – Moderate		Minor (Not Significant)
Non-motorised User Amenity	Residents in Bonar Bridge – Moderate		Minor (Not Significant)
Road Safety	Users of A836 – Moderate		Minor (Not Significant)
Large Loads	Abnormal Loads Route - Moderate	Traffic Management plan (TMP) for the movement of abnormal loads. Trial run for abnormal loads prior to 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.	Minor (Not Significant)

12.10 References

Institute of Environmental Management and Assessment, Guidelines for the Environmental Assessment of Traffic and Movement (2023);

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