11 ACCESS, TRANSPORT AND TRAFFIC

11.1 INTRODUCTION

This Chapter of the Environmental Impact Assessment Report (EIA Report) evaluates the effects of vehicle movements to and from the Ackron Wind Farm (the Development) associated with construction, operation and decommissioning phases of the Development. This assessment was undertaken by Gary Reid at Arcus Consultancy Services Limited (Arcus) and reviewed by Heather Kwiatkowski, Principal EIA Consultant at Arcus, and technically reviewed by Tomos ap Tomos, Associate Director of Engineering at Arcus, who is full member of the Chartered Institution of Highways and Transportation (CIHT).

This Chapter of the EIA Report is also supported by the following figures provided in Volume 2 EIA Report Figures:

- Figure 11.1: Abnormal Load - Route to Site;
- Figure 11.2: General Construction Traffic - Route to Site;
- Figure 11.3: Traffic Count Locations; and
- Figure 11.4: RTC Assessment.

This Chapter of the EIA Report is supported by the following Technical Appendix documents provided in Volume 3 Technical Appendices:

- Appendix A11.1: Abnormal Load Route Assessment;
- Appendix A11.2: Construction Development Programme; and
- Appendix A11.3: Framework Construction Traffic Management Plan (CTMP).

This Chapter includes the following elements:

- Legislation, Policy and Guidance;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Assessment of Potential Effects;
- Mitigation and Residual Effects;
- Cumulative Effect Assessment;
- Summary of Effects; and
- Statement of Significance.

11.2 LEGISLATION, POLICY AND GUIDANCE

The following guidance, legislation and information sources have been considered in carrying out this assessment.

11.2.1 Legislation

- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017[1] (the EIA Regulations).

[1] The Scottish Government (2017). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/uksi/2017/571/contents/made. Accessed on 25/05/2020.

11.2.1.1 Policy and Guidance

- Scottish Planning Policy (2014)[2];
- National Transport Strategy[3];
- Guidelines for the Environmental Assessment of Road Traffic[4]; and
- Roads and Transport Guidelines for New Developments.

11.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

11.3.1 Scoping Responses and Consultation

Consultation for this EIA Report topic was undertaken with the organisations shown in Table 11.1.

Table 11.1: Consultation Responses

Consultee	Summary of Consultation Response	Response to Consultee
Transport Scotland Scoping Response 06/06/2019	Generally satisfied with the proposed changes but request that all public roads affected by the Development are identified, current condition of the roads are established with the supervision of a consulting engineer, assessment of structural strength of carriageway is undertaken, a road surface condition and profile is conducted, assessment of structures and any weight restrictions is undertaken and details of adjacent communities are provided.	An Abnormal Load Risk Assessment (ALRA) has been undertaken and is included in Appendix A11.1. The ARLA considers the geometric suitability of routes. Consultation is ongoing with THC on the timing of the Structural assessment. Development of the Site is expected to begin in 2023 so the best timing of this assessment would be prior to construction and the structural condition assessment is best dealt with via a condition of consent. This assessment considers effects of increased traffic on trunk roads and adjacent communities along the delivery routes throughout this Chapter.
The Highland Council Transport Planning Office Scoping Response 24/04/2019	A Transport Assessment (TA) is required. This TA should identify all Council maintained roads likely to be affected by the various stages of the development and detailed consideration of development traffic, abnormal load movement. Prior to the TA, the developer should first carry out a detailed scoping exercise in consultation with the Council. Any timber extraction required in connection with the development proposals should also be considered in the TA.	This Chapter of the EIA Report considers any potential effects of increased traffic on council-maintained roads and is accompanied by an ALRA which considers the suitability of roads for the transport of larger wind turbine components. An Updated Scoping Exercise was undertaken in October 2019. All woodland extraction has been considered in this Chapter.

[2] The Scottish Government (2014). Scottish Planning Policy. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2014/06/scottish-planning-policy/documents/00453827-pdf/00453827-pdf/govscot%3Adocument. Accessed on 25/05/2020.
[3] The Scottish Executive (2005). Planning Advice Note, PAN 75, Planning for Transport. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2005/08/planning-advice-note-pan-75-planning-transport/documents/0016795-pdf/0016795-pdf/govscot%3Adocument. Accessed on 25/05/2020.
[4] Institute of Environmental Management and Assessment (1993). Guidelines for the Environmental Assessment of Road Traffic. Institute of Environmental Management and Assessment.

Consultee	Summary of Consultation Response	Response to Consultee
	TA should include a framework CTMP aimed at minimising the impact of the construction traffic.	Consultation was undertaken with THC regarding the proposed access junction in which THC confirmed that there was no objection in principal to the revised location proposed. Any traffic management measures required to mitigate against identified significant effects have been considered in this Chapter. Framework CTMP is provided in Appendix A11.3

11.3.2 Scope of Assessment

The key issues for the assessment of potential access, traffic and transportation effects relating to the Development.

- Traffic generation;
- Accidents and safety;
- Driver delay;
- Pedestrian amenity;
- Severance;
- Noise and vibration;
- Hazardous loads;
- Pedestrian delay;
- Visual effects; and
- Air quality.

11.3.3 Elements Scoped Out of Assessment

Operational traffic is expected to be minimal and negligible in terms of existing traffic flow levels on routes within the vicinity of the Development. Assessment of operational traffic has therefore been scoped out of this assessment.

Traffic associated with decommissioning of the Development will be less than that experienced during construction, this is due to all below ground infrastructure being left in-situ. It is not possible to accurately forecast baseline traffic flow levels 25 years into the future. For the above reasons, further work would be undertaken at the time of decommissioning to determine if significant transport effects might be experienced.

11.3.4 Study Area

The Development is located on land located approximately 18 kilometres (km) west of Thurso and 2 km southeast of Melvich in Sutherland and is centred on National Grid Reference (NGR) 291200, 962150 (the Site) as shown on Figure 1.1. The Site lies wholly within the administrative boundary of the Highland Council (the Council).

The Study Area has been defined by the public road network in the vicinity of the Development and potential delivery corridors to be used during construction. These take into account the local strategic / trunk road network, sources of labour and the potential sources of construction materials, specifically stone and concrete from local quarries.

There are no public roads located within the Site. Existing access is available to the west via the A897 at Ackron and Golval and then via existing farm tracks.

Main access for the Development will be from the A897 to the west of the Site and A836 near Halladale Bridge east of Melvich. The A836 forms part of the North Coast 500. **Chapter 14: Noise** of the EIA report outlines potential impacts and mitigation measures in relation to tourism. The Study Area includes all routes which will be used by construction vehicles:

- Between the Site and the port of entry, which in this case will be Scrabster Harbour; and
- Between the Site and the nearest trunk road network (A9).

Both routes merge into one approach corridor at the A836 north of Pennyland. The routes are outlined below:

11.3.4.1 Abnormal Load Route (ALR)

- Port of entry to be Scrabster Harbour (port is a proven turbine component delivery point);
- Proceed southbound on A9 towards Burnside;
- Turn right onto A836;
- Proceed westward on the A836 for approximately 14.9 miles;
- Turn left onto A897; and
- Follow A897 for approximately 200 m to Site access junction.

This route is indicated on Figure 11.1.

11.3.4.2 General Approach for Construction Vehicles

- Traffic is assumed to be originated from the south, northbound on the A9 and approaching the Site from the east via the A836;
- Follow the A9 to Thurso;
- Proceed through Thurso, keeping on A9, towards Burnside;
- At Scrabster junction, keep straight onto A836 towards Tongue;
- As per the ALR route:
- Proceed westward on the A836 for approximately 14.9 miles;
- Turn left onto A897; and
- Follow A897 to Site access junction.

This route is indicated on Figure 11.2.

11.3.5 Design Parameters

11.3.6 Baseline Survey Methodology

Baseline traffic flow conditions were gathered from publicly available traffic counts published by the Department for Transport (DfT) at three locations along the route with three automatic traffic counts (ATCs) also commissioned at key locations along the route.

It should be noted that the commissioned traffic counts were undertaken prior to the lockdown measures implemented due to COVID-19. As such, the figures generated have not been affected by these measures.

Traffic growth between the latest published DfT counts (2018), the ATC's (2020) and the anticipated commencement of construction of the Development (2023) was estimated by applying traffic growth factors from the National Trip End Model (NTEM) forecasts using the Trip End Model Presentation Program (TEMPRO[5]). NTEM and TEMPRO are designed by the DfT, and provide forecasts of traffic growth over time for use in local and regional

[5] UK Government, Department for Transport (2013). Trip End Model Presentation Program (TEMPro). Available at: https://www.gov.uk/government/publications/tempro-downloads. Accessed on 08/04/2020.

transport models. NTEM and TEMPRO are the industry standard tool for estimating traffic growth.

Baseline traffic conditions were established via desk study and review of online mapping resources. Traffic flow capacity was estimated using information contained in the Design Manual for Roads and Bridges (DMRB) – Volume 15[6]. It is acknowledged that this document has been withdrawn, however the quoted traffic flow capacities remain the most up to date available reference source and are useful within the framework of this assessment.

11.3.7 Methodology for the Assessment of Effects

The magnitude of the effect of increase in traffic flow is a function of the existing traffic volumes on routes and the percentage increase in flow as a result of the Development.

An initial screening exercise was undertaken to identify routes where an adverse effect could potentially occur. The Institute of Environmental Management and Assessment (IEMA 1993) Guidelines[7] suggest two broad principles:

- Rule 1 – include road 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.

Where the predicted increase in traffic flow is lower than these thresholds, the significance of the effects can be considered to be low or not significant with no further detailed assessments warranted. Consequently, where the predicted increase in traffic flow is greater than these thresholds, the potential effects are considered to be significant and are assessed in greater detail.

The IEMA (1993) guidelines are intended for the assessment of environmental effects of road traffic associated with major new developments giving rise to traffic generation, as opposed to short-term construction. In the absence of alternative guidance and as the traffic generation during the operational phase is very low, these guidelines have been applied to assess the short-term construction phase of the Development.

Where existing traffic levels are generally low (e.g. rural roads and some unclassified roads), any increase in traffic flow may result in a predicted increase that would be higher than the IEMA (1993) guideline thresholds. In these situations, it is important to consider any increase in terms of overall traffic flow in relation to the capacity of the road, before making a conclusion on whether the effect is significant as defined under the EIA Regulations.

Any change in traffic flow which is greater than the thresholds set out in the IEMA (1993) guidelines would be subject to further analysis. The magnitude of potential impacts will be identified through consideration of receptor sensitivity against the degree of predicted change to baseline conditions, the duration and reversibility of this change and professional judgement.

11.3.7.1 Sensitivity of Receptors

The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the sensitivity of potentially affected receptors, will be

[6] Standards for Highways (2013) Volume 15, Economic Assessment of Road Schemes in Scotland, DMRB. Available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol15/index.htm. Accessed 08/04/2020.
[7] Institute of Environmental Management and Assessment (1993). Guidelines for the Environmental Assessment of Road Traffic. Institute of Environmental Management and Assessment.

assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

Table 11.2 details the framework for determining the sensitivity of receptors.

Table 11.2: Framework for Determining Sensitivity of Receptors

Sensitivity	Description
High	Receptors of greatest sensitivity, would include: People whose livelihood depends upon unrestricted movement within their environment including commercial drivers and companies who employ them, local residents, schools and colleges. Accident hotspots would also be considered.
Medium	Receptors with sensitivity, would include: People who pass through the area habitually, but whose livelihood is not wholly dependent on free access. Would also typically include: congested junctions, community services, parks, businesses with roadside frontage, and recreation facilities.
Low	Receptors with some sensitivity, would include: People who occasionally use the road network. Would also typically include: public open spaces, nature conservation areas, listed buildings, tourist attractions, residential roads with adequate footway provision and places of worship.
Negligible	Receptors with very low sensitivity, would include: People not sensitive to transport effects. Would also refer to receptors that are sufficiently distant from the affected roads and junctions.

11.3.7.2 Magnitude of Effect

The magnitude of potential effects will be identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

The criteria for assessing the magnitude of an effect are presented in Table 11.3.

Table 11.3: Framework for Determining Magnitude of Change

Sensitivity of Receptor	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.
Negligible	The receptor is resistant to change and is of little environmental value.

11.3.7.3 Significance of Effect

The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 11.1 summarises guideline criteria for assessing the significance of effects.

Table 11.1: Framework for Assessment of the Significance of Effects

Magnitude of Effect	**Sensitivity of Receptor**				
	Very High	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Major / Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations, and are shaded in light grey in the above table.

11.3.8 Assessment Limitations

11.3.8.1 Route to Site

Construction traffic classified as being an 'abnormal load', will approach the Site via the main transport corridor outlined in Section 11.3.4.1, with standard construction traffic approaching the Site via the A9 before following the route detailed in Section 11.2.4.2.

Restrictions[8] will be put in place to restrict standard construction traffic (HGVs and LGVs) from utilising the A897 between Helmsdale and the Site as part of the route to Site. A small section of the A897 (approx. 200 metres or 0.12 miles) will be required in order to access the Site from the A836; however, this will not cause significant impact along the road due to the limited length of road that will be utilised.

11.3.8.2 Baseline Traffic

Baseline traffic flow conditions were gathered from publicly available traffic counts published by the DfT at three locations (Sordale, Thurso Bridge and Pennyland House) along the route with three further traffic counts being commissioned at Forss, near Sandside Bay and at Ackron Farm. Figure 11.3 shows the traffic count locations along the abnormal load and general construction traffic routes respectively.

All three traffic counts provided by the DfT have been projected from previous manual or automatic counts. As such they provide an estimated flow as detailed in Table 11.2.

[8] Exceptions shall be granted to sub-contractors living or staying along the A897 and the B871 roads, to ensure that local accommodation businesses on these roads are not affected by the above restriction. This will also ensure that sub-contractors are not restricted from staying in accommodation along the A897 and the B871.

Table 11.2: Traffic Count Data

Traffic Count Methods				
Location Ref.	**Source**	**Year**	**Count Type**	**Last Manual Count**
1 - Sordale Point ID: 10800	DfT	2018	Projected	2015
2 - Thurso Bridge Point ID: 40956	DfT	2018	Projected	2017
3 - Pennyland House Point ID: 40800	DfT	2018	Projected	2016
4 - Forss	ATC	2020	Automatic	13/03/2020
5 - Near Sandside Bay	ATC	2020	Automatic	13/03/2020
6 - Ackron Farm	ATC	2020	Automatic	13/03/2020

It is possible that due to traffic values being estimated, there are minor differences between the assessed and actual baseline traffic flows at these locations. This should not have any material change to the outcome of the assessment.

11.3.8.3 Material Import Requirements

To present a worst-case scenario it will be assumed that concrete will be transported along the entirety of the route specified in Section Section 11.2.4.2; however; it should be noted that there is an existing quarry adjacent to the Site (Ackron Sand and Rock Quarries). Discussions are in place as to the utilisation of this quarry for the sourcing of aggregates, however if this is not possible an additional source will be required. Therefore, a worst-case scenario of all concrete being imported has been assumed.

It is expected that material required for the formation of the internal access tracks will be sourced from on-site borrow pits with the exception of a quantity of fine surface material which will be imported.

11.3.8.4 Construction Vehicle Routes

The routes to Site for construction traffic are shown on Figure 11.1 and Figure 11.2. The port of delivery for wind turbine components will be Scrabster Harbour, as this is the closest port to the Site which has been proven to be able to handle deliveries of this nature. General construction traffic is expected to arrive from the A9 to the east. This assessment considers routes which are to be used by all construction traffic between the Site and Scrabster Harbour and between the Site and the A9.

Wind turbine components, which include; blades, tower sections and nacelles, will be transported by Abnormal Load Vehicles (ALVs) between the port of delivery and the Site. Typical ALVs are able to retract to the size of a standard Heavy Goods Vehicle (HGV) following delivery. An Abnormal Load Route Assessment (ALRA) was undertaken in May 2020 order to assess the suitability of the proposed route and detail any upgrade works required to be undertaken on the ALR, this is included in Appendix A11.1.

In addition to wind turbine components, deliveries will be required for plant and equipment, concrete for turbine foundations, balance of plant electrical equipment and aggregate. Such deliveries are likely to be made by HGVs utilising the A9.

11.3.9 Embedded Mitigation

As detailed in **Chapter 3: Site Selection and Design**, two access options from the A836 (NC500) and A897 were examined, with the A897 option selected as it did not require an access junction off the NC500 and minimised visibility of the access track through open moorland from the NC500. Additionally, the junction from the A897 enables the main construction compound to be located adjoining the main access utilising an area of existing hardstanding.

11.4 BASELINE CONDITIONS

11.4.1 Baseline Traffic Flow

Table 11.3 summarises the data collected from the traffic count data. Traffic count locations are shown on Figure 11.3.

Table 11.3: Existing Average Daily Traffic (ADT) 2018

Location Ref.	Source	Road	Route	Location	Total ADT	HGV ADT	HGV% of Total ADT
1	DfT	A9	General	Sordale Point ID: 10800	3,419	305	8.9%
2	DfT	A9	General	Thurso Bridge Point ID: 40956	13,839	270	2.0%
3	DfT	A9	General	Pennyland House Point ID: 40800	3,419	148	4.3%
4	ATC	A836	ALR/General	Forss	8,373	1,215	14.5%
5	ATC	A836	ALR/General	Near Sandside Bay	3,288	931	28.3%
6	ATC	A897	ALR/General	Ackron Farm	814	241	29.6%

11.4.2 Road Capacity

Typical capacity values for a variety of road types are provided within the DMRB. Capacity is defined as the maximum sustainable flow of traffic passing in one hour under favourable road and traffic conditions and depends on the road type, speed limit and width. Table 11.4 give the estimated capacity of each of the roads within the Study Area.

Table 11.4: Theoretical Road Capacities - ALR

Road	Type	Speed Limit (mph)	Capacity (veh/hour/direction)	Two-Way Hourly Flow (veh/hour)	Two – Way Daily Flow (veh/day)
A9	Rural – Typical Single 6.0 m	60	900	1,800	43,200
A836	Rural – Typical Single 6.0 m	60	900	1,800	43,200
A897	Rural – Poor Single 4.0 m	60	140	280	6,720

11.4.3 Road Traffic Collision Assessment

Analysis of all 'serious' and 'fatal' Road Traffic Collisions (RTCs) within the last five years was carried out utilizing CrashMap[9] for the route as specified in Section 11.3.4. It was determined that as any ALV movements will be carried out under escort and outwith peak hours, the risk of RTCs during these movements would be negligible. As such, ALR movements have not been considered.

'Slight' RTCs are defined as a collision in which nobody is fatally or seriously injured, but at least one person is slightly injured. 'Serious' RTCs are defined as those which result in

[9] AGILYSIS (2019) CrashMap. UK Road Safety Map. Available at: www.crashmap.co.uk. Accessed 20/03/2020

hospitalisation of one or more of the parties involved. 'Fatal' RTCs are defined as those in which one or more parties dies within 30 days as a result of injuries sustained during the RTC.

Three 'fatal' RTCs were recorded along the general construction traffic route. The first took place along the A9 at Mount Vernon, Thurso, the second on a stretch of the A836 between Thurso and Forss and the third at the Bridge of Forss.

Two 'serious' RTCs were identified in the Study Area. The first took place on the A9 in Thurso's town centre and the second on the A836 leaving Reay.

There were a number of 'slight' RTCs distributed along the length of the general construction traffic route with six taking place along the A9 and fourteen along the A836.

No particular clusters or hotspots for RTCs were identifiable within the Study Area. Figure 11.4 indicates the location of each of the RTCs identified within the Study Area.

No 'serious' or 'fatal' RTCs involving HGVs occurred within the Study Area.

11.4.4 Sensitive Receptors

A number of receptors of medium or high sensitivity to changes in traffic have been identified within the Study Area and are detailed in Table 11.5. These receptors are either located on proposed delivery routes or located within close proximity and require access through the proposed delivery routes.

Table 11.5: Sensitive Receptors

Route	Receptor	Sensitivity	Justification
General	Pennyland Primary School NGR: ND108684	High	Located near the A9 / A836 on Trostan Rd. Staff and students may use part of this route on their journey to and from the school. This receptor may be highly sensitive to changes in HGV traffic.
General	Playden Nursery NGR: ND113681	High	Located within Thurso, near to the A9. Staff and students may use part of this route on their journey to and from the school. This receptor may be highly sensitive to changes in HGV traffic.
General	Miller Academy Primary NGR: ND114680	High	Located within Thurso, near to the A9. Staff and students may use part of this route on their journey to and from the school. This receptor may be highly sensitive to changes in HGV traffic.
General	Thurso High School NGR: ND111675	High	Located within Thurso. The school is a reasonable distance from the A9; however, staff and students may use part of this route on their journey to and from the school. This receptor may be highly sensitive to changes in HGV traffic.
General	North Highland College NGR: ND108674	High	Located within Thurso. The college is a reasonable distance from the A9; however, staff and students may use part of this route on their journey to and from the school.

Route	Receptor	Sensitivity	Justification
			This receptor may be highly sensitive to changes in HGV traffic.
General	Mount Pleasant Primary School NGR: ND122683	High	Mount Pleasant Primary School is located adjacent to the A836, east of Thurso. Staff and students may use the route for part of their journey to and from the school. This receptor may be highly sensitive to changes in HGV traffic.
ALR / General	Reay Primary School NGR: NC970648	High	Reay Primary School is located adjacent to the A836, within the village of Reay. Staff and students will use the part of the route through the village for their journey to and from the school. This receptor may be highly sensitive to changes in HGV and ALV traffic.
General	Gillock Park NGR: ND114685	High	The park is located adjacent to the A9, north of Thurso. People will use part of this route for their journey to and from this space. This receptor may be highly sensitive to changes in HGV traffic.
ALR / General	Reay Play Park NGR: NC957644	High	The park is located near to the A836, in the village of Reay. People may use part of this route for their journey to and from this space. This receptor may be highly sensitive to changes in HGV and ALV traffic.
ALR / General	Barchester - Pentland View Care Home NGR: ND103692	High	The care home is adjacent to the A9, north of Thurso. Staff and visitors may use this route to and from the home. This receptor may be highly sensitive to changes in HGV and ALV traffic.
General	Bayview House NGR: ND112686	High	The care home is adjacent to the A9 between Scrabster and Thurso. Staff and visitors may use this route to and from the home. This receptor may be highly sensitive to changes in HGV traffic.
General	Thurso Health Centre NGR: ND114680	Med	This doctor's surgery is located near to the A9, on Davidson's Lane, Thurso. Patients and staff may use part of this route journeying to and from the clinic. This receptor may be sensitive to changes in HGV traffic.
General	Riverbank Medical Practice NGR: ND116681	Med	This doctor's surgery is located near to the A9, on Janet Street, Thurso. Patients and staff may use part of this route journeying to and from the clinic. This receptor may be sensitive to changes in HGV traffic.
General	Princes Street Surgery	Med	This doctor's surgery is located near to the A9, on Princes Street, Thurso. Patients and

Route	Receptor	Sensitivity	Justification
	NGR: ND113680		staff may use part of this route journeying to and from the clinic. This receptor may be sensitive to changes in HGV traffic.
General	Dunbar Hospital NGR: ND110678	Med	This Hospital is located in Thurso near to the A9, on Ormlie Road. Patients, staff and emergency responders may use part of this route journeying to and from the clinic. This receptor may be sensitive to changes in HGV traffic.
ALR / General	The Reay Shop NGR: NC960647	Med	Shop is located adjacent to the A836 in the village of Reay. Staff and customers to the sop will use part of the route to travel to and from the shop. This receptor may be sensitive to changes in HGV and ALV traffic.
General	Thurso Guide Hall NGR: ND118684	Med	Community hall is located near to the A9 in Thurso on Robert Dick Place. Users of this facility may use part of the route traveling to and from the building. This receptor may be sensitive to changes in HGV traffic.
General	The Community Learning and Leisure Centre NGR: ND114680	Med	Community hall is located near to the A9 in Thurso on Princes Street. Users of this facility may use part of the route traveling to and from the building. This receptor may be sensitive to changes in HGV traffic.
General	Thurso Camping and Caravan Park NGR: ND112687	Med	The park is located adjacent to the A9, north of Thurso. People will use part of this route for their journey to and from this space. This receptor may be sensitive to changes in HGV traffic.
ALR / General	Kaithness Clays NGR: ND022698	Med	This facility is located near to the A836 at the Forss Business & Energy Park, north of Lybster. Visitors will use this route to travel to and from this facility. This receptor may be sensitive to changes in HGV traffic.
ALR / General	Reay Golf Course NGR: KW14 7RE	Med	Golf Course is adjacent to the A836 in the village of Reay. Users of this facility will use this route to travel to and from the course. This receptor may be sensitive to changes in HGV traffic.

Residential and commercial properties which front directly on to the general delivery routes and ALR are considered to be of high sensitivity. Individual properties are not listed in this assessment.

11.4.5 Future Baseline Scenarios

11.4.5.1 Traffic Flow

Background traffic growth will occur on the local road network irrespective of whether or not the Development is constructed.

Traffic growth factors of 1.057 and 1.031 were calculated for the Highland region as defined within TEMPRO baseline years (2018) and (2020) respectively, with the anticipated year of construction being (2023). The baseline traffic flow information collected for each route was then multiplied by the relevant growth factor to give the estimated traffic flow for the year of construction. Table 11.6 Indicates the projected baseline traffic flow at each of the locations for the anticipated year of construction.

Table 11.6: Projected Baseline Traffic Flow

Location Ref.	Road	Location	Growth Factor	Projected ADT	HGV ADT	HGV (%)
1	A9	Sordale Point ID: 10800	1.057	3,613	322	8.9
2	A9	Thurso Bridge Point ID: 40956	1.057	14,625	285	2.0
3	A9	Pennyland House Point ID: 40800	1.057	3,613	156	4.3
4	A836	Forss	1.031	8,631	1,252	14.5
5	A836	Near Sandside Bay	1.031	3,389	960	28.3
6	A897	Ackron Farm	1.031	839	248	29.6

11.4.6 Anticipated Construction Development Traffic

An indicative programme of anticipated construction traffic associated with the Development is provided in Appendix A11.2 and is expected to run for approximately 15 months. The following sub-sections provide detail for each element of work. A summary of all predicted construction traffic is provided at the end of this section.

11.4.6.1 Woodland

Woodland operations (i.e. primarily felling) are required in order to provide prepare the Site for construction of the Turbine 2. Anticipated woodland movements are set out in Table 11.7.

Table 11.7: Anticipated Vehicle Movements - Woodland

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Plant Delivery/Removal	HGV Low Loader*	5	8	8
Timber Extraction	HGV	5	4	4
Fuel Delivery	Fuel Tanker HGV	5	2	2
Overall			**14**	**14**

*Includes transporter vehicle leaving and then returning to site during demobilisation

11.4.6.2 Site Mobilisation and Demolition

HGV and other vehicle movements will be required during site mobilisation. This will comprise the erection of welfare facilities, delivery of construction site vehicles and importation of plant and equipment. The majority of these movements will be as HGVs and low loaders which will deliver and then depart the Site empty.

During site demobilisation, this equipment will be removed from Site. Vehicle movements for demobilisation will result from empty HGVs and low loaders travelling to Site and then departing loaded. Table 11.8 indicates the anticipated number of vehicle movements associated with site mobilisation and demobilisation.

Table 11.8: Anticipated Vehicle Movements - Site Mobilisation / Demobilisation

Operation	Vehicle Type	Construction Months	Total	Max Monthly
On-site vehicles	Car/LGV**	1, 15	30	16
Construction Compound	HGV / Low Loader	1, 15	120*	60*
Overall			**150**	**76**

*Includes transporter vehicle leaving and then returning to site during demobilisation

**Self-propelled vehicles which arrive in one month and depart in another

11.4.6.3 Access Track and Hardstanding Construction

This assessment assumes a worst-case, in which, deliveries run along the wider general construction route, as detailed in Section 11.3.4. It has been assumed that the top 0.15 m layer of fine material required for all access tracks and hardstandings will be imported to Site, the remaining aggregate required will be won from onsite borrow pits.

The volume of material required for a 0.15 m surface layer across all track and hardstandings is estimated to be 17,841 metres cubed (m^3). Assuming each dump truck has a volumetric capacity of 9 m^3, this will result in approximately 1,983 loads, or 3,966 total vehicle movements over the duration of this phase of works.

Two teams are expected to operate during access track construction. Each team may utilise an excavator, roller and four dumper trucks for transporting material between the borrow pits and working areas. It is assumed that the excavators and rollers will be delivered to the site via low loaders at the commencement of this operation and will generate two vehicle trips each for delivery and another two trips during removal, the dumper trucks will be self-propelled to and from the Site.

Other materials will require to be imported regularly throughout construction of the access tracks such as geo-membrane, drainage pipes and culvert sections.

Table 11.9 11.9 sets out the anticipated number of vehicle movements associated with access track and hardstanding construction.

Table 11.9: Anticipated Vehicle Movements - Access Track and Hardstanding Construction

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Plant Delivery	HGV Dump Truck**	2, 8	16	8
	HGV / Low Loader (Excavators/Rollers)	2, 8	8*	4*

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Material Deliveries	HGV	2 - 8	3,966	568***
Overall			**3,990**	**578**

*Includes transporter vehicle leaving and then returning to site during demobilisation

**Self-propelled vehicles which arrive in one month and depart in another

***Construction Programme included in Appendix 11.2 which documents peak traffic in more detail with some months with 566 max deliveries.

11.4.6.4 Turbine Foundation Construction

For the purposes of this assessment it is assumed that concrete for each turbine foundation will be formed from imported ready-mix concrete. Therefore, in the event that onsite batching is utilised, the peak daily number of vehicles associated with this phase of works would be reduced.

Turbine foundations are typically poured in one continuous session over a single day, with 12 non-consecutive days required in total over the 26-week duration of this element of works. Each foundation will comprise 500 m^3 of concrete, which will require 63 ready-mix HGV loads, assuming a capacity of 8 m^3 per vehicle. This will require 126 vehicle movements per turbine; totalling 1,512 vehicle movements for 12 turbines over the 26-weeks of this phase of works.

Additionally, 645 tonnes of steel reinforcement (rebar) will be required. This will result in 66 HGV movements over this period. Table 11.10 indicates the anticipated number of vehicle movements associated with turbine foundation construction.

Table 11.10: Anticipated Vehicle Movements - Turbine Foundation Construction

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Concrete Delivery	Ready Mix HGV	6 - 11	1,512	252
Rebar Delivery	HGV	6 - 11	66	12
Overall			**1,578**	**264**

11.4.6.5 Control Building and Substation Construction

Material for construction of the substation compound hardstanding will be imported in a total of 58 HGV movements. Electrical components and switchgear will require to be imported and is predicted to total 40 HGV movements over the eight-month phase of this element.

Two transformers will require to be delivered by ALV due to their weight. Following delivery of components, the ALVs will retract to the size of an HGV for the return journey. This will result in four vehicle movements, two ALV movements and two HGV movements. Two escort vehicles are assumed to accompany each ALV resulting in eight vehicle movements.

Table 11.11 indicates the number of vehicles associated with substation construction.

Table 11.11: Anticipated Vehicle Movements - Substation Construction

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Electrical Components and Switchgear Delivery	HGV	3 - 10	40	6
Transformer Delivery	ALV	3 - 10	2	1
	HGV	3 - 10	2	1
	Escort Car / Van	3 - 10	8	4
Material Delivery	HGV	3 - 10	58	8
Overall			**110**	**20**

11.4.6.6 Electrical Cabling Delivery

Electrical cabling for wind farm power distribution will require to be delivered and will constitute 34 HGV movements over the period of delivery.

Table 11.12 indicates the number of vehicle movements associated with electrical cabling delivery.

Table 11.12: Anticipated Vehicle Movements - Electrical Cabling Delivery

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Electrical Cabling Delivery	HGV	10 - 12	34	12
Overall			**34**	**12**

11.4.6.7 Crane Delivery

A large crawler or track mounted crane of approximately 1,000 tonne capacity will be required for turbine erection along with an additional 160 tonne pilot crane. The crawler crane will be transported in component form and assembled on Site. This will require approximately 52 HGV movements to be undertaken prior to the commencement of turbine delivery. The pilot crane will be self-propelled although will constitute an ALV due to its weight.

The crane will remain onsite for the duration of the turbine assembly phase.

Table 11.3 indicates the number of vehicle movements associated with crane delivery.

Table 11.13: Anticipated Vehicle Movements - Crane Delivery

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Crawler Crane	HGV	10, 14	52	26
	Abnormal Load Vehicle**	10, 14	2	1
	Escort Car / Van	10, 14	8	4
Overall			**62**	**31**

**Self-propelled vehicles which arrive in one month and depart in another

11.4.6.8 Turbine Delivery

Turbines will be delivered as separate components the majority of which will require to be transported by ALV. For 12 turbines, it is assumed that there will be 11 vehicles per turbine which equates to 132 ALV deliveries equalling 264 vehicle movements in total.

Following delivery of components, the ALVs will retract to the size of a standard HGV for the return journey. Two escort vehicles are required to accompany each ALV movement or convoy which will result in a worst-case of 528 additional vehicle movements. In practice, this figure may be reduced where ALVs approach the Site in convoy and fewer escort vehicles per ALV are required.

24 HGV vehicle movements will be required for the delivery of turbine accessories and ancillary equipment.

Table 11.14 indicates the number of vehicle movements that are expected for turbine delivery.

Table 11.14: Anticipated Vehicle Movements - Turbine Delivery

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Turbine Components	ALV	10 - 14	132	28
	Escort Car or Van	10 - 14	528	106
	HGV	10 - 14	132	28
Ancillary Equipment	HGV	10 - 14	24	6
Overall			**816**	**168**

11.4.6.9 Fuel Delivery

Fuel will require regular delivery to the Site throughout the construction period and is expected to total one HGV fuel tanker delivery per month from site mobilisation; totalling 30 vehicle movements over the duration of construction. This excludes fuel delivered to support woodland operations which is accounted for in Section 11.4.6.1.

Table 11.15 indicates the number of vehicle movements associated with fuel delivery.

Table 11.15: Anticipated Vehicle Movements - Fuel Delivery

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Fuel Delivery	HGV Fuel Tanker	1 - 15	30	2
Overall			**30**	**2**

11.4.6.10 Construction Personnel and Staff

It is anticipated that an average of 40 staff will be required onsite per day throughout the construction period, months 1-15. For the purposes of this assessment, the most recent available Scottish private vehicle occupancy rate of 1.57 people per vehicle was used, equating to 25.5 vehicles per day during the construction period.

Assuming 26 workdays per month, this will result in 663 vehicles per month and a total of 9,945 vehicle trips for staff over the course of the Development's construction. Table 11.16 indicates the number of vehicle movements associated with staff.

Table 11.16: Anticipated Vehicle Movements - Staff

Operation	Vehicle Type	Construction Months	Total	Max Monthly
Staff	Car or Minibus	1 - 15	9,945	663
Overall			**9,945**	**663**

11.4.6.11 Summary

Table 11.17 provides a summary of all deliveries expected throughout duration of construction. The values calculated in Section 11.5 may differ from those generated in Appendix A11.2 due to both rounding and assuming the worst-case scenario, which has led to an artificial inflation of the values in the Construction Development Programme.

Table 11.17: Anticipated Vehicle Movements - Summary

Operation	Vehicle Type	Months Operational	Total	Max Monthly
Site Mobilisation/Demobilisation				
On-site vehicles	Car / LGV**	1, 15	30	16
Construction Compound	HGV Low Loader	1, 15	120*	60*
Subtotal			**150**	**76**
Access Track and Hardstanding Construction				
Plant Delivery	HGV Dump Truck**	2, 8	16	8
	HGV / Low Loader (Excavators / Rollers)	2, 8	8*	4*
Material Deliveries	HGV	2 - 8	3,966	568
Subtotal			**3,990**	**578**
Woodland Operations				

Operation	Vehicle Type	Months Operational	Total	Max Monthly
Plant Delivery/Removal	HGV Low Loader*		8	8
Woodland Extraction	HGV		4	4
Fuel Delivery	Fuel Tanker HGV		2	2
Overall			**14**	**14**
Turbine Foundation Construction				
Concrete Delivery	Ready Mix HGV	6 - 11	1,512	252
Rebar Delivery	HGV	6 - 11	66	12
Subtotal			**1,578**	**264**
Control Building and Substation Construction				
Electrical Components and Switchgear Delivery	HGV	3 - 10	40	6
Transformer Delivery	ALV	3 - 10	2	1
	HGV	3 - 10	2	1
	Escort Car / Van	3 - 10	8	4
Material Delivery	HGV	3 - 10	58	8
Subtotal			**110**	**20**
Electrical Cabling Delivery				
Electrical Cabling Delivery	HGV	10 - 12	34	12
Subtotal			**34**	**12**
Crane Delivery				
Crawler Crane	HGV	10, 14	52	26
	Abnormal Load Vehicle**	10, 14	2	1
	Escort Car / Van	10, 14	8	4
Subtotal			**62**	**31**
Turbine Delivery				
Turbine Components	ALV	10 - 14	132	28
	Escort Car / Van	10 - 14	528	106
	HGV	10 - 14	132	28
Ancillary Equipment	HGV	10 - 14	24	6

Operation	Vehicle Type	Months Operational	Total	Max Monthly
Subtotal			**816**	**168**
Fuel Delivery				
Fuel Delivery	HGV Fuel Tanker	1-15	30	2
Subtotal			**30**	**2**
Staff				
Staff	Car or Minibus	1-15	9,945	663
Subtotal			**9,945**	**663**
Totals				
Total HGV and Abnormal Load Movements (excluding concrete deliveries)			4,698	604
Total HGV Movements for Concrete Delivery (12 non-consecutive days)[10]			1,512	252
Total Car and Van Movements			10,519	775
Overall Total			**16,729**	**1,519*** **

*Includes transporter vehicle leaving and then returning to site during demobilisation

**Self-propelled vehicles which arrive in one month and depart in another

***Total flow in peak month

11.5 ASSESSMENT OF POTENTIAL EFFECTS

11.5.1 Traffic Generation

A detailed breakdown of the distribution of vehicle movements in each month and by element of work, throughout the construction period of the Development is included in Appendix A11.2. The peak month from a traffic perspective was identified and used to predict the traffic increase along the construction traffic route.

From inspection of the predicted traffic movements, the peak month for vehicle flow is expected to be month eight where a total of 1,519 vehicle movements are predicted. Concrete deliveries are expected to occur during this month on non-consecutive days. On days where concrete delivery occurs, a maximum of 175 vehicle movements are expected.

Out-with the foundation pouring phase, the peak from a transport perspective is expected to be month eight. During this month a total of 1,267 vehicle movements are expected resulting in an average of 49 vehicle movements per day, mainly due to material import and staff movements.

The values calculated in this Section refer to the general construction traffic route only. This is appropriate as in practice the maximum number of ALV movements per day is not likely to exceed 2-3 vehicles, which will travel in convoy with two escort vehicles. In the

[10] Onsite batching is the preferred option by the Applicant and the ability to accommodate batching onsite would be confirmed following post-consent site investigations. In the event that onsite batching is utilised, the peak daily number of vehicles associated with this phase of works would be reduced.

worst-case scenario this would be three ALV movements with a total of six escort vehicles which would cause minimal impact in baseline traffic receptors. Therefore, the effect of ALV movements is negligible not significant in terms of the EIA Regulations.

Table 11.18 details the anticipated vehicle flow in the peak month on days outwith concrete deliveries alongside the percentage increase above the predicted baseline at each point within the Study Area. For the purposes of this assessment, 26 working days per month has been assumed for all daily traffic calculations.

Table 11.18: Predicted Peak Month Average Daily Traffic - Outwith Concrete Delivery – General Construction Traffic Route

Location Ref.	Total Vehicle Movements			HGV Movements Only		
	2023 Baseline	Peak Month	Increase (%)	2023 Baseline	Peak Month	Increase (%)
1 Sordale Point ID: 10800	3,613	3,662	1.3	322	346	7.2
2 Thurso Bridge Point ID: 40956	14,625	14,674	0.3	285	309	8.1
3 Pennyland House Point ID: 40800	3,613	3,662	1.3	156	180	14.9
4 Forss	8,631	8,680	0.6	1,252	1,276	1.9
5 Near Sandside Bay	3,389	3,438	1.4	960	983	2.4
6 Ackron Farm	839	888	5.8	248	272	9.4

*For the purposes of this estimation abnormal load vehicles are included in HGV.

** The locations indicated in this table are indicated on Figure 11.3.

Table 11.19 details the anticipated vehicle flow in the peak month on days where concrete deliveries will take place; this will occur on a maximum of 12 non-consecutive days in the month.

Table 11.19: Predicted Peak Month Average Daily Traffic - During Concrete Delivery – General Construction Traffic Route

Location Ref.	Total Vehicle Movements			HGV M Only*		
	2023 Baseline	Peak Month	Increase (%)	2023 Baseline	Peak Month	Increase (%)
1 Sordale Point ID: 10800	3,613	3,788	4.8	322	472	46.3
2 Thurso Bridge Point ID: 40956	14,625	14,800	1.2	285	435	52.3
3 Pennyland House Point ID: 40800	3,613	3,788	4.8	156	306	95.4
4 Forss	8,631	8,806	2.0	1,252	1,402	11.9

Location Ref.	Total Vehicle Movements			HGV M Only*		
	2023 Baseline	Peak Month	Increase (%)	2023 Baseline	Peak Month	Increase (%)
5 Near Sandside Bay	3,389	3,564	5.2	960	1,109	15.5
6 Ackron Farm	839	1,014	20.8	248	398	60.1

*For the purposes of this estimation abnormal load vehicles are included in HGV.

** The locations indicated in this table are indicated on Figure 11.3.

As detailed in the assessment methodology, a screening exercise was undertaken in order to determine which locations warrant detailed assessment.

The lower threshold of significance (where traffic flows are predicted to increase by 10% or more) was considered appropriate for those locations with identified sensitive receptors. Most of these receptors are within or around the town of Thurso and the village of Reay and will be considered against location references; 2, 3, and 5.

The upper threshold of significance (where traffic flows are predicted to increase by more than 30%) was considered appropriate for other locations within the study, which applies to location references; 1, 4 and 6.

Using the above thresholds, and assessing the estimated percentage increases in overall traffic and HGV traffic, further detailed assessment will be considered in the following locations/ cases:

- On the A9 (Location reference 3) throughout construction of the Development as a result of HGV traffic increase; and
- All locations except Location Reference 4, along the route on concrete delivery days as a result of HGV traffic increase.

The following subsections detail considerations for each of the above cases.

11.5.1.1 1-49 (Location References 3) HGV Increase Throughout Construction

Location references 3 on the A9 close to Pennyland House has a predicted increase in HGV traffic of 14.9%, exceeding the lower 10% threshold for this location.

As detailed in the assessment methodology, where considering increases in traffic on roads with a low baseline traffic flow, it is important to consider the overall and residual capacity of the road in question.

Table 11.4 highlights the theoretical capacities of the A9 at 46,200 vehicles per day. The maximum number of vehicle movements, including baseline and predicted construction traffic, per day is calculated at 3,662 at this location showing significant residual capacity to accommodate the temporary increase in HGV traffic.

It is important to note that whilst the HGV traffic increase is above this threshold, the overall traffic volume increases only by 1.3%, which is well within the allowable threshold.

As such, the residual capacity available along this road and with an overall traffic increase of only 1.3% any potential impact from the temporary increase in HGV traffic above the allowable threshold will be minimal and fully reversible. Thus, the effect of increased traffic on this route is minor and **not significant** in terms of the EIA Regulations.

11.5.1.2 2-9, A836, A897 (Location References 1, 2, 3, 5 and 6) HGV Increase During Concrete Delivery

During concrete delivery, which occurs on 12 non-consecutive days over a period of 6 months, the HGV increase for these locations exceeds the significance thresholds, with the total increase in HGV traffic ranges from 15.5% to 95.4%. Assuming we don't batch on site.

The A9 and A836 have an estimated capacity (detailed in Table 11.4) of 43,200 vehicles per day, while the A897 has an estimated capacity of 6,720 vehicles per day. The predicted total number of vehicle movements, including baseline and predicted construction traffic at each location, per day during this phase is as follows:

- Location 1: 3,788 vehicles per day
- Location 2: 14,674 vehicles per day
- Location 3: 3,788 vehicles per day
- Location 5: 3,564 vehicles per day
- Location 6: 1,014 vehicles per day

The roads at each location therefore are shown to have significant residual capacity and as such will be capable of handling the temporary increase in traffic.

All of the identified locations fall below their respective thresholds when looking at overall traffic volumes.

The short timeframe involved in the concrete delivery 12 non-consecutive days, over 6 months, means that the overall impact on the road network will be temporary and fully reversible.

Of specific importance would be the A897 which has been raised as a point of concern by local residents and the Highland Council. Please note that construction vehicles will only utilise a small length of this road (approximately 200 m or 0.12 miles) in order to access the Site entrance. Restrictions will be put in place to prevent construction traffic from utilising this road from Helmsdale as a route to Site with all drivers being made aware of the routes outlined in Section 11.3.4.

The increase in overall traffic flow and HGV flow may have an adverse effect on traffic generation at these sensitive receptors which is low and therefore **not significant** in terms of the EIA Regulations.

11.5.2 Accidents and Safety

As detailed in Section 11.4.3, the RTC assessment identified three 'fatal' RTCs and two 'serious' RTCs within the Study Area. None of the 'fatal' or 'serious' RTCs identified involved HGVs.

20 'slight' RTCs were identified along the entirety of the general construction route, however these were distributed evenly across both the A9 and A836, with no clusters or hotspots identified. Figure 11.4 indicates the location of all identified RTCs.

It has been concluded that these roads are operating within acceptable safety parameters at present and in the absence of identifiable trends in RTCs or known accident hotspots, an increase in overall traffic flow or HGV composition is not sufficient to affect a change in safe operation of the road network.

The temporary increase in overall traffic and HGVs for the duration of the construction of the Development will not result in an adverse effect in respect to accidents and safety. Therefore, the effect on accidents and safety is negligible and **not significant** in terms of the EIA Regulations.

11.5.3 Pedestrian Amenity

Pedestrian amenity, fear and intimidation can be affected by changes to traffic flow and composition. The A9 and A836 do not have pedestrian footways, except where they pass through settlements.

Two principal areas where pedestrian amenity was considered in detail are discussed in the following subsections.

11.5.3.1 Sensitive Receptors Located on or Near the Delivery Route

HGV traffic levels are predicted to increase above the relevant thresholds of significance throughout construction at location reference 3. Four of the 21 identified sensitive receptors, as detailed in Section 11.4.4, are located at the affected point along this route including:

- Pennyland Primary School;
- Pentland View Care Home;
- Bayview House Care Home; and
- Thurso Camping and Caravan Park.

It is possible that students of Pennyland Primary School could walk alongside or cross the delivery route on their way to and from school. Due to the sensitivity of this receptor being categorised as 'high', the effect on it has been classified as moderate.

In addition, any individuals using the other services listed above are likely to cross this route. These receptors have a lower sensitivity than Pennyland Primary school. Thus, the effect on these receptors is classified as 'low'.

The increase in overall traffic flow and HGV flow may have an adverse effect on pedestrian amenity at these sensitive receptors, specifically in the case of Pennyland Primary School, which is moderate and therefore **significant** in terms of the EIA Regulations

In accordance with the EIA Regulations, Section 11.6 of this Chapter details mitigation measures which are to be adopted to reduce the significance of this effect.

11.5.4 Driver Delay

All roads within the Study Area are operating significantly below capacity and are predicted to continue to do so during construction of the Development. The effect of general increase in traffic on driver delay is therefore negligible and not significant in terms of the EIA Regulations.

Some driver delay can be expected to occur on routes due to the slow movement of ALVs between the port of delivery (Scrabster Harbour) and the Site. Where safe to do so ALVs will occasionally stop to allow traffic to pass if necessary. A total of 132 ALVs associated with turbine delivery, two associated with the crane delivery and two associated with transformer delivery for the substation are anticipated. These will be distributed throughout the duration of specific elements of works (months 10 – 14).

Due to the overall limited number of loads across the construction period and the short-term nature of this period of works, which will be managed with communication with the local community which is to form part of the CTMP as best practice, the anticipated effect of abnormal loads on driver delay is minor and not significant in terms of the EIA Regulations. A Framework CTMP is provided in Appendix 11.3.

11.5.5 Severance

Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The A9 and A836 pass through settlements along the route which have the potential to be affected by severance, and is covered by location references 2 and 3 for the town of Thurso and location 5, which is the closest location to the village of Reay.

During construction of the Development, overall traffic is predicted to increase by 0.3% at Location Reference 2 and by 1.3% at Location Reference 3 throughout the duration of the Development. In this case the temporary change in traffic falls below the thresholds of significance (10%) for this effect. Considering solely HGV's the increase seen is 7.2 % and 52.3% on non-concrete days and concrete delivery days respectively at location 2 and by 14.9% and 95.4% for location 3 with the 10% threshold not being met at either during concrete delivery and throughout construction for location 3.

Location 5 also sees an increase in HGV traffic of 15.5% above the allowable threshold during concrete delivery days, which may have a significant effect on the sensitive receptors near to this location in the village of Reay. Whilst this increase in traffic is seen as having no serious impact due to the spread-out nature of these delivery days, mitigation measures will be put forth in Section 11.6 to manage any potential impact on the sensitive receptors in this area.

The A9 and A836 residual capacity is 43,200 daily vehicle movements, which is more than sufficient to cope with the increase in traffic brought about by the Development.

It has therefore been determined that the effect of severance is negligible and **not significant** in terms of the EIA Regulations.

11.5.6 Noise and Vibration

Assessment of noise and vibration effects as a result of offsite construction vehicle movements has been considered using the guidance contained in DMRB – LA 111[11]. In accordance with the guidance, the following points have been noted when considering the need for a quantitative assessment of offsite construction traffic noise and vibration:

- The level of detail of a noise and vibration assessment shall be proportionate to the quality of data available and the risk of likely significant effects occurring; and
- Are there any noise sensitive receptors where there would be a reasonable stakeholder expectation that a construction noise/vibration assessment would be undertaken?

It should be noted that all onsite construction noise and vibration effects and operational noise effects are considered in **Chapter 10: Noise** of the EIA Report.

Considering offsite transport related noise and vibration effects against the above points, there are a number of sensitive receptors located close to the proposed general construction traffic route. However, this route is an 'A-road' (i.e. a major a traffic corridor) and there should therefore be an expectation that it is used by HGV traffic. As a result, there is no 'reasonable stakeholder expectation' that a quantitative noise and vibration assessment be undertaken for a temporary and fully reversible change in traffic flow as a result of the Development.

Furthermore, ground-borne vibration resulting from HGV and ALV movements is generally only likely to be significant where vehicles traverse discontinuities, such as rough surfaces (including potholes) or speed-humps. Effects from the temporary increase in traffic are

[11] Department for Transport (May 2020). Design Manual for Roads and Bridges – LA 111 Noise and Vibration. Available at: https://www.standardsforhighways.co.uk/dmrb/search?q=noise&pageNumber=1. Accessed on 12/08/2020

therefore only likely to be experienced at receptors located next to such road defects, in which case the maintaining authority (i.e. the local authority, or Transport Scotland) would be responsible for enacting repairs.

Airborne vibrations resulting from low frequency sound emitted by vehicle engines and exhausts can result in detectable vibrations in building elements such as windows and doors and cause disturbance to local people. Due to the short-term and temporary nature of these increase in traffic movements the effect of noise and vibration upon receptors along the route would be minor and **not significant** in terms of the EIA Regulations.

11.5.7 Hazardous Loads

Fuel will be regularly transported to the Site over the duration of construction of the Development. All fuel will be transported by suitably qualified contractors, and all regulations for the transportation and storage of hazardous substances will be observed. No other hazardous substances in significant quantities are expected to be transported to Site. Therefore, the effect of the transportation of hazardous substances is negligible and **not significant** in terms of the EIA Regulations.

11.5.8 Visual Effects

The movements of ALVs could be considered visually intrusive. This effect would be short-term and would only occur during the movement of abnormal loads. Therefore, the visual effect upon receptors along the routes as a result of the ALVs would be negligible and **not significant** in terms of the EIA Regulations.

11.5.9 Air Quality

Maintaining good local air quality is essential for the human health and overall quality of life for people living in the area. Road transport accounts for a significant proportion of emissions of a number of pollutants including carbon dioxide (CO_2), nitrogen dioxide (NO_2), and particulate matter (PM10). Nitrogen oxide emissions are also of concern for nearby vegetation and ecosystems.

The DMRB gives guidance on matters relating to air quality in Volume 11 Section 3 and advises that significant impacts to local air quality may be found in the following cases:

- Where the road alignment will change by 5 m or more; or
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic flow (AADT) or more; or
- Heavy Duty Vehicle flows will increase by 200 AADT or more; or
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

Given the assessment of the expected volume of construction traffic, none of the above criteria have been met or exceeded. In addition, due to the temporary nature of the increase in vehicles using the proposed access route, any effects on local air quality will be short term and reversible.

Therefore, the effect of the increase in traffic on local air quality would be negligible and **not significant** in terms of the EIA Regulations.

11.5.10 Operational Effects

Traffic associated with operation of the Development is limited to maintenance and is expected to be insignificant in comparison to traffic generated during construction. General maintenance and site monitoring visits will likely be undertaken by car and Light Goods Vehicles (LGVs). The effect of operational traffic is therefore expected to be negligible and **not significant** in terms of the EIA Regulations.

11.5.11 Decommissioning Effects

Traffic and transport effects associated with decommissioning of the Development are expected to comprise removal of the turbines and all associated above ground equipment. Turbine towers and blades are likely to be dismantled into smaller sections prior to their removal to ease transport requirements.

At this stage, it is not possible to forecast quantitatively or accurately the traffic effect during decommissioning of the Development as the baseline data would no longer be valid in 30 years. It is reasonable to assume that baseline traffic would continue to increase. The implication of applying further background traffic growth would be that the proportional impact of the decommissioning traffic would reduce in comparison to the construction traffic impact that has been assessed. It is expected that traffic flow on routes within the vicinity of the Site would continue to remain well below capacity.

The decommissioning effects would also be greatly reduced as the majority of the construction traffic is created by the import of concrete for turbine foundations, which will be left in situ at depth of greater than 1 m below ground level as per current decommissioning best practice.

Prior to decommissioning of the Development, a traffic assessment would be undertaken and appropriate traffic management procedures agreed with the relevant authorities at the time.

11.6 MITIGATION AND RESIDUAL EFFECTS

11.6.1 Mitigation Measures

A significant effect was identified in Section 11.5 relating to pedestrian amenity at several sensitive receptors, including:

- Pennyland Primary School;
- Pentland View Care Home;
- Bayview House Care Home; and
- Thurso Camping and Caravan Park

Moderate classification was given specifically to Pennyland Primary School, due to the 'high' sensitivity given to schools as per current guidelines. As such, whilst no significant effect was identified at each, drivers should be made aware of the following locations:

- Playden Nursery;
- Millar Academy Primary School;
- Thurso High School;
- North Highland College;
- Mount Pleasant Primary School; and
- Reay Primary School.

A number of mitigation measures are proposed which are recommended for adoption in the CTMP (Framework CTMP is provided in Appendix 11.3) as follows:

- Construction Traffic, including Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs to include vans and cars) will be restricted from travelling between the Site and Helmsdale via the A897[12];
- As far as reasonably possible, deliveries should be scheduled outside of school opening and closing times;

[12] Exceptions shall be granted to sub-contractors living or staying along the A897 and the B871 roads, to ensure that local accommodation businesses on these roads are not affected by the above restriction. This will also ensure that sub-contractors are not restricted from staying in accommodation along the A897 and the B871.

- Drivers of all delivery vehicles to be made aware during induction of the presence of schools and emergency services within Thurso and also the village of Reay as this will see an increase in HGV traffic during concrete delivery days above the allowable threshold;
- If possible, onsite batching should be considered to reduce max monthly anticipated vehicle movement of concrete deliveries during turbine foundation construction. Onsite batching is the preferred option by the Applicant and the ability to accommodate batching onsite would be confirmed following post-consent site investigations; and
- Communication with local communities should be undertaken for planned activities, such as turbine deliveries and concrete delivery days (if onsite batching is not possible).

The above measures are recommended; however, the CTMP (Framework CTMP is provided in Appendix 11.3) will detail the exact measures to be implemented during construction of the Development.

11.6.2 Residual Effects

If the above mitigation measures are implemented through the CTMP (Framework CTMP is provided in Appendix 11.3) for the duration of construction, the effect on increased traffic on pedestrian amenity at the sensitive receptors along the route will be reduced to minor and **not significant** in terms of the EIA Regulations.

11.7 CUMULATIVE EFFECT ASSESSMENT

Significant cumulative effects may occur during construction of the Development where this overlaps with construction of other nearby developments. Proposed developments[13] which have the potential to result in cumulative traffic and transport effects include:

- Achlachan 2 (3 turbines);
- Armadale (23 turbines);
- Cairnmore Hill (8 turbines);
- Dounreay (2 turbines);
- Drum Hollistan 2 (7 turbines);
- Halsary (15 turbines);
- Limekiln (21 turbines);
- Limekiln Extension (5 turbines);
- Strathy South (39 turbines);
- Strathy Wood (14 turbines);
- Thusater Farm (1 turbine);
- Forss Extension (2 turbines); and
- Weydale (1 turbine).

Table 11.20 provides an estimate of daily traffic generation figures that have been assumed for each of the identified developments. Exact traffic data is not available for the identified developments and in order to provide a reasonable assessment, it has been assumed that traffic generation for each project will be in proportion to that generated by the Development (calculated pro-rata, per turbine).

Traffic relating to the delivery of concrete during foundation pours has not been included as it is assumed that these events will be timed to ensure they do not coincide. It is unlikely that the local capacity for concrete production could accommodate several pours coinciding in any case.

[13] Status of wind farms is as of 15 September 2020.

Table 11.20 Extrapolated Cumulative Daily Traffic Movements from Identified Developments (Peak Month - Non-Concrete Pour Days)

Development	No. Turbines	Total Traffic	HGV
Achlachan 2	3	12	6
Armadale	23	93	45
Cairnmore Hill	8	32	15
Dounreay	2	8	4
Drum Hollistan 2	7	28	14
Halsary	15	61	29
Limekiln	21	85	41
Limekiln Extension	5	20	10
Strathy South	39	158	76
Strathy Wood	14	57	27
Thusater Farm	1	4	2
Forss Extension	2	8	4
Weydale	1	4	2
Total	**141**	**573**	**273**

The cumulative traffic associated with the identified developments will primarily result due to the import of materials and from staff movements. For the purposes of this assessment, it has been assumed that all traffic will use each road within the Study Area to present a worst case scenario.

Table 11.21 indicates the anticipated total traffic (including baseline) and the percentage increase above baseline in the worst-case cumulative scenario.

Table 11.21 Cumulative Daily Traffic Increase (Peak Month - Non-Concrete Pour Days)

15.25: Cumulative Extrapolated Average Daily Traffic – Non-Concrete Delivery						
Location	**Total Vehicles**			**HGV Only***		
	2023 Baseline	**Peak Month**	**Increase (%)**	**2023 Baseline**	**Peak Month**	**Increase (%)**
1	3,613	4,234	17.2	322	619	91.9
2	14,625	15,246	4.2	285	582	103.8
3	3,613	4,234	17.2	156	453	189.4
4	8,631	9,253	7.2	1,252	1,549	23.6
5	3,389	4,011	18.3	960	1,256	30.9
6	839	1,460	74.0	248	545	119.2

As indicated above, the addition of all construction traffic from the identified cumulative developments results in a worst-case increase of 189.4% at Location Reference 3.

The A897, which is of particular significance to this report sees an increase of 119.2%, however in practice this location will not see this increase as the A897 is utilised only as

an access road to the Site and would not be suitable for use as a main transport road by the developments highlighted above.

There is sufficient residual capacity on each of the roads within the Study Area to accommodate the predicted increase in traffic which may occur in the cumulative scenario.

The likelihood of all of the identified developments receiving planning consent which coincides with construction of the Development is considered low. In the event that a number of the identified developments are scheduled to be constructed simultaneously, it is assumed that the respective TMPs would be agreed in consultation to minimise disruption. For these reasons the impact is expected to be significantly lower than stated in Table 11.21.

The impact on traffic and transport due to cumulative effects is therefore minor and **not significant** in terms of the EIA Regulations.

11.8 SUMMARY OF EFFECTS

Table 11.22 provides a summary of the effects detailed within this chapter.

Table 11.22: Summary of Effects

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
Road network	Traffic Generation	Minor	N/A	Minor
Road network	Accidents and Safety	Negligible	N/A	Negligible
Pedestrians	Pedestrian Amenity	Moderate	As far as reasonably possible, deliveries should be scheduled outside of school opening and closing times; Drivers of all delivery vehicles to be made aware during induction of the presence of schools and emergency services within Thurso and also in the village of Reay	Minor
Road network	Driver Delay	Minor	N/A	Minor
Settlements along route	Severance	Negligible	N/A	Negligible
Road network and Settlements along route	Noise and Vibration	Minor	N/A	Minor
Road users and local residents	Hazardous Loads	Negligible	N/A	Negligible
Road users and local residents	Visual Effects	Negligible	N/A	Negligible
Locals along route	Air Quality	Negligible	N/A	Negligible
Road network	Cumulative Effects	Minor	In the event that a number of the identified	Minor

Receptor	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
			developments are scheduled to be constructed simultaneously, it is assumed that the respective TMPs would be agreed in consultation to minimise disruption.	
Operational Phase				
Road network	Operational Effects	Negligible	N/A	Negligible
Road network	Decommissioning Effects	N/A	Prior to decommissioning of the Development, a traffic assessment would be undertaken and appropriate traffic management procedures agreed with the relevant authorities at the time.	N/A

11.9 STATEMENT OF SIGNIFICANCE

Effects are considered to be significant for the purposes of the EIA Regulations where the effect is classified as being of 'major' or 'moderate' significance. A moderate effect was identified for pedestrian amenity at Pennyland Primary School. Mitigation measures were identified in Section 11.6 of this EIA Chapter and the residual effects following implementation of these mitigation measures are predicted to be low and thus **not significant** in terms of the EIA regulations.

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