

Bhlaraidh Wind Farm Extension

Technical Appendix 12.1: Transport Assessment

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Prepared by
Nick Garrity

Checked by
Jordan Dunn

Approved By
Jordan Dunn

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Prepared by
Allan Spence

Checked by
Jordan Dunn

Approved By
Jordan Dunn

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FIGURES

Figure 12.1 - Site Location, Study Area and Traffic Count Locations



APPENDICES

Appendix A - Construction Traffic Profile

1 INTRODUCTION

- 1.1 Tetra Tech was commissioned by SSE Renewables (“the Applicant”) to undertake an assessment of the transport aspects of the proposed Bhlaraidh Wind Farm Extension, hereafter referred to as the ‘Proposed Development’ or ‘the Site’. The Site is located in the Scottish Highlands to the west of Loch Ness.
- 1.2 The Site lies adjacent to Bhlaraidh Wind Farm which began operation in 2017.
- 1.3 This Transport Assessment (TA) identifies the key transport and access matters associated with the Proposed Development, including the proposed routing for construction traffic including abnormal loads. The TA identifies the predicted number and distribution of construction traffic movements and details where mitigation measures are required to accommodate the proposed movements.
- 1.4 The TA considers the impacts during the construction phase of the Proposed Development, when volumes of traffic generation are anticipated to be at their greatest due to the delivery of equipment and construction materials. In line with IEMA guidelines, severance, driver delay, pedestrian delay, pedestrian amenity, fear and intimidation as well as accidents and safety have evaluated in isolation for the proposed Bhlaraidh Wind Farm Extension. Additionally, these receptors were evaluated cumulatively considering other committed and in-planning wind farms to produce a worst-case scenario. The operational phase of the Proposed Development is not anticipated to have any significant impacts on the public road network as a result of the low levels of traffic that are forecast.
- 1.5 All turbine blade loads would originate from either Kyleakin or Kyle of Lochalsh and access the site via the A87 and A887 to the existing Bhlaraidh Wind Farm access junction. All other turbine components would be delivered to Inverness and would also access the site via the A82 and A887 from the north. An Abnormal Load Route Assessment has been undertaken and is included as Technical Appendix 12.2. General construction traffic is likely to approach the site from the A82 both north and south of Invermoriston and then the A887 to the Proposed Development.

- 1.6 This TA has been prepared in accordance with instructions from the Applicant on the above project details. No liability is accepted for the use of all or part of this report by third parties. This report is © Copyright of Tetrattech 2021 and the Applicant. No section of this report may be reproduced without prior written approval.

Report Structure

- 1.7 Following this introductory chapter, the TA is structured as follows:
- **Chapter Two** describes the Proposed Development along with details of the proposed abnormal loads;
 - **Chapter Three** sets out details of relevant local and national policy and guidance;
 - **Chapter Four** sets out the assessment stages considered within the TA;
 - **Chapter Five** details the baseline transport conditions encountered within the study area;
 - **Chapter Six** sets out estimates of development traffic flows;
 - **Chapter Seven** provides details of the traffic impact assessment;
 - **Chapter Eight** sets out construction traffic management proposals;
 - **Chapter Nine** summarises the findings of the Transport Assessment and outlines the key conclusions.

2 PROPOSED DEVELOPMENT

Site Description

2.1 The Proposed Development would consist of up to 18 turbines, each up to a maximum tip height of 180m and the following associated infrastructure.

- Up to eighteen wind turbines of up to 180m tip height with internal transformers;
- On site access tracks;
- A new on-site substation; and
- Any associated ancillary works required.

2.2 In addition to the permanent components, the construction phase would comprise the following temporary facilities:

- Reuse of former main site compound area utilised for Bhlaraidh Wind Farm;
- Reuse of a former concrete batching plant area, for a satellite compound;
- Temporary concrete batching plant; and
- Borrow pits, comprising a combination of reuse of existing borrow pits created for Bhlaraidh Wind Farm, and new borrow pits.

2.3 Access to the Proposed Development is via the existing junction to Bhlaraidh Wind Farm on the A887, located to the west of Invermoriston. No access to the site will be taken via Allt Saigh. It is anticipated that all construction traffic with the exception of wind turbine blade components will access the Site from the east on the A887.

2.4 The location of the Proposed Development is indicated in Figure 12.1.

Proposed Turbine Details

2.5 The 18 turbines proposed as part of the development would have a tip height of up to 180m and a rotor diameter of up to 158m. It is anticipated that the total generating capacity will be in excess of 100MW depending on the final choice of turbine.



- 2.6 SSE indicated that they wish to consider access for up to 76m long blade turbines being transported to Site.
- 2.7 Technical appendix 12.2 Route Assessment considers a 77m long Siemens SG155 blade with tower loads up to 33.6m in length and up to 4.7m wide considered to provide a worst-case assessment scenario for a variety of different options.

3 POLICY CONTEXT

Introduction

- 3.1 A review of relevant transport and planning policies has been undertaken and is summarised below. The review provides the basis for the wider development context of wind farm proposals.

National Policy

Scottish National Planning Framework (NPF)

- 3.2 The Scottish National Planning Framework (NPF) sets the context for development planning in Scotland and provides a framework for the spatial development of Scotland as a whole. It sets out the Government's development priorities over the next 20-30 years and identifies national developments which support the development strategy. Scotland's third National Planning Framework 3 was laid in the Scottish Parliament on June 23, 2014.

Scottish Planning Policy (2020)

- 3.3 In relation to transport and access matters, SPP notes:

"286. Where a new development or a change of use is likely to generate a significant increase in the number of trips, a transport assessment should be carried out. This should identify any potential cumulative effects which need to be addressed; and

290. Development proposals that have the potential to affect the performance or safety of the strategic transport network need to be fully assessed to determine their impact. Where existing infrastructure has the capacity to accommodate a development without adverse impacts on safety or unacceptable impacts on operational performance, further investment in the network is not likely to be required. Where such investment is required, the cost of the mitigation measures required to ensure the continued safe and effective operation of the network will have to be met by the developer."

Planning Advice Note (PAN) 75

- 3.4 PAN75: Planning for Transport provides advice on the requirements for Transport Assessments as follows:

"requires a 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."

Onshore Wind Turbines: Online Renewables Planning Advice (May 2014)

- 3.5 The Scottish Government introduced online renewables advice in February 2011 which has been regularly updated since then. The most recent specific advice note regarding onshore wind turbines was published in May 2014. The advice note identifies the typical planning considerations in determining applications for onshore wind turbines including landscape impact, impacts on wildlife and ecology, shadow flicker, noise, ice throw, aviation, road traffic impacts, cumulative impacts and decommissioning.
- 3.6 In terms of road traffic impacts, the guidance notes that in siting wind turbines close to major roads, pre-application discussions are advisable. This is particularly important for the movement of large components (abnormal load routing) during the construction period, periodic maintenance and for decommissioning.

Transport Assessment Guidance (2012)

- 3.7 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.
- 3.8 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 for the Environmental Assessment of Road Traffic, IEMA (1993)

- 3.9 The document includes guidance on how the sensitivity of receptors should be assessed, contains rules to help determine which links in the study area should be considered for detailed assessment and identifies the key impacts that are most important when assessing the magnitude of traffic effects from an individual development.

Local Policy

The Highland Council (THC) Local Transport Strategy (LTS), 2010

- 3.10 The document refers to the road network across rural areas being characterised by 'winding single carriageway roads with passing places'. Reference is also made to the additional pressure that can be placed on sub-standard roads. The LTS notes that in terms of timber transport, there are initiatives such as tyre pressure moderation which are reducing the damaging effect of forestry lorries on rural roads. The LTS also mentions the many bridges which are subject to weight restrictions in the Local Authority area. The LTS states that "where possible, the Council, through its Lifeline Bridges programme will invest in the bridges to maintain access either by removing weight restrictions or reducing the weight restriction effect of HGV vehicles." The aim of the Lifeline Bridges



programme is to assist the economy of the area by allowing the efficient transport of essential goods and services and also providing for industries that are heavily dependent on large vehicle transport.

4 ASSESSMENT STAGES

4.1 There are three stages that this assessment considers:

- The Construction Phase of the project;
- The Operational Phase of the project; and
- The Decommissioning Phase of the project.

4.2 Of these phases, the greatest traffic volumes are associated with the project construction phase. The operational phases are restricted to occasional maintenance operations which generate much lower volumes of traffic that are not considered to be more than daily traffic variation levels on the road network.

4.3 The decommissioning phase involves fewer trips on the network than the construction phase, as elements of infrastructure such as access tracks are often left in place, adding to local infrastructure.

4.4 The 'worst case' transport scenario is therefore the construction phase and this assessment concentrates on this phase of the Proposed Development. It should be noted however that the construction effects are short lived and temporary in nature.

5 BASELINE CONDITIONS

Road Network

5.1 The road network included in the assessment was identified through an assessment of the likely routes between suppliers of equipment and materials and the Site. Roads forming the study area are shown in Figure 12.1 and include:

- A82 between Inverness and Fort William;
- A87 between Invergarry and Kyle of Lochalsh; and
- A887 between Bunloyne and Invermoriston.

5.2 A brief summary of the characteristics of each section of road is provided below:

- A887 is a two-way rural single carriageway road subject to the national speed limit except where it passes through settlements including Invermoriston, where the speed limit reduces to 40mph.
- The A87 is a two-way rural single carriageway road subject to the national speed limit except where it passes through settlements including Invergarry, where the speed limit reduces to 40mph and Kyle of Lochalsh where the speed limit reduces to 30mph.
- The A82 runs south to north between Glasgow and Inverness with a mixture of rural sections subject to the national speed limit and urban sections including through Fort William and Fort Augustus where the speed limit drops to 30mph.

Data Collection Methodology

5.3 The UK coronavirus lockdown commenced on the 23rd of March 2020 with various restrictions on movement in place for the majority of 2020 with an associated impact on traffic flows within the Study Area. To ensure a robust assessment of the likely impacts during the construction phase traffic data, 2018 Annual Average Daily Traffic Flow data was extracted from the online Department for Transport database of count sites located within the Study Area.

5.4 The area of the proposed development has not seen any significant growth in recent years therefore the DfT count sites are believed to provide an accurate representation of existing road usage without the risk of commissioning surveys that may result in misrepresentative traffic flows compared to usual conditions because of the current global pandemic.

5.5 To determine the existing road usage, 2018 Annual Average Daily Traffic Flow (AADT) data for seven sites was extracted from the online DFT database of count sites. The locations of the traffic count sites are illustrated on Figure 12.1 and are as follows:

1. A82 south of Invergarry (Department for Transport Count Point 40762);
2. A87 west of Bunloyne (Department for Transport Count Point 10770);
3. A887 between Bunloyne and Invermoriston (Department for Transport Count Point 40958);
4. A82 south of Drumnadrochit (Department for Transport Count Point 758);
5. A82 north of Invergarry (Department for Transport Count Point 10760);
6. A82 south of Invermoriston (Department for Transport Count Point 50707);
and
7. A87 south of its junction with the A887 (Department for Transport Count Point 30776)

Existing Traffic Conditions

5.6 The traffic counters allowed the traffic flows to be split into vehicle classes and the data has been summarised into cars/ light goods vehicles (Lights) and HGVs (all goods vehicles >3.5 tonnes gross maximum weight).

5.7 Table 5.1 summarises the 24-hour average daily traffic data collected at the count sites.



Table 5.1 Existing Traffic Movements (Daily Average Two-way Flows)

Survey Location	Cars/ Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	3,986	358	4,344
A87 west of Bunloyne (Count Point 10770)	2,086	224	2,310
A887 between Bunloyne and Invermoriston (Count Point 40958)	879	167	1,046
A82 south of Drumnadrochit (Count Point 758)	3,363	429	3,792
A82 north of Invergarry (Count Point 10760)	2,614	233	2,847
A82 south of Invermoriston (Count Point 50707)	2,550	243	2,793
A87 south of its junction with the A887 (Count Point 30776)	1,489	107	1,596

Baseline Traffic Conditions

- 5.8 Construction of the Proposed Development is likely to take 18 months with the peak period potentially falling during 2025, depending if and when consent is granted.
- 5.9 Any lengthening in the construction programme for the Proposed Development would have a reduced effect on the surrounding road network in peak period trip generation terms.
- 5.10 Future year baseline traffic flows were determined by applying a National Road Traffic Forecast (NRTF) 2025 high growth factor to the existing traffic flows within the study area, the year where construction traffic is projected to be at its peak. Traffic flows associated with nearby operational wind farms were captured within the existing traffic flows.



5.11 The NRTF high growth factor for 2018 to 2025 is 1.0969 and this factor was applied to the 2018 DfT count data. The resulting future year baseline traffic flows are shown in Table 5.2.

Table 5.2 Future Year Baseline Traffic (Weekday Average Two-way Flows)

Survey Location	Cars/ Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	4,372	393	4,765
A87 west of Bunloyne (Count Point 10770)	2,288	246	2,534
A887 between Bunloyne and Invermoriston (Count Point 40958)	964	183	1,147
A82 south of Drumnadrochit (Count Point 758)	3,689	471	4,159
A82 north of Invergarry (Count Point 10760)	2,867	256	3,123
A82 south of Invermoriston (Count Point 50707)	2,797	267	3,064
A87 south of its junction with the A887 (Count Point 30776)	1,633	117	1,751

Accident History

5.12 Road traffic personal injury accident data was obtained from the stats 19 national accident record database extracted from www.cyclestreets.net/collisions and www.crashmaps.co.uk for the five years from the start of 2015 over a study area comprising the road network indicated in Figure 13.1.

5.13 The data is collected by the police about road traffic crashes occurring on British roads where someone is injured with the severity of injury defined as follows:

- Slight – minor injury treated at the scene;



- Serious – injury for which the person is detained in hospital; and
- Fatal – the person dies within 30 days of the accident.

5.14 The data indicated that over the network reviewed, which is approximately 208 km in length (two way), an average of 33 accidents occur every year of which 65% are classified as “slight”, 28% as “serious” and 7% as “fatal” by the police officer(s) reporting and recording the personal injury accident.

5.15 Table 5.4 summarises of the accident data.

Table 5.4 Accident Data Summary 2014-2018

Severity Of Accident	Slight	Serious	Fatal	TOTAL
A82 – Inverness to Fort William	62	29	9	100
A87 – Invergarry to Kyle of Lochalsh	40	14	2	56
A887 – Bunloyne to Invermoriston	4	3	0	7

5.16 No common cause or accident location has been identified in the analysis that would point to a specific road safety issue.

Footpath and Cycle Network

5.17 Chapter 13 Socio-economics, Tourism & Recreation of the accompanying EIA identifies the recreational routes that are within 15km of the Proposed Development and provides an assessment of any potential impact. The findings suggest there will be a minor impact on the Loch Ness 360 long-distance walking route which passes within approximately 5km of the Proposed Development at its closest point. In every other case, the impact is considered to be negligible.

5.18 Reference should also be made to the Bhlaraidh Wind Farm Outdoor Access Management Plan for further details of proposed mitigation measures.

6 DEVELOPMENT TRIPS

Derivation of Development Traffic Flows

6.1 During the 18-month construction period, 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 cement materials; and
- Abnormal loads consisting of the wind turbine sections and a heavy lift crane.

6.2 Average monthly traffic flow data were used to establish the construction trips associated with the site based on the assumptions detailed in the following sections.

Staff Traffic

6.3 Staff would arrive in non-HGV vehicles and where possible would be encouraged to car share. The workforce on-site would depend on the activities undertaken, but, based on previous wind farm construction site experience; the maximum number is expected to be around 54 per day during the peak of construction.

6.4 For the purposes of estimating traffic movements, it has been assumed that 66% of staff would be transported by minibus carrying up to 16 people and 33% would arrive by car / LGV (single occupancy has been assumed as the worst case at this stage with potentially fewer movements through car sharing).

6.5 Based on these assumptions, staff transport cars and LGVs would account for a maximum of 42 two-way vehicle trips per day.

General Construction Traffic

6.6 An estimate of cement, aggregate, sand and steel reinforcement requirements for the turbine foundations was based on experience of previous developments. It was assumed that concrete would be batched on-site which reduces the vehicle movements required for deliveries by approximately one third compared

with use of ready-mix concrete. The total estimated trips required for the delivery of the concrete and steel reinforcement is summarised in Tables 6.1, 6.2 and 6.3.

- 6.7 Aggregate materials would be required to construct the wearing course of the access tracks, crane hardstanding's and turning heads and foundations for the temporary construction compounds and electrical substation. All stone material associated with track and hardstanding construction will be excavated from borrow pits on-site. Therefore, traffic movements on the local road network associated with the aggregate for the access tracks will be negligible and have not been included within the assessment.

Table 6.1: Concrete Aggregate Deliveries

Material	Total Volume (m ³)	Lorry Capacity (m ³)	Number of Lorries	Number of movements
Aggregate	5760	20	461	922

Table 6.1: Concrete Sand Deliveries

Material	Total Weight (m ³)	Lorry Capacity (m ³)	Number of Lorries	Number of movements
Sand	3600	20	288	576

Table 6.3: Steel Reinforcement Deliveries

Material	Total Weight (Tonnes)	Lorry Capacity (Tonnes)	Number of Lorries	Number of movements
Steel Reinforcement	1672.2	30	56	112

- 6.8 An allowance has also been made for the laying of a geotextile membrane along the length of the track network. The total estimated trips are summarised in Table 6.4.



Table 6.4: Geotextile Membrane Deliveries

Material	Total Length (m)	Number of Drums	Lorry Capacity (Drums) / No Lorries	Number of movements
Geotextile Membrane	10154	135	20 / 31	62

6.9 Electrical cables would be laid in trenches along the access track between the turbine locations and the onsite substation. The cables would be buried in sand to protect them from damage. Cabling sand would be imported to the site. The total estimated number of trips required to deliver the electrical cables and cabling sand is summarised in Tables 6.5 and 6.6.

Table 6.5: Cabling Movements

Material	Total Length (m)	Length per drum / Number of Drums	Drums per Lorry / No Lorries	Number of movements
Electrical Cabling	47946	500 / 96	6 / 16	32

Table 6.6: Cabling Trench Movements

Material	Total Volume (m ³)	Density (te) / Lorry Capacity (m ³)	Number of Lorries	Number of movements
Cabling Sand	9589	1.6 / 20	768	1536

6.10 It was assumed that there would be one service delivery (food/drink) per working day throughout the 18-month programme. This equates to 40 vehicle movements per month (20 trips inbound and 20 trips outbound).

6.11 It was assumed that construction would take place over a 22 working day month. Working hours will be limited to between 0700 -and 1900 Monday to Saturday Friday and 0700 – 1400 on Saturdays. There shall be no construction traffic movements to or from the site outwith these hours or on Sundays. In the



event of work being required out with these hours, e.g. abnormal load deliveries, commissioning works or emergency mitigation works, the Planning Authority will be notified prior to these works taking place.

Turbine Transport

- 6.12 The turbines are broken down into components for transport to the site. The hub, nacelle, drive train and blade and tower sections are classified as Abnormal Indivisible Loads (AIL) due to their weight, length, width and height when loaded.
- 6.13 For the purposes of the report, the worst-case numbers of components requiring transport are illustrated in Table 6.7. It should be noted that the actual turbines installed on the site may have fewer tower sections, resulting in fewer loads being transported.

Table 6.7: Turbine Component Deliveries

Component	Maximum No. Per Turbine
Blades	3
Tower sections	4
Hub	1
Nacelle	1
Drive Train	1
Container	1
Transformer	1
Footings	1
Site parts (shared Containers)	0.2
Total Movements	13.2
Number of Turbines	18
Total Vehicle Deliveries	119
Total Vehicle Movements	238

- 6.14 In addition to the turbine deliveries, two 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 are escorted

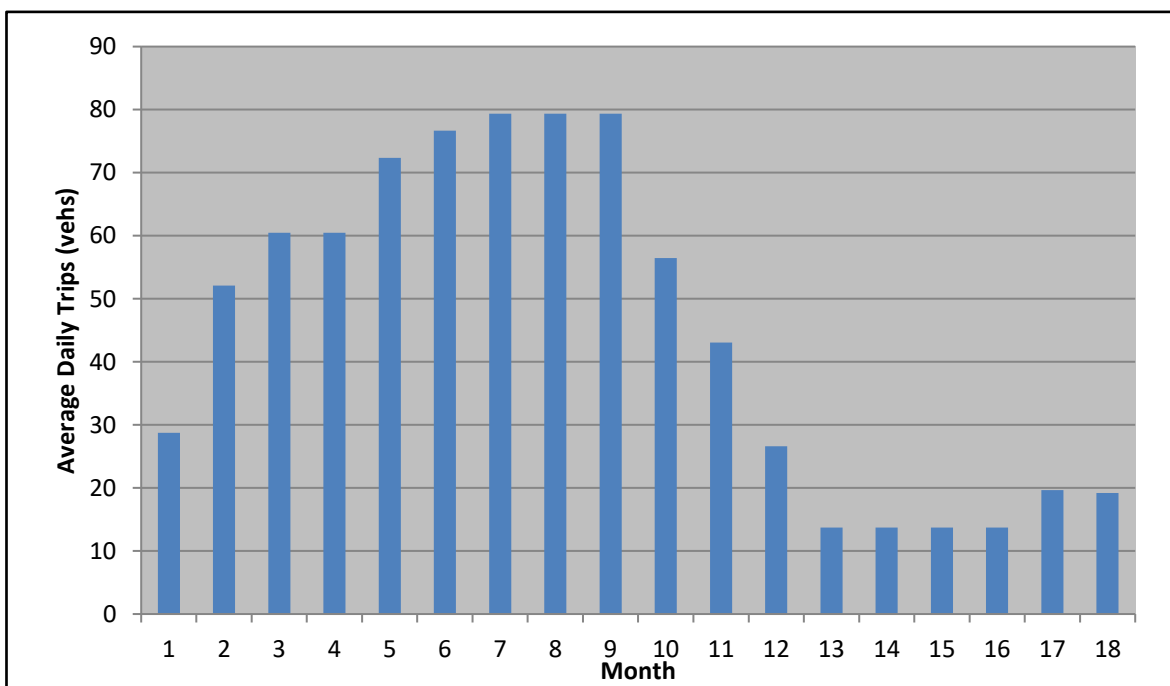


by boom and ballast trucks to allow full mobilisation on-site. Smaller erector cranes would also be present to allow the assembly of the main cranes and to ease the overall erection of the turbines.

Total Construction Traffic

- 6.15 The total estimated construction traffic movements are detailed in the main delivery schedule table provided in Appendix B of this report.
- 6.16 The average daily construction trips across the construction programme is illustrated in Graph 6.1.

Graph 6.1 Average Daily Construction Trips



Development Traffic Distribution

- 6.17 The origin of vehicle traffic will depend on the location of staff accommodation and the source of materials being imported. It is likely that staff will be accommodated across a wide area. There are several potential sources of quarried material (aggregate / sand) for concrete production including Breedon

and Leiths Scotland both situated at Fort William and Tarmac Dunain Mains Quarry Inverness and Mid Lairgs Quarry south of Inverness.

- 6.18 General construction HGV traffic will be required to use the A887 from its junction with the A82 then access the Site from the east. The choice of HGV route was based on the identifying the most suitable route between the Site access and the primary Trunk or A-Class road network. The chosen route was identified as the most suitable and shortest route to achieve this, avoiding impact on other potentially sensitive receptors including the narrow Torgyle Bridge on the A887 to the west of the Site.
- 6.19 All turbine blade loads will originate from either Kyleakin or Kyle of Lochalsh and access the site via the A87 and A887 to the existing Bhlaraidh Wind Farm access junction. All other turbine components will be delivered to Inverness and will access the site via the A82 from the north.
- 6.20 All traffic distribution assumptions are shown in Table 6.7.



Table 6.7 Construction Traffic Distribution Assumptions

Road	Staff	Turbine Transport/Escorts	Cranes	Sand/Cement	Other
A82 south of Invergarry (Count Point 40762)	25.00%	0.00%	0.00%	50.00%	50.00%
A87 west of Bunloyne (Count Point 10770)	0.00%	50.00%	0.00%	0.00%	0.00%
A887 between Bunloyne and Invermoriston (Count Point 40958)	100.00%	100.00%	100.00%	100.00%	100.00%
A82 south of Drumnadrochit (Count Point 758)	75.00%	50.00%	100.00%	50.00%	50.00%
A82 north of Invergarry (Count Point 10760)	25.00%	0.00%	0.00%	50.00%	50.00%
A82 south of Invermoriston (Count Point 50707)	25.00%	0.00%	0.00%	50.00%	50.00%

Conclusions

6.21 The results conclude that the peak period of construction is anticipated to occur during months 7-9 of the 18-month programme. This corresponds with the delivery of materials for concrete production turbine foundations and commencement of turbine deliveries. During the busiest months, activities are anticipated to generate an average of 73 two-way vehicle trips per day of which 46 would be made by LGV (site staff) and 34 by HGV.

The traffic impact assessment focuses on the peak period traffic flows to illustrate the potential impacts on the study network.

7 TRAFFIC IMPACT ASSESSMENT

Construction Traffic

- 7.1 The future year baseline traffic data was combined with the peak daily construction traffic flows to estimate the total trips on the study network during the peak of the construction phase. This was then distributed across the network.
- 7.2 Table 7.1 illustrates the peak weekday construction traffic flow; Table 7.2 the weekday and future year baseline plus peak construction traffic (total) flows and Table 7.3 the percentage increase in total traffic over baseline traffic.

Table 7.1: Peak Construction Traffic (Weekday Average Two-Way Flows)

Survey Location	Cars/ Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	11	16	26
A87 west of Bunloyne (Count Point 10770)	2	2	3
A887 between Bunloyne and Invermoriston (Count Point 40958)	45	35	80
A82 south of Drumnadrochit (Count Point 758)	33	17	50
A82 north of Invergarry (Count Point 10760)	11	16	26
A82 south of Invermoriston (Count Point 50707)	11	16	26
A87 south of its junction with the A887 (Count Point 30776)	0	0	0



Table 7.2: Total Traffic Flows (Weekday Average Two-Way Flows)

Survey Location	Cars/ Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	4,383	408	4,791
A87 west of Bunloyne (Count Point 10770)	2,290	247	2,537
A887 between Bunloyne and Invermoriston (Count Point 40958)	1,010	218	1,227
A82 south of Drumnadrochit (Count Point 758)	3,722	488	4,210
A82 north of Invergarry (Count Point 10760)	2,878	271	3,149
A82 south of Invermoriston (Count Point 50707)	2,808	282	3,090
A87 south of its junction with the A887 (Count Point 30776)	1,633	117	1,751

Table 7.3: Percentage Increase Total vs Future Year Baseline (Weekday Average Two-Way Flows)

Survey Location	Cars/ Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	0.24%	4.00%	0.55%
A87 west of Bunloyne (Count Point 10770)	0.07%	0.63%	0.13%
A887 between Bunloyne and Invermoriston (Count Point 40958)	4.71%	18.83%	6.96%
A82 south of Drumnadrochit (Count Point 758)	0.90%	3.67%	1.21%
A82 north of Invergarry (Count Point 10760)	0.37%	6.14%	0.84%
A82 south of Invermoriston (Count Point 50707)	0.38%	5.89%	0.86%
A87 south of its junction with the A887 (Count Point 30776)	0.00%	0.00%	0.00%

7.3 Working hours will be limited to between 0700 -and 1900 Monday to Saturday Friday and 0700 – 1400 on Saturdays. There shall be no construction traffic

movements to or from the site outwith these hours or on Sundays. In the event of work being required out with these hours, e.g. abnormal load deliveries, commissioning works or emergency mitigation works, the Planning Authority will be notified prior to these works taking place.

- 7.4 The results indicate that, total traffic movements are not predicted to increase by more than 30% on any of the links within the study area. HGV movements are only anticipated to increase by more than 10% on the A887 in the vicinity of the Site access junction.
- 7.5 The greatest impact of construction traffic would be experienced on the A887 which reflects the lower number of trips on this section of the road network.
- 7.6 In real terms, the maximum number of additional HGV movements per hour on any link averages less than 3 within the peak month of construction activity assuming an 12 hour working day.
- 7.7 This volume of additional traffic is not considered to present a concern in terms of the link capacity.

Operational Traffic

- 7.8 It is predicted that during the operation of the site (a 50 year consent is being sought) there would be an average of 2 vehicle movements per week for maintenance purposes. Also, there may be occasional abnormal load movements to deliver replacement components in the unlikely event of a major failure.

Decommissioning Traffic

- 7.9 Prior to decommissioning of the site, a traffic assessment would be undertaken, and appropriate traffic management procedures followed. It is anticipated that the number of associated movements would be less than during the construction phase and that the number of abnormal loads would be drastically reduced.

Cumulative Assessment

- 7.10 Consideration was given to the cumulative impact of the Proposed Development plus other cumulative developments that are both committed and subject of valid planning applications which would impact on the study area including Dell, Cloiche, Glenshero and Millennium South Wind Farms. It is noted that two other adjacent development proposals, Loch Laith and Tomchrasky Wind Farms are at the pre-application stage although no information is currently available in relation to either site that would enable a review of the likely traffic and transportation effects.
- 7.11 The National Grid ESO Transmission Entry Capacity Register was consulted to find out the most up to date estimated Connection Dates for each of these four wind farms. The findings are presented below:
- Millenium South - October 2021;
 - Glenshero - August 2024;
 - Cloiche - July 2025; and
 - Dell - April 2026.
- 7.12 Given these estimated connection dates, it is considered highly unlikely that the construction programmes for the Proposed Development and cumulative wind farm developments would coincide. In addition to this, there are also supply chain constraints associated with the transport of construction materials including wind turbines. However, for the purposes of this assessment, and acknowledging that connection dates can change, it was assumed that it will be granted permission and the peak periods of the respective construction programmes would overlap. As such, the cumulative assessment has considered the worst-case scenario.
- 7.13 Peak period traffic flows for the cumulative developments were extracted from planning documentation and added to the future year flows where they impact on the study area. Table 7.4 illustrates the weekday traffic flows associated with the four cumulative developments, Table 7.5 the Total Cumulative Traffic Flows (baseline traffic plus proposed development and cumulative wind farms) and Table 7.6 the percentage increase in cumulative traffic over baseline traffic.

Table 7.4: Cumulative Development Peak Construction Traffic (Weekday Average Two-Way Flows)

Survey Location	Cars/Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	162	109	272
A87 west of Bunloyne (Count Point 10770)	54	33	86
A887 between Bunloyne and Invermoriston (Count Point 40958)	12	13	25
A82 south of Drumnadrochit (Count Point 758)	151	102	253
A82 north of Invergarry (Count Point 10760)	152	109	272
A82 south of Invermoriston (Count Point 50707)	151	102	253
A87 south of its junction with the A887 (Count Point 30776)	54	33	86

Table 7.5: Total Cumulative Traffic Flows (Weekday Average Two-Way Flows)

Survey Location	Cars/Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	4,545	517	5,063
A87 west of Bunloyne (Count Point 10770)	2,344	280	2,623
A887 between Bunloyne and Invermoriston (Count Point 40958)	1,022	231	1,252
A82 south of Drumnadrochit (Count Point 758)	3,873	590	4,463
A82 north of Invergarry (Count Point 10760)	3,030	380	3,421
A82 south of Invermoriston (Count Point 50707)	2,959	384	3,343
A87 south of its junction with the A887 (Count Point 30776)	1,687	150	1,837



Table 7.6: Percentage Increase Cumulative vs Future Year Baseline (Weekday Average Two-Way Flows)

Survey Location	Cars/Lights	HGV	Total
A82 south of Invergarry (Count Point 40762)	3.95%	31.76%	6.26%
A87 west of Bunloyne (Count Point 10770)	2.43%	14.06%	3.52%
A887 between Bunloyne and Invermoriston (Count Point 40958)	5.95%	25.93%	9.14%
A82 south of Drumnadrochit (Count Point 758)	4.99%	25.34%	7.30%
A82 north of Invergarry (Count Point 10760)	5.67%	48.79%	9.55%
A82 south of Invermoriston (Count Point 50707)	5.77%	44.16%	9.11%
A87 south of its junction with the A887 (Count Point 30776)	3.31%	28.12%	4.91%

- 7.14 The results indicate that when considering the cumulative construction phases, total traffic increases on all routes within the study area. Total traffic flows would not increase by more than 30% at any location. HGV traffic flows are predicted to increase by more than 10% at each of the survey locations, ranging from 14.06% on the A87 west of Bunloyne, to 48.79% on the A82 north of Invergarry.
- 7.15 The A82 is considered a receptor of low sensitivity designed to accommodate general and HGV traffic moving between primary destinations and therefore the magnitude of any effects on this link are considered to be Minor. Fort Augustus is a receptor of medium sensitivity and cumulative effects in relation to pedestrian amenity could arise within Fort Augustus prior to the implementation of mitigation although these are considered to be Minor and not significant. The significance of any cumulative effects is considered to be minor and can be mitigated through the implementation of Construction Traffic Management Plans (CTMPs) associated with each individual development.

8 CONSTRUCTION TRAFFIC MANAGEMENT PROPOSALS

8.1 The chapter identifies the high-level proposals for managing the effects of vehicles associated with the proposed development during construction that would be incorporated into a site specific CTMP. The CTMP would be based on the proposals identified within this chapter should the proposed development be granted planning consent and when a contractor is appointed. A CTMP is intended to be a working document that evolves during the construction period.

Construction Phase

8.2 During the construction period, a community liaison group will be set up to disseminate information and take feedback and a project website will be set up and regularly updated to provide the latest information relating to traffic movements associated with vehicles accessing the site. This will be agreed with THC.

8.3 Information would also be provided relating to expected abnormal load convoy movements from Inverness and Kyleakin or Kyle of Lochalsh through to the site accesses. It is hoped that this level of information will make residents aware of convoy movements and help reduce any potential conflicts.

8.4 All construction deliveries would be undertaken at appropriate times (to be discussed and agreed with the relevant roads authorities and police) with the aim to minimise the effect on the local road network. It is likely that the abnormal load convoys would travel in the early morning periods, before peak times while general construction traffic would generally avoid the morning and evening peak periods.

8.5 The following measures will be implemented during the construction phase through the CTMP:

- All materials delivery lorries (dry materials) will be sheeted to reduce dust and stop spillage on public roads;

- Specific training and disciplinary measures will be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
- Wheel wash facilities will be established at the site entrance if required;
- Working hours will be limited to between 0700 -and 1900 Monday to Saturday Friday and 0700 – 1400 on Saturdays. There shall be no construction traffic movements to or from the site outwith these hours or on Sundays. In the event of work being required out with these hours, e.g. abnormal load deliveries, commissioning works or emergency mitigation works, the Planning Authority will be notified prior to these works taking place;
- Avoidance of transit through the rural communities identified during arrival and departure times of school buses with all construction traffic following the designated access route from the A82;
- Police escorts will be utilised for the movement of abnormal loads with the aim of having several vehicles in convoy to minimise the disruption caused to road users. Abnormal load escorts will also warn oncoming vehicles of approaching loads and will pull vehicles over to allow the convoy to pass. They will also pull the convoy over at predetermined locations allowing vehicles to pass reducing the risk of any large build-up of traffic;
- Appropriate traffic management measures will be put in place at the A887 Bhlaraidh Wind Farm access junction to avoid conflict with general traffic, subject to the agreement of THC;
- Typical measures will include speed limit, HGV turning and crossing signs and/ or banksmen at the site access and warning signs; and
- Provision of construction updates on the project website and a newsletter to be distributed to residents within an agreed distance of the site.

- 8.6 All drivers will be required to attend an induction to include:
- A safety briefing;
 - The need for appropriate care and speed control;
 - A briefing on driver speed reduction agreements (to slow site traffic at sensitive locations);
 - Identification of specific sensitive areas;
 - Identification of the specified access route; and
 - The requirement not to deviate from the specified route.
- 8.7 Video footage of the pre-construction phase condition of the abnormal loads access route and the construction vehicles route will be recorded to provide a baseline of the state of the road prior to any construction work commencing. This baseline will allow identification of any change in the road condition during the construction stage of the Proposed Development. Any necessary repairs will be coordinated with THC and Transport Scotland and any damage caused by traffic associated with the Proposed Development during the construction period that would be hazardous to public traffic will be repaired as soon as possible.
- 8.8 Damage to road infrastructure caused directly by construction traffic will be made good and street furniture that is removed on a temporary basis will be fully reinstated. Agreement with THC on any removal of street furniture associated with abnormal load delivery will be confirmed months in advance of this work with street furniture returned to its previously location following the completion of abnormal load movements.
- 8.9 There will be a daily road edge review on the A887 in the vicinity of the site access junction and debris and mud will be removed from the carriageway using an on-site road sweeper to keep the road clean and safe.

Operational Phase Mitigation

- 8.10 Site entrance roads will be well maintained and monitored.



Decommissioning Phase Mitigation

- 8.11 Like the construction phase, an Abnormal Load Traffic Management Plan and Construction Traffic Management Plan will be prepared for the decommissioning phase.

9 SUMMARY & CONCLUSIONS

Summary

- 9.1 Tetra Tech was commissioned by SSE (“the Applicant”) to undertake an assessment of the transport aspects of the Proposed Development. The site is located in the Scottish Highlands to the west of Loch Ness.
- 9.2 Existing traffic data established a base point for determining the impact during the construction phase and was factored to future levels (2025 high growth) to help determine the effect of construction traffic on the local road network at its peak.
- 9.3 The results indicate that total traffic movements are not predicted to increase by more than 10% on any routes. The greatest impact of construction traffic would be experienced on the A887 where HGV movements are anticipated to increase by 15%.
- 9.4 The maximum traffic impact associated with construction of the proposed development is predicted to occur between months 7- 8 of the 18-month programme. During these months, an average of 46 HGV movements (or around than 3 per hour) is predicted per day and it is estimated that there would be 46 car and LGV movements per day to transport construction workers to and from the site.
- 9.5 A worst-case cumulative assessment, considering the coincidental construction of the proposed development with Cloiche Wind Farm concluded that total traffic flows on all routes would not increase by more than 10%. However, total HGV traffic movements are anticipated to increase by more than 10% on the A887.
- 9.6 The significance of any cumulative effects is considered to be minor and can be mitigated through the implementations of CTMPs associated with each individual development.
- 9.7 A review of the local road network was undertaken to assess the feasibility of transporting turbines to the site. No capacity issues are expected on any of the

roads assessed due to the additional construction traffic movements associated with the proposed development as background traffic flows are very low and the links are of reasonable standard.

Conclusions

9.8 The assessment has identified the following:

- That the construction phase of the project would generate the highest level of traffic;
- The construction traffic during the most intensive phase of the construction programme would be short lived and temporary in nature;
- That total traffic movements are not predicted to increase by more than 10% on any routes within the study area;
- HGV movements are not anticipated to increase by more than 30% on any of the routes considered as a result of the Proposed Development;
- Assessment of the cumulative impact of the Proposed Development and the simultaneous construction of other wind farm sites indicates that HGV traffic movements would increase by more than 30% on a number of routes although this is considered to be temporary and not significant;
- That the surrounding road network has sufficient capacity to accommodate the temporary construction traffic;
- That the routes from the Ports of Entry at Inverness and Kyleakin / Kyle of Lochalsh are suitable for turbine delivery; and
- That a construction traffic management plan for general construction traffic and abnormal traffic management plan are required to control construction traffic in the interests of road safety and efficiency.



FIGURES



Key

- Site Access Point
- Traffic Count Location
- Study Area
- Site_Boundary

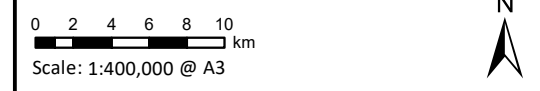
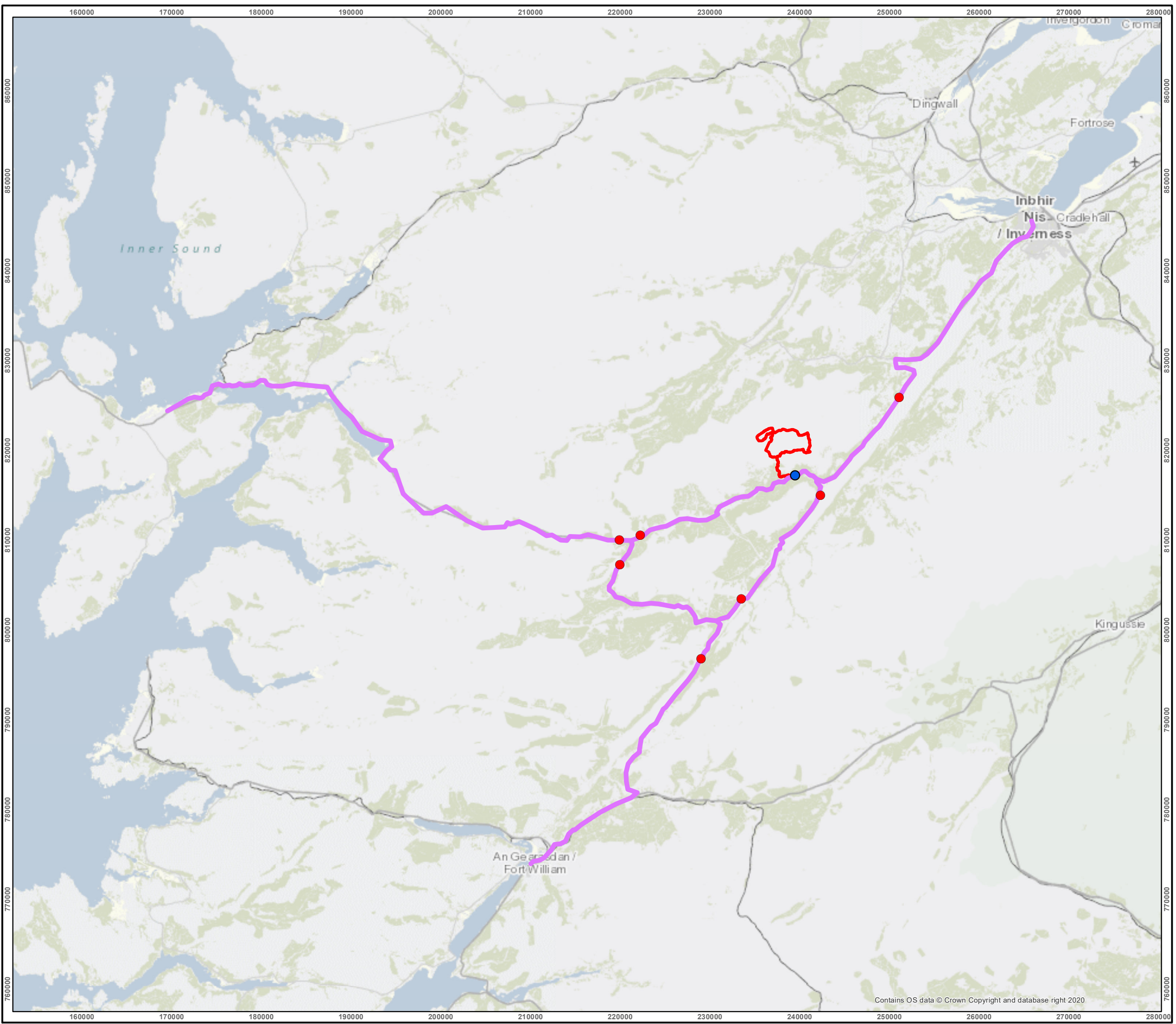


Figure 12.1
Study Area and Traffic Count Locations

Bhlaraidh Wind Farm Extension



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APPENDIX A

Construction Traffic Profile

Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site mobilisation/demobilisation	120	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	120
General site delivery vehicles	20	40	40	40	40	40	40	40	40	32	32	20	12	12	12	12	12	12
Earth moving plant	0	10	20	0	0	0	0	0	20	0	0	0	0	0	0	0	10	0
Imported stone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinforcement	0	0	0	0	14	28	28	28	14	0	0	0	0	0	0	0	0	0
Concrete	0	0	0	0	188	375	375	375	188	0	0	0	0	0	0	0	0	0
Cable Deliveries	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0
Cabling Sand	0	0	0	0	0	13	13	13	13	13	13	0	0	0	0	0	0	0
Geotextile separators	0	0	0	0	0	3	3	3	3	3	3	0	0	0	0	0	0	0
Delivery of HV electrical items	0	0	0	0	0	11	11	11	11	11	11	0	0	0	0	0	0	0
Craneage and related vehicles	0	0	0	0	0	0	12	0	0	0	0	12	0	0	0	0	0	0
All Escorts	0	0	0	0	0	44	88	88	88	88	88	44	0	0	0	0	0	0
Turbine transporters	0	0	0	0	0	40	79	79	79	79	79	40	0	0	0	0	0	0
Staff	462	924	924	924	924	924	924	924	924	740	740	462	278	278	278	278	278	278
Service (food/water etc)	20	40	40	40	40	40	40	40	40	32	32	20	12	12	12	12	12	12
Total estimated movements	622	1134	1024	1004	1206	1519	1614	1602	1421	999	999	598	302	302	302	302	432	422
Working Days	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Daily Average	28	52	47	46	55	69	73	73	65	45	45	27	14	14	14	14	20	19
Lights	21	42	42	42	42	44	46	46	46	38	38	23	13	13	13	13	13	13
HGVs	7	10	5	4	13	25	27	27	19	8	8	4	1	1	1	1	7	7

