

12 Traffic and Transport

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12 Traffic and Transport

12.1 Executive Summary

- 12.1.1 During construction the Proposed Development will be accessed from the A836 via a temporary access junction located in the south-western corner of the site. Following construction this access junction will be restored to the current landscape condition and re-instated, and access during operation will be taken from a junction located in the north-western corner of the site.
- 12.1.2 In order to construct the Proposed Development, bulk materials such as concrete and aggregate will be brought in from local suppliers from the south via the A836. Specialist loads such the turbine components will be transported to site from Invergordon using specialist vehicles via the A9, A839 and A836.
- 12.1.3 The construction activities will lead to increased traffic volumes predominantly of the A836 during the construction phase only. Following commissioning of the Proposed Development, traffic flows will fall to two vehicles every week.
- 12.1.4 An assessment of likely potential effects using IEMA guidelines has been undertaken. This determined that minor, non-significant residual effects could be expected on the A836 road corridor from the site access junction through to Ardgay, relating to the increase in traffic operating on the route during the construction phase. There are no residual effects associated with the operational phase of the Proposed Development. Any effects during construction are reduced by mitigation proposals including a Construction Traffic Management Plan (CTMP).
- 12.1.5 The traffic effects during the operational phase of the Proposed Development are likely to be insignificant as expected traffic flows will be less than two vehicle movements per week, far below the recognised thresholds for triggering a formal transport assessment. As such, the effects during the operational phase are scoped out of the assessment.
- 12.1.6 The traffic effects during the decommissioning phase can only be fully assessed closer to that period, 30 years on from the completion of the site. As elements of the Proposed Development may remain in-situ (such as cable trenches, access tracks, etc), the traffic flows associated with the decommissioning works will be lower than those associated with the construction phase. The construction phase therefore represents a worst-case assessment and as such, no further assessment of the decommissioning phase has been considered at this point in time and has been scoped out of the assessment.

12.2 Introduction

- 12.2.1 This Chapter examines the transport and access issues associated with the Proposed Development and considers the likely significant effects on transport and access associated with the construction, operation, and decommissioning of the Proposed Development. The specific objectives of the chapter are to:
- describe the existing access network and transport baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including direct, indirect, and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects; and
 - assess the residual effects remaining following the implementation of mitigation.
- 12.2.2 The assessment has been carried out by Gordon Buchan BEng (Hons), MSc, CMILT, MCIHT, of Pell Frischmann Consultants Limited.

- 12.2.3 This chapter is supported by the following figures and appendices:
- Appendix 12.1: Transport Assessment (including Construction Traffic Management Plan);
 - Figure 12.1: Study Area; and
 - Figure 12.2: AIL Access Route.

12.2.4 Figures and technical appendices are referenced in the text where relevant.

12.3 Legislation, Policy and Guidelines

12.3.1 An overview of relevant transport planning policies has been undertaken and is summarised below for national and local government policies.

Legislation

12.3.2 There is no specific relevant legislation relating to this chapter.

National Policy

Planning Advice Note (PAN) 75

12.3.3 Planning Advice Note (PAN) 75: Planning for Transport provides advice on the requirements for Transport Assessments. The document notes that:

“... transport assessment to be produced for significant travel generating developments. Transport Assessment is a tool that enables delivery of policy aiming to integrate transport and land use planning.”

“All planning applications that involve the generation of person trips should provide information which covers the transport implications of the development. The level of detail will be proportionate to the complexity and scale of the impact of the proposal...For smaller developments the information on transport implications will enable local authorities to monitor potential cumulative impact and for larger developments it will form part of a scoping exercise for a full transport assessment. Development applications will therefore be assessed by relevant parties at levels of detail corresponding to their potential impact.”

Highland-wide Local Development Plan (2012)

12.3.4 The Highland-wide Local Development Plan (LDP) was adopted by The Highland Council (THC) in April 2012 and is the established planning policy for the Highlands. It sets out a settlement strategy and spatial framework for how the Council foresees development occurring in the forthcoming twenty-year period.

12.3.5 The LDP does not contain any specific wind farm traffic policy guidance in relation to the transport assessment for the Proposed Development. However, Policy 56 is relevant with regards to general transport policy. The relevant transport elements from this policy are:

“Development proposals that involve travel generation must include sufficient information with the application to enable the Council to consider any likely on- and off- site transport implications of the development and should:

incorporate appropriate mitigation on site and/or off site, provided through developer contributions where necessary, which might include improvements and enhancements to the walking/cycling network and public transport services, road improvements and new roads; and

incorporate an appropriate level of parking provision, having regard to the travel modes and services which will be available and key travel desire lines and to the maximum parking standards laid out in Scottish Planning Policy or those set by the Council.

When development proposals are under consideration, the Council's Local Development Strategy will be treated as a material consideration.

The Council will seek the implementation and monitoring of Green Travel Plans in support of significant travel generating developments."

Guidance

Transport Assessment Guidance (2012)

- 12.3.6 Transport Scotland's (TS) Transport Assessment Guidance was published in 2012. It aims to assist in the preparation of Transport Assessments (TA) for development proposals in Scotland such that the likely transport impacts can be identified and dealt with as early as possible in the planning process. The document sets out requirements according to the scale of development being proposed.
- 12.3.7 The document notes that a TA will be required where a development is likely to have significant transport impacts but that the specific scope and contents of a TA will vary for developments, depending on location, scale, and type of development.

Guidelines of the Environmental Assessment of Road Traffic (1993)

- 12.3.8 This transport assessment has reviewed the guidance described in the Guidelines of the Environmental Assessment of Road Traffic, 1993 published by IEMA.

Guidance on the Preparation of Transport Assessments (2014)

- 12.3.9 THC has prepared guidance on how Transport Assessments (TA) should be prepared for development sites within The Highlands. The guidance was published by THC in November 2014.
- 12.3.10 This assessment has noted the guidelines and has provided the required assessment.
- 12.3.11 .

12.4 Consultation

- 12.4.1 Table 12.1 summarises the consultation responses regarding transport and access matters and provides information on where and/or how they have been addressed in this assessment. The following regulatory bodies made comment on transport matters during scoping discussion held in 2018:
- The Highland Council (THC) Transport Department (as local roads agency); and
 - Transport Scotland (as trunk roads agency)
- 12.4.2 Further comments from THC, SEPA and NatureScot (formerly Scottish Natural Heritage (SNH)) were received during a pre-application consultation.

Table 12.1 - Consultation Summary

Consultee and Date	Issue Raised	Response / Action Taken
THC (March 2018) (Scoping Opinion))	An assessment in line with Transport Assessment Guidance should be undertaken with growth rates agreed with THC.	Noted and provided.
	Liaison with THC structures should be undertaken.	Contact has been made with THC structures although no response has been received

Consultee and Date	Issue Raised	Response / Action Taken
		regarding queries relating to Feith Osdail bridge.
	Timber extraction traffic must be considered.	This traffic has been included in the assessment.
	Operational traffic can be scoped out from the assessment.	Noted.
	An abnormal load assessment is required	This has been provided
	The route north of Lairg will require careful consideration	We note that Creag Riabhach wind farm will be constructed in advance of the Proposed Development. The road upgrades associated with Creag Riabhach will be available to traffic from the Proposal Development. Additional works have been considered and are presented in an Access Traffic Management Plan.
	A Construction Traffic Management Plan (CTMP) should be provided.	CTMP proposals have been presented in the submission for delivery to be secured via planning condition.
	A Wear & Tear agreement to cover local roads should be provided.	Noted and a commitment to agree a suitable agreement has been made in the submission.
	THC Renewables Proposal checklist elements should be used along with THC Transport Assessment Guidelines.	The required details have been provided.
	THC design guidance and TA guidelines to be used.	Noted.
Transport Scotland (March 2018) (Scoping Opinion)	No transport technical opinion provided.	Noted.
THC (September 2020) (Pre-Application Advice)	The assessment techniques requested are similar in scale and nature as those requested previously	Noted and provided.

Consultee and Date	Issue Raised	Response / Action Taken
	Concerns expressed about the safety and design of the proposed access strategy and a request to use the private Dalnessie access track	A detailed Access Traffic Management Plan, including detailed access drawings, a Road User Safety Audit (RUSA) and detailed traffic management proposals has been provided in Appendix 12.1. Access via the private Dalnessie access track is not possible and as such the southern access track has been proposed. This will only be in place for construction activities only and will then be removed and the land restored. The track and southern junction will be reinstated for the decommissioning phase.
	Need detailed designs for both access junctions including visibility splays	Detailed access designs and a RUSA have been provided in Appendix 12.1.
	Impact on the Feith Osdail bridge of construction traffic	No further details of the impact of empty construction traffic on the Feith Osdail bridge have been received from THC
	Impact on A836 road structure	The scale of traffic associated with the Proposed Development is less than that the Council has consented for Creag Riabhach which is using the same access route on the A836. The mitigation proposed for Creag Riabhach will be in place for construction traffic movements associated with the proposed development. Further minor works are detailed in the submission and can be secured by planning condition.
	Need to consider grid connection works and the associated traffic with these works	Grid connection works are covered by a separate planning application.
Transport Scotland (September	No additional requests from those already made	Noted.

Consultee and Date	Issue Raised	Response / Action Taken
2020) (Pre-Application Advice)		
SEPA / NatureScot (September 2020) (Pre-Application Advice)	Concerns regarding the access tracks and need for two access junction and the associated ecological and environmental impact	<p>The two access options are required to bypass the Feith Osdail bridge which is not suitable for construction traffic loads. It is not possible to use the adjacent private Dalnessie access track which is outwith the site boundary.</p> <p>To minimise the impact, the southern access is temporary in nature and will be removed upon completion of the construction phase and the land restored. Access for maintenance to the site will be via the northern access junction only.</p>

12.5 Assessment Methodology and Significance Criteria

12.5.1 A high-level overview of the effects of the traffic movements has been considered in accordance with Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA)) Guidelines for the Environmental Assessment of Road Traffic. The document is referred to as the IEMA Guidelines in this chapter.

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

- determine baseline conditions;
- review the Proposed Development to identify potential effects including any cumulative effects;
- evaluate significance of effects on receptors;
- identify mitigation; and
- assess residual effects.

12.5.3 This chapter considers effects on the following:

- the existing baseline transport conditions of the study area surrounding the Proposed Development site;
- the likely infrastructure requirements necessary to enable the Proposed Development;
- the likely effects and changes associated with the imposition of construction traffic on the local road network;
- what measures would be required to mitigate against any potential significant effects of the temporary construction traffic;

- the likely traffic conditions during the operational phase of the proposed development; and
 - the likely traffic conditions during the decommissioning phase of the proposed development.
- 12.5.4 No cumulative transport effects have been assessed within this chapter. A review of the Caithness & Sutherland Local Development Plan indicates that there are no significant traffic generating developments proposed within the immediate study area that would be complete and open prior to the expected date of the Proposed Development being constructed.
- 12.5.5 The use of Low NRTF traffic growth assumptions have provided a robust future year assessment scenario to account for the level of trip generation that can occur as a result of the types of local development that may occur within the study area and the effects of tourist traffic on the network.
- 12.5.6 The assessment is based on the Proposed Development as described in Chapter 3.

Consultation

- 12.5.7 The scope of the assessment has been informed by consultation responses summarised in Table 12.1 and the following guidelines/policies:
- Institute of Environmental Assessment, Guidelines for the Environmental Assessment of Road Traffic (1993);
 - Institution of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Impact Assessment' (2005);
 - Table 2.2 of Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2008); and
 - The Highland Council, Guidance on the Preparation of Transport Assessments.

Study Area

- 12.5.8 The Study Area includes local roads that are likely to experience increased traffic flows resulting from the Proposed Development. The geographic scope was determined through a review of Ordnance Survey (OS) plans and an assessment of the potential origin locations of construction staff and supply locations for construction materials.
- 12.5.9 The Proposed Development would take access directly from two new access junctions (one permanent and one temporary).
- 12.5.10 Access for construction materials would be predominantly from the south via the A9, A836 and A839. Access via the B9176 Struie Road is not considered suitable for bulk materials deliveries due to the sinuous nature of the road and the natural constraints at the Allt Fearn Burn bridge, Strathroy River bridge and bends and at the River Avereon bridge. Bulk construction traffic would be prohibited from this route via the Balance of Plant (BoP) contract as the Applicant does not consider the road suitable for articulated Heavy Goods Vehicle (HGV) deliveries, where alternative routes such as the A9 and A836 exist.
- 12.5.11 Abnormal loads associated with the wind turbines only have one road available to access the site and this is via the A9, A839 and A836, with loads passing through The Mound, Rogart and Lairg. A full description of the route is described in later sections with details of the constraints.
- 12.5.12 The study area for the assessment has therefore been assumed to be:
- The A9 (between Invergordon and The Mound);
 - The A836 (from the Dornoch Bridge to the proposed northern site access junction); and
 - The A839 (between the A9 at The Mound and Lairg).

- 12.5.13 This study area, illustrated in Figure 12.1 includes areas of material supply (quarries, etc), the site access junction, the trunk road network and the construction material and abnormal load delivery routes. It is also of sufficient size to include the main areas of workforce accommodation during the construction period.

Potential Effects Scoped Out

- 12.5.14 The traffic effects during the operational phase of the Proposed Development are likely to be insignificant as expected traffic flows will be less than two vehicle movements per week, far below the recognised thresholds for triggering a formal transport assessment. As such, the effects during the operational phase are scoped out of the assessment.
- 12.5.15 The traffic effects during the decommissioning phase can only be fully assessed closer to that period, 30 years on from the completion of the site. As elements of the Proposed Development may remain in-situ (such as cable trenches, access tracks, etc), the traffic flows associated with the decommissioning works will be lower than those associated with the construction phase. The construction phase therefore represents a worst-case assessment and as such, no further assessment of the decommissioning phase has been considered at this point in time and has been scoped out of the assessment.

Desk Study

- 12.5.16 The desk study included reviews and identification of the following:
- relevant transport planning policy
 - collection of traffic flow and accident data;
 - accident data;
 - sensitive locations, such as within built up areas and at the site access junctions;
 - any other traffic sensitive receptors in the area (core paths, routes, communities, etc.);
 - Ordnance Survey (OS) plans;
 - potential origin locations of construction staff and supply locations for construction materials to inform extent of local area roads network to be included in the assessment; and
 - constraints to the movement of Abnormal Indivisible Loads (AIL) through a Route Survey including swept path assessments.

Site Visit

- 12.5.17 A site visit was undertaken in September 2020 review the access route for Abnormal Indivisible Loads (AIL) and to review potential access constraints and opportunities.

Assessment of Potential Effect Significance

Criteria for Assessing the Sensitivity of Receptors

- 12.5.18 The Institution of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Impact Assessment' (2005) notes that the separate 'Guidelines for the Environmental Assessment of Road Traffic' (1993) document should be used to characterise the environmental traffic and transport effects (off-site effects) and the assessment of significance of major new developments. The guidelines intend to complement professional judgement and the experience of trained assessors.
- 12.5.19 In terms of traffic and transport impacts, the receptors are the users of the roads within the study area and the locations through which those roads pass.

12.5.20 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 12.2.

Table 12.2 - Classification of Receptor 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-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 trunk road junction 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.

12.5.21 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.

Criteria for Assessing the Magnitude of Change

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

- Rule 1 – include highways links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
- Rule 2 – include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

12.5.23 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:

- Severance – the IEMA Guidance states that, “severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery.” Further, “Changes in traffic of 30%, 60% and 90% are regarded as producing ‘slight’, ‘moderate’ and ‘substantial’ [or minor, moderate and major] changes in severance respectively”. However, the Guidelines acknowledge that “the measurement and prediction of severance is extremely difficult”;

- Driver delay – the IEMA Guidelines note that these delays are only likely to be “significant [or major] when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.”;
- Pedestrian delay – the delay to pedestrians, as with driver delay, is likely only to be major when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. An increase in total traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross the road and would be considered major;
- Pedestrian amenity – the IEMA Guidelines suggests that a tentative threshold for judging the significance of changed in pedestrian enmity would be where the traffic flow (or its lorry component) is halved or doubled. Therefore, it is considered that a change in the traffic flow of -50% or +100% would produce a major change in pedestrian amenity;
- Fear and intimidation – there are no commonly agreed thresholds for estimating levels of fear and intimidation, from known traffic and physical conditions. However, as the impact is considered to be sensitive to traffic flow, changes in traffic flow of 30%, 60% and 90% are regarded as producing minor, moderate, and major changes respectively; and
- Accidents and safety – professional judgement would be used to assess the implication of local circumstances, or factors which may elevate or lessen risks of accidents.

12.5.24 While not specifically identified, as more vulnerable road users, cyclists are considered in similar terms to pedestrians.

Criteria for Assessing Cumulative Effects

12.5.25 No cumulative assessment has been undertaken in transport terms as detailed in following sections.

Criteria for Assessing Significance

12.5.26 To determine the overall significance of effects, the results from the receptor sensitivity and magnitude of change assessments are correlated and classified using a scale set out in Table 2.4 of Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB) and summarised in Table 12.3.

Table 12.3 - Significance of Effects

Receptor Sensitivity	Magnitude of Impacts			
	Major	Moderate	Minor	Negligible
High	major	major / moderate	moderate / minor	minor
Medium	major / moderate	moderate	minor	minor / negligible
Low	moderate / minor	minor	minor	minor / negligible
Negligible	minor	minor	minor / negligible	negligible

12.5.27 In terms of the EIA Regulation, effects would be considered to be significant where they are assessed to be major or moderate. Where an effect could be one of major/moderate or moderate/minor, professional judgement would be used to determine which option should be applicable and whether the effect is significant or not.

- 12.5.28 The assessment is based upon average traffic flows in one-month periods. During the month, activities at the site may fluctuate between one day and another and it is not possible to fully develop a day by day traffic flow estimate as no BoP contractor has been appointed and external factors can impact upon activities on a day by day basis (weather conditions, availability of materials, time of year, etc).

Limitations to Assessment

- 12.5.29 The assessment is based upon an assumed construction programme for the Proposed Development. Alterations in this programme, may increase or decrease traffic flows per month.
- 12.5.30 This assessment is based upon average traffic flows. There may be localised peaks with construction days where flows can be higher for a specific hour, such as a shift change on site.
- 12.5.31 Assumptions on the origin points for materials have been made to provide a worst-case assessment scenario. Should these origin points change, the effects on surrounding areas may alter to those presented in the assessment.
- 12.5.32 Wide area review of traffic surveys was not undertaken due to the impact that COVID 19 restrictions have had on traffic flows and patterns.

12.6 Baseline Conditions

Baseline Traffic Surveys

- 12.6.1 Access to the site would be taken directly from the A836 via two new access junctions as described earlier (one permanent and one temporary). The permanent northern junction would be surfaced and constructed so that the junction bellmouth would be to adoptable standards. The remaining access tracks within the site would be private.
- 12.6.2 The A836 is a district distributor road that provides connections between Tain and Thurso via of Lairg and Tongue. The road is of a good standard and varies between 6 m and 7 m in width and is subject to a 60mph limit outwith settlements.
- 12.6.3 The A839 connects The Mound and A9 through to Lairg and beyond to Invercassley. The road is generally a modern two-lane road with a speed limit of 60 miles per hour (mph), with 30 mph restrictions within settlements.
- 12.6.4 The A836 and A839 are all maintained and operated by THC.
- 12.6.5 The A9 is the main trunk road in the area and connects Polmont to Scrabster. The road is operated on behalf of Transport Scotland by BEAR Scotland. Within the study area, the road is subject to a 60 mph speed limit in the main.
- 12.6.6 The A9 and A836 within the study area form part of the North Coast 500 (NC500) tourist route. This 516 mile route is now a popular tourist sightseeing route around the north-west Highlands and Sutherland and has been responsible for an increase in traffic visiting the study network.
- 12.6.7 In order to assess the impact of development traffic on the study area, Annual Average Daily Traffic (AADT) flows were obtained from the UK Department for Transport (DfT) traffic database. It was not possible to collect new traffic flow data for the whole of the study network due to the ongoing impact on transport and access arising from the COVID 19 travel restrictions.
- 12.6.8 The counts sites used were as follows:
1. A836 to the south of Crask Inn;
 2. A836 within the centre of the village of Lairg;
 3. A839 to the west of Pittentrail;
 4. A836 to the west of Bonar Bridge;

- 5. A836 within the village of Ardgay;
 - 6. A9 to the south of The Mound; and
 - 7. A9 at Glenmorangie.
- 12.6.9 The locations of the traffic count sites used in this assessment are illustrated in Figure 12.1. The DfT traffic data allow the traffic flows to be split in vehicle classes. The data was summarised into Cars / Light Goods Vehicles (LGV) and HGVs (all goods vehicles >3.5tonnes gross maximum weight).
- 12.6.10 Table 12.4 summarises the AADT traffic data collected and used in this assessment.

Table 12.4- Existing AADT Traffic Conditions

Survey Location	Cars & LGV	HGV	Total
A836 Site Access	289	29	318
A836 Lairg	1,825	140	1,965
A839 Lairg	830	27	857
A839 Rogart	830	27	857
A836 Bonar Bridge	1,683	106	1,789
A836 Ardgay	1,706	128	1,834
A9 south of The Mound	3,988	310	4,298
A9 at Glenmorangie	7,383	494	7,877

Baseline Road Safety Review

- 12.6.11 Road traffic accident data for the three year period commencing 1 January 2017 through to the 31 December 2019 was obtained from the online resource crashmap.co.uk which uses data collected by the police about road traffic crashes occurring on British roads.
- 12.6.12 The statistics are categorised into three categories, namely “Slight” for damage only incidents, “Serious” for injury accidents and “Fatal” for accidents that result in a death. The review included the A836 and A839 from the A9 towards the Proposed Development site.
- 12.6.13 A summary analysis of the incidents indicates that:
- 17 accidents were recorded within the study area roads within the five year period.
 - Of those 17 accidents, 13 were classed as “Slight”, 2 as “Serious” and 2 as “Fatal”. One “Fatal” accident (between Ardgay and Bonar Bridge) involved a pedestrian casualty, the other (located to the west of Lairg) involved a motorcyclist.
 - No accidents were recorded on the A836 near the locations of the proposed access junctions.
 - Motorcycles were involved in 6 accidents, including 1 “Fatal” and 2 “Serious” incidents. One child was injured in a “Slight” accident on the A839 in Lairg.
 - Young drivers were involved in only 3 “Slight” accidents.
 - There were no reported accidents involving a bus or a pedal cycle in the study area;
 - There were no noted HGV accidents noted on the A839 or A836.

- Young drivers were involved in 6 accidents of which 1 was classed as “Serious”, the rest noted as “Slight”.
- 12.6.14 The analysis indicates that the vast majority of recorded accidents are categorised as being “Slight”. No HGV traffic was involved and over half involved high risk groups (motorcycles and young drivers).

Baseline Sustainable Travel Infrastructure Review

- 12.6.15 There are no Core Paths recorded by THC near the proposed site access points. 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 (NCR 1).

Future Baseline

- 12.6.16 Construction of the Proposed Development could commence during 2022 if consent is granted and is anticipated to take up to 12 months depending on weather conditions and ecological considerations.
- 12.6.17 To assess the likely effects during the construction, base year traffic flows were determined by applying a National Road Traffic Forecast (NRTF) low growth factor to the surveyed traffic flows.
- 12.6.18 The NRTF low growth factor for 2019 to 2022 is 1.022. These factors were applied to the 2019 survey data to estimate the 2022 Base traffic flows shown in Table 12.5. This will be used in the Construction Peak Traffic Impact Assessment.

Table 12.5 - Baseline 2022 Traffic Conditions¹

Survey Location	Cars & LGV	HGV	Total
A836 Site Access	295	30	325
A836 Lairg	1,865	143	2,008
A839 Lairg	848	28	876
A839 Rogart	848	28	876
A836 Bonar Bridge	1,720	108	1,828
A836 Ardgay	1,744	131	1,874
A9 south of The Mound	4,076	317	4393
A9 at Glenmorangie	7,545	505	8,050

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

12.7 Standard Mitigation

Construction Phase Mitigation

- 12.7.1 The following measures would be implemented through a Construction Traffic Management Plan (CTMP) during the construction phase. The CTMP would be agreed with THC prior to construction works commencing:

¹ Please note that growth assumptions can lead to minor rounding errors in quoted figure within this chapter and appendices

- Where possible, further detailed design processes would minimise the volume of material to be imported to site to help reduce HGV numbers;
 - A site worker transport and travel arrangement plan, including transport modes to and from the worksite (including pick up and drop off times);
 - A Traffic Management Plan to control the operation of the access junctions;
 - All materials delivery lorries (dry materials) should be sheeted to reduce dust and stop spillage on public roads;
 - Specific training and disciplinary measures should be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
 - Wheel cleaning facilities will be provided at both access junctions;
 - Normal site working hours would be limited to between 07:00 and 18:00 (Monday to Friday and 07:00 and 13:00 (Saturday) though component delivery and turbine erection may take place outside these hours;
 - Provide construction updates on the project website and or a newsletter to be distributed to residents within an agreed distance of the site.
 - All drivers would be required to attend a detailed induction prior to undertaking any works on the proposed development site.
- 12.7.2 Advance warning signs will be installed on the approaches to the affected road network. Information signage could be installed to help improve driver information and allow other road users to consider alternative routes or times for their journey (where such options exist).
- 12.7.3 The location and numbers of signs will be agreed post consent and would form part of the wider traffic management proposals for the Proposed Development.
- 12.7.4 Information on the turbine convoys will be provided to local media outlets such as local papers and local radio to help assist the public.
- 12.7.5 The Applicant will also ensure information was distributed through its communication team via the project website, local newsletters and social media.
- 12.7.6 A police escort will be required to facilitate the delivery of the predicted loads. The police escort would be further supplemented by a civilian pilot car to assist with the escort duty. It is proposed that an advance escort would warn oncoming vehicles ahead of the convoy, with one escort staying with the convoy at all times. The escorts and convoy would remain in radio contact at all times where possible.
- 12.7.7 The abnormal loads convoys will be no more than three AILs long, or as advised by the police, to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic where it is safe to do so.
- 12.7.8 The times in which the convoys would travel will need to be agreed with Police Scotland who have sole discretion on when loads can be moved.
- Abnormal Load Transport Management Plan**
- 12.7.9 An Abnormal Load Transport Management Plan will be prepared to cater for all movements to and from the Proposed Development site. This would include:
- Procedures for liaising with the emergency services to ensure that police, fire and ambulance vehicles are not impeded by the loads. This is normally undertaken by informing the emergency

services of delivery times and dates and agreeing communication protocols and lay over areas to allow overtaking.

- A diary of proposed delivery movements to liaise with the communities to avoid key dates such as popular local events etc.
- A protocol for working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic.
- Proposals to establish a construction liaison committee to ensure the smooth management of the project / public interface with the applicant, the construction contractors, the local community, and if appropriate, the police forming the committee. This committee would form a means of communicating and updating on forthcoming activities and dealing with any potential issues arising.

Operational Phase Mitigation

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

12.8 Receptors Brought Forward for Assessment

Proposed Development Access Strategy

- 12.8.1 The Proposed Development would be accessed directly from two new access junctions located on the A836 to the north of Lairg.
- 12.8.2 The southern access junction would be located between the access track leading to the Dalnessie Estate and the Feith Osdail Bridge. This access would be temporary in nature and would be removed immediately following the construction phase of the Proposed Development.
- 12.8.3 The southern access is the main inbound access for construction traffic. All loaded HGV traffic will enter the site at this location to avoid loaded vehicles crossing the Feith Osdail bridge.
- 12.8.4 Due to the layout of the southern access junction, it is proposed that the junction is operated under traffic signal control (unless THC are content with it to operate as a priority operation). Further details of the junction operation and modifications to the A836 to facilitate the construction site are provided in the Traffic Management Plan provided within the Transport Assessment (Appendix 12.1).
- 12.8.5 The northern access junction would be permanent and is located to the north of the Feith Osdail bridge. This junction will be used for operational and maintenance access, as well as providing an exit for empty HGV traffic from the construction site. A small number of construction deliveries would be made to the northern access junction at the start of the construction phase for the delivery of plant and initial construction materials in advance of the internal track river crossing being complete. The numbers of the movements will be low and will not exceed a weight or number to be agreed with THC.
- 12.8.6 The access junctions would be designed to accommodate all predicted loads and traffic for both the construction and operational phases of the proposed development. The impact of construction traffic entering and exiting the site has been considered on the A836 link within the assessment.
- 12.8.7 A sitespecific access bridge will be provided within the site to link the southern and northern sections of the site. As the bridge is located within the site, no further impact assessment of it is required within this chapter.

Construction Traffic

- 12.8.8 During the 12 month construction period, the following traffic will require access to the site:
- staff transport, either cars or staff minibuses;
 - construction equipment and materials, deliveries of machinery and supplies such as crushed rock and concrete; and
 - abnormal loads consisting of the wind turbine sections and also a heavy lift crane, transported to site in sectional loads.
- 12.8.9 Average monthly traffic flow data were used to establish the construction trips associated with the site based on the assumptions detailed in Appendix 12.1.
- 12.8.10 The distribution of construction trips on the network will vary depending on the types of loads being transported. All traffic will enter the site by way of the southern site access junction. All trips will approach from the south using the A836, with construction staff expected to be based at both Lairg and Bonar Bridge.
- 12.8.11 Aggregates and ready-mix concrete will be supplied from local sources and the assessment has assumed the facilities located to the east of Ardgay for the supply of these materials. General construction, building supply deliveries, geotextile, cable and reinforcement deliveries will be made from the A9 via the A839 and A9.
- 12.8.12 Upon completion of construction, the southern access junction and track will be removed, and the land occupied by these areas completely restored. Access for the site for operational uses would then be via the northern access junction only. During the decommissioning phase, the access would be re-established temporarily to allow access and then returned to its original condition.
- 12.8.13 ALL deliveries associated with the turbine components will access the from Invergordon via the A9, A839 and A836.
- 12.8.14 Using the assumptions above (and provided in greater detail in Appendix 12.1: Transport Assessment), a construction programme has been developed for the Proposed Development. This has been used to determine timescales for the various deliveries and trips and is detailed in Table 12.6.
- 12.8.15 The results conclude that Month 5 is likely to be the peak period for the construction phase. The activities are anticipated to generate an average of 66 movements per day (23 trips inbound and 23 trips outbound), of which 20 would be made by light vehicles (site staff) and 46 by HGV.
- 12.8.16 Using the distribution of traffic described in Appendix 12.1, the proposed traffic flows on the study area network at the peak of construction are illustrated in Table 12.7.
- 12.8.17 Please note that the figures quoted in Table 12.6 are average flows that have been rounded to the nearest whole number. As such, there may be minor rounding errors reported.

Table 12.6 - Construction Traffic Profile

Activity	1	2	3	4	5	6	7	8	9	10	11	12
Site Establishment & Remediation	50	20									20	50
General Site Deliveries	40	40	40	40	40	40	40	40	40	40	40	40
Access Track Works		744		744	744							
Timber Extraction	54	54										
Bridge Deliveries & Works		41	27									
Reinforcement Deliveries					11		11					
Ready Mix Concrete Deliveries					210	210	210					
Cable Deliveries							14					
Cabling Sand							72	72				
Geotextile Deliveries		5		5								
Substation & Battery Deliveries						23		23		12		
Craneage (Cranes & Ballast Vehicles)								20	20			
Reinstatement											281	281
Turbine Component Deliveries								49	49			

Activity	1	2	3	4	5	6	7	8	9	10	11	12
AIL Escorts								64	64			
Commissioning									40	20		
Staff	220	264	440	440	440	440	440	440	440	440	440	440
Total HGV	144	904	67	789	1,005	273	347	204	109	52	341	371
Total Cars / LGV	220	264	440	440	440	440	440	504	544	460	440	440
Total Movements	364	1,168	507	1,229	1,445	713	787	708	653	512	781	811
Total HGV per Day	7	41	3	36	46	12	16	9	5	2	16	17
Total Cars / LGV per Day	10	12	20	20	20	20	20	23	25	21	20	20
Total per Day	17	53	23	56	66	32	36	32	30	23	36	37

Table 12.7 – Peak Construction Month Daily Traffic Data

Survey Location	Care & LGV	HGV	Total
A836 Site Access	20	46	66
A836 Lairg	16	44	60
A839 Lairg	6	2	8
A839 Rogart	6	2	8
A836 Bonar Bridge	10	44	54
A836 Ardgay	0	44	44
A9 south of The Mound	0	2	2
A9 at Glenmorangie	0	2	2

12.8.18 The peak month traffic data was combined with the future year (2022) traffic data to allow a comparison between the baseline results to be made. The increase in traffic volumes is presented in percentage increases for each class of vehicle and is illustrated in Table 12.8. Please note there may be minor rounding errors quoted in the tables.

Table 12.8 - 2022 Peak Month Daily Traffic Data

Location	Cars & LGV	HGV	Total	Cars & LGV % Increase	HGV % Increase	Total Traffic % Increase
A836 Site Access	315	75	391	6.77%	154.1%	20.2%
A836 Lairg	1,881	187	2,068	0.86%	30.75%	2.99%
A839 Lairg	854	30	884	0.71%	8.40%	0.95%
A839 Rogart	854	30	884	0.71%	8.40%	0.95%
A836 Bonar Bridge	1,730	152	1,882	0.58%	40.62%	2.95%
A836 Ardgay	1,744	175	1,918	0.00%	33.64%	2.35%
A9 south of The Mound	4,076	319	4,395	0.00%	0.73%	0.05%
A9 at Glenmorangie	7,545	507	8,053	0.00%	0.46%	0.03%

12.8.19 A review of 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 that makes up the study area and the assessment is presented in Appendix

12.1. The assessment clearly indicates that there are no road capacity issues associated with the Proposed Development and that no further assessment is required.

Receptor Review

12.1.1 The impact assessment indicates that traffic levels will not exceed the 30% threshold for total traffic within the study area. The 10% total traffic impact threshold is exceeded on the A836 at the site access locations. The 10% threshold for HGV traffic is exceeded on the at the site access and on the A836 within Lairg, Bonar Bridge and Ardgay. The 10% total traffic threshold and the 10% HGV threshold are both exceeded, requiring a further assessment, as detailed below.

12.1.2 A review of receptors has been undertaken to allow assessment against the criteria laid out in the IEMA guidance and the supporting thresholds. The receptor sensitivities within the study area are noted below in Table 12.9 and are based upon the descriptions contained in Table 12.2.

Table 12.9 – Receptor Sensitivity Summary

Receptor	Sensitivity	Justification
Road Users of the A836 at the Site Access Junctions	High	A class road not subject to high HGV traffic flows
Road Users of the A836 in Lairg	Low	A class road with no traffic calming features
Road Users of the A836 in Bonar Bridge	Low	A class road with no traffic calming features
Road Users of the A836 in Ardgay	Low	A class road with no traffic calming features
Residents on the A836 frontage in Lairg	Low	Rural settlement with few community or public facilities or services on the road frontage
Residents on the A836 frontage in Bonar Bridge	Medium	Intermediate sized rural settlement, containing some community or public facilities and services
Residents on the A836 frontage in Ardgay	Low	Rural settlement with few community or public facilities or services on the road frontage

12.9 Potential Effects

Construction

12.9.1 An assessment of the likely effects has been undertaken using the previously described thresholds. The results of this are summarised below in Table 12.10. The likely effects have assumed that the proposed mitigation measures described in Section 12.7 are in place.

Table 12.10 – Construction Phase Effects Assessment

<i>Receptor</i>	<i>Severance</i>	<i>Driver Delay</i>	<i>Pedestrian Delay</i>	<i>Amenity</i>	<i>Fear</i>	<i>Accidents & Safety</i>
A836 Users at the Site Access Junctions	moderate/ minor	minor	moderate/ minor	moderate/ minor	minor	minor
A836 Lairg Users	minor	minor	minor	minor	minor	minor
A836 Bonar Bridge Users	minor	minor	minor	minor	minor	minor
A836 Ardgay Users	minor	minor	minor	minor	minor	minor
Lairg A836 residents	minor	minor	minor	minor	minor	minor
Bonar Bridge A836 residents	minor	minor	minor	minor	minor	minor
Ardgay A836 residents	minor	minor	minor	minor	minor	minor

12.9.2 The moderate / minor effects noted on the A836 have been reviewed against the physical characteristics of the road at the site access locations, where pedestrian flows are insignificant due to the lack of infrastructure and pedestrian destinations. As such, professional judgement has been used and the severance, pedestrian delay and amenity criteria can be reclassified as “minor”. All construction effects are therefore not significant.

12.10 Additional Mitigation and Enhancement

12.10.1 Whilst no further assessment is required following the assessment noted in Section 12.7, further mitigation measures are proposed to further improve the operation of the construction phase and to ensure the highest levels of road safety,

Wear & Tear Agreement

12.10.2 THC will require an agreement to cover the cost of abnormal wear and tear on the A836 between Lairg and the northern site access junction. This will address concerns about possible floating sections of the road to the north of the Feith Osdail bridge as well as general construction traffic impacts.

12.10.3 Video footage of the pre-construction phase condition of the abnormal loads access route and the construction vehicles route would be recorded to provide a baseline of the state of the road prior to any construction work commencing. This baseline would inform any change in the road condition during the construction stage of the Proposed Development. Any necessary repairs would be coordinated with THC. Any damage caused by traffic associated with the Proposed Development, during the construction period that would be hazardous to public traffic, would be repaired immediately.

- 12.10.4 During construction activities, a road wear and tear review would be undertaken with THC every two months during construction. A bridge monitoring review will also be prepared in consultation with THC structures.
- 12.10.5 Any damage to road infrastructure caused directly by construction traffic would be made good, and street furniture that is removed on a temporary basis would be fully reinstated.
- 12.10.6 There would be a regular road edge review and any debris and mud would be removed from the public carriageway to keep the road clean and safe during the initial months of construction activity, until the construction junction and immediate access track works are complete.

Site Access Traffic Management Plan

- 12.10.7 A detailed site access Traffic Management Plan has been developed to review the operation of both access junctions in detail. This includes a review of road safety using an independently prepared Road User Safety Audit, detailed traffic management proposals, road signage strategy and provision of passing places between the Feith Osdail bridge and the northern site access junction of the A836.
- 12.10.8 A copy of the detailed Traffic Management Plan is provided in Appendix 12.1 as an appendix to the Transport Assessment.

Additional Traffic Management Measures

- 12.10.9 Additional site specific measures could further improve road safety across the study area. These are:
 - A voluntary 15 mph speed limit for HGV traffic associated with the site when passing through Ardgay, Bonar Bridge and Lairg. This will help reduce fear and amenity issues within the settlements and help improve road safety.
 - The greater use of on-site borrow pits would help reduce the number of HGV movements leading to and from site that what has been assumed within this assessment.
- 12.10.10 These measures will be delivered as part of a wider ranging Construction Traffic Management Plan, secured by planning condition.

12.11 Residual Effects

Construction

- 12.11.1 The assessment confirms that the residual effects will be minor and non- significant following mitigation. This conclusion has been based upon professional judgement following a review of the actual numbers of movements on the proposed study area which whilst result in a statistically high percentage impact are low in physical numbers.
- 12.11.2 The traffic effects associated with the construction phase are however temporary in nature and are confined to the construction period only (anticipated to be 12 months). No long lasting detrimental transport or access issues are associated with the Proposed Development. The proposed measures will help reduce the impacts of construction traffic and will improve road safety for all road users during this period.

12.12 Cumulative Assessment

- 12.1.3 The use of NRTF growth assumptions has provided a basis for general local development growth within the study area. The use of NRTF covers other committed development traffic flows within the study area.
- 12.12.1 Sites that do not have planning consent cannot be considered as committed schemes and cannot be included in the Proposed Development assessment as they may be refused or may not progress beyond scoping.

- 12.12.2 Three consented wind farm sites are located in close proximity to the Proposed Development site. These are Creag Riabhach (located to the north on the A836 near Crask Inn), Lairg 2 Wind Farm (located to the south of Lairg) and Braemore (located to the south of the A839, west of Achany).
- 12.12.3 Creag Riabhach is due to start construction in late 2020, with construction due to complete in March 2022. As such, all construction activities will have ceased by the time that works will commence at the Proposed Development. It has been assumed however that the road upgrades and passing places that are to be delivered as part of Creag Riabhach between Dalchork and Feith Osdail will remain in place and will be of benefit to all road users including delivery traffic associated with the Proposed Development.
- 12.12.4 Lairg 2 was consented in June 2020 and construction activities are unlikely to commence until 2023 / 2024 due to the need to discharge planning conditions, grid connection timescales and general procurement requirements. It will therefore likely occur after works at the Proposed Development have concluded.
- 12.12.5 Braemore was consented in 2017, but construction works have yet to commence (planning permission for the site expires in October 2022). A review of the planning submission documents for site revealed that there is no detailed transport review of the site and as such it is not possible to include its trip estimates into this assessment.
- 12.12.6 No other significant traffic generating developments were noted in the study area that may occur during the construction period associated with The Proposed Development.
- 12.12.7 Any crossover of traffic with the Proposed Development flows and those associated with future developments would be addressed via a Traffic Management Plan. The inclusion of further traffic flows in the base line (i.e. including non-consented traffic) will dilute the potential impact that the Proposed Development will have. As such, the approach taken is considered to be an overly robust assessment and no significant residual effects are anticipated.

12.13 Summary

- 12.13.1 The Proposed Development will lead to increased traffic volumes on the A836 during the construction phase. This increase will be temporary.
- 12.13.2 An assessment of likely effect using IEMA guidelines has been undertaken. This determined that minor, non-significant effects could be expected along the A836 between the site access junction and Ardgay, relating to the increase in HGV traffic operating on the route. All other receptors with the study area have been scoped out of the assessment.
- 12.13.3 Operational and decommissioning effects have been scoped out of the assessment.

Table 12.11 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Traffic effects on the A836	Minor	Adverse	Implementation of Construction Traffic Management Plan, development of RUSA reviewed access junction and detailed access management plan, provision of construction traffic road signage, convoy escorts for AIL movements, provision of localised road improvement works.	Minor	Adverse
Operation					
No operational effects anticipated					
Decommissioning					
Any decommissioning effects would be less than those predicted for the construction phase and have therefore been scoped out of the assessment.					

Table 12.12 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
None	None	None	None	None

12.14 References

Department for Transport (2013). *Design Manual for Roads and Bridges, Volume 15, Part 5 "The NESA Manual"*. Available at: <http://www.sias.com/2013/TS/201303NesaManual.pdf>

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