Offshore Wind Power Limited

West of Orkney Windfarm Onshore EIA Report

Volume 1, Chapter 16 - Access, Traffic and Transport

WO1-WOW-CON-EV-RP-0096: Approved by S.Kerr
Document Control 25/10/2023

ASSIGNMENT L100632-S06

DOCUMENT L-100632-S06-A-ESIA-016

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West of Orkney Windfarm

REVISIONS & APPROVALS

REV	DATE	DESCRIPTION	ISSUED	CHECKED	APPROVED	CLIENT
A01	16/10/2023	Issued for Use	SYSTRA	LS	LS	OWPL
R01	31/05/2023	Issued for Review	SYSTRA	LS	LS	OWPL

CONTENTS

16 ACCESS, TRAFFIC AND TRANSPORT

Chapter summary

This chapter of the onshore Environmental Impact Assessment (EIA) Report assesses the potential effects from the onshore project on access, traffic and transport receptors. This includes direct, indirect, whole project assessment, cumulative, inter-related effects, inter-relationships and transboundary effects.

The baseline assessment identified the traffic flows in the study area, even on the A9 (trunk road) are low, and there are a number of Heavy Goods Vehicle (HGV) movements. This means that only small absolute increases in traffic as a result of the onshore Project will result in large percentage increases on individual road links in the study area.

The most sensitive locations in terms of traffic impacts are where roads pass through the more urban areas of Thurso and Halkirk, and on single-track roads where passing opportunities are limited.

The following impacts were identified as requiring assessment for a number of the road links within the study area:

- Construction and decommissioning:
  - Driver delay;
  - Accidents and safety;
  - Severance;
  - Pedestrian delay and amenity;
  - Dust and dirt; and
  - Wear and tear on road carriageway, verges and associated structures.

The largest traffic impacts are predicted to occur during the construction stage. The volume and pattern (temporal and spatial) of construction traffic has been calculated using a first principles approach, and with reference to the construction programme.

During construction, horizontal directional drilling (HDD) will be used to install the cable below the railway line, which means there will be no effect on the operation of the railway. OWPL are in consultation with Network Rail Scotland and this will continue throughout the Project.

The assessment has taken account of embedded mitigation measures for the assessment of potential effects, which in this case are the measures set out in the construction traffic management plan (CTMP) an outline of which has been provided alongside this onshore EIA report. The CTMP sets out embedded mitigation measures, which include a new scheme of passing places on single-track roads on construction routes. This will reduce traffic delays for a small number of local road users, and for construction vehicles using these routes.

No significant impacts to any access, traffic and transport receptors are predicted, either for the onshore project or cumulatively with other plans or developments during the construction stage. Due to low baseline traffic levels, the impact of additional development traffic was assessed as having a marginal effect on driver delay, pedestrian delay and amenity and severance. In terms of accidents and safety, it was calculated that the development would result in an overall increase of around 2.3 Personal Injury Accidents (PIA) as a result of the onshore Project construction, which is not considered to be significant. Standard on-site measures will ensure that dust and dirt effects on the public road network are minimised.

Pre- and post-construction roads conditions surveys will be undertaken along all of the construction routes (with the exception of the A9 and A836). These will identify any damage caused by construction vehicles and ensure that the developer is responsible for any repairs.

16.1 Introduction

This chapter of the Onshore Environmental Impact Assessment (EIA) Report presents the access, traffic and transport receptors of relevance to the onshore Project and assesses the potential impacts from the construction, operation and maintenance as well as decommissioning of the onshore Project on these receptors. Where required, mitigation is proposed, and the residual impacts and their significance are assessed. Potential cumulative and transboundary impacts are also considered.

Table 16-1 provides a list of all the supporting studies which relate to and should be read in conjunction with the access, traffic and transport impact assessment. All supporting studies are appended to this Onshore EIA Report and issued on the accompanying Universal Serial Bus (USB).

Table 16-1 Supporting studies

DETAILS OF STUDY	LOCATIONS OF SUPPORTING STUDY
Climate and Carbon Assessment	Onshore EIA Report, Supporting study (SS) 1: Climate and carbon assessment.
Traffic Survey Report	Onshore EIA Report, SS14: Traffic survey report.
Abnormal Loads Assessment (ALA)	Onshore EIA Report, SS15: Abnormal Loads Assessment (ALA).

The impact assessment presented herein draws upon information presented within other impact assessments within this Onshore EIA Report. Equally, the access, traffic and transport impact assessment also informs other impact assessments. This interaction between the impacts assessed within different topic-specific chapters on a receptor is defined as an 'inter-relationship'. The chapters and impacts related to the assessment of potential effects on access, traffic and transport are provided in Table 16-2.

Table 16-2 Access, traffic and transport inter-relationships

CHAPTER	IMPACT	DESCRIPTION
Terrestrial non-avian ecology (chapter 10, Onshore EIA Report)	Traffic generated by the onshore Project may cause impacts to terrestrial non-avian ecology receptors.	Considers the potential disturbance, injury or mortality effects on terrestrial non-avian ecology receptors from traffic associated with the onshore Project.
Terrestrial ornithology (chapter 11, Onshore EIA Report)	Traffic generated by the onshore Project may cause impacts to terrestrial ornithology receptors.	Considers the potential disturbance, injury or mortality effects on terrestrial ornithology receptors from traffic associated with the onshore Project.

CHAPTER	IMPACT	DESCRIPTION
Land use and other users, including forestry (chapter 12, Onshore EIA Report)	Traffic generated by the onshore Project may cause impacts upon infrastructure and other users.	Considers potential impacts on the North Coast 500 (NC500) which may have impacts upon tourism and recreation receptors.
Air Quality (chapter 14, Onshore EIA Report)	Particulates generated by construction traffic affects air quality in the vicinity of construction routes.	Considers the construction traffic-related impacts on local air quality.
Noise and vibration (chapter 15, Onshore EIA Report)	Noise generated by construction traffic.	Considers the noise generated by construction traffic.

The following specialists have contributed to the assessment:

- SYSTRA Ltd: provision of baseline description, input to traffic survey scope of works, impact assessment, Onshore EIA Report chapter, including ALA and traffic survey report write-up; and
- Nationwide Data Collection Ltd: undertook the traffic survey, as agreed with The Highland Council (THC).

16.2 Legislation, policy and guidance

Over and above the legislation presented in chapter 3: Planning policy and legislative context, the following legislation, policy and guidance are relevant to the assessment of impacts from the onshore Project on access, traffic and transport:

- Legislation:
  - Environmental Impact Assessment (Transport) (Scotland) Regulations 2019: these Regulations make minor updates to the Roads (Scotland) Act 1984, with regard to environmental impact assessment, and amend the Transport and Works (Scotland) Act 2007 to update out-of-date references to European Union (EU) law with references to the current EU equivalents. Finally, they make minor updates to the Transport and Works (Scotland) Act 2007 (Applications and Objections Procedure) Rules 2007 with reference to Regulation (EU) 2019/1010 on the alignment of reporting obligations in the field of legislation related to the environment.
- Policy:
  - National Planning Framework 4 (NPF4) (Scottish Government, 2023): sets out key national planning policies that form part of the statutory development plan. It also outlines key policy links with regards to land use and development of land in the north of Scotland and rural areas. Specific policies related to this chapter include: Policy 11 Energy and Policy 13 Sustainable transport;
  - National Transport Strategy 2 (NTS2) (Transport Scotland, 2020): sets out the Government's vision for Scotland's transport system for the next 20 years, for both people and freight. It recognises the different needs of cities, towns, remote and rural areas and islands;

  - The Highland-wide Local Development Plan (HwLDP) (The Highland Council (THC), 2012): sets out a strategy to support the growth of all communities across THC region. It seeks to enable sustainable Highland communities, safeguard the environment, support a competitive, sustainable and adaptable Highland. The specific policy relating to this chapter includes: Policy 67 Renewable energy developments; and
  - The Caithness and Sutherland Local Development Plan (CaSPlan) (THC, 2018a): guides future development in Highland, particularly in the Caithness and Sutherland area. Specific policies related to this chapter include: Environment and heritage, Caithness settlements – Halkirk, and Forss Business and Energy Park.
- Guidance:
  - Department for Transport (DfT) publication "Design Manual for Roads and Bridges" (DMRB) (DfT, 2023): the manual contains information about current design standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the United Kingdom;
  - Institute of Highways and Transportation (IHT) publications - "Guidelines for Traffic Impact Assessment" (IHT, 1998): set out each of the stages involved in the production of a Transport Assessment, and the requirements in terms of analysis and reporting;
  - Institute of Environmental Management and Assessment (IEMA) publication – "Environmental Assessment of Traffic and Movement (IEMA, 2023) ("the IEMA Guidelines"): sets out a systematic, consistent and comprehensive coverage of the assessment of traffic and movement impacts for a wide range of development projects. They are intended to complement the professional judgement and experience of trained assessors; and
  - THC "Roads and Transport Guidelines for New Developments" (RTGND) (THC, 2013): sets out the guidance and standards for the provision of transport infrastructure, including the design and construction of all new roads, associated with development proposals, within THC area. It includes sections on inspection procedures during construction, and the management of construction traffic, which covers the movement of abnormal loads and 'wear and tear' agreements.

16.3 Scoping and consultation

Stakeholder consultation has been ongoing throughout the EIA and has played an important part in ensuring that the scope of the baseline characterisation and impact assessment are appropriate with respect to the onshore Project and the requirements of the regulators and their advisors.

The Scoping Report was submitted to Scottish Ministers (via Marine Scotland - Licensing Operations Team (MS-LOT[1]) and THC on 1st March 2022, who then circulated the report to relevant consultees[2]. A Scoping Opinion was received from THC on 9th May 2022. Relevant comments from the Scoping Opinion specific to access, traffic and transport are provided in Table 16-4 below, which provides a response on how these comments have been addressed within the Onshore EIA Report. The Scoping Opinion includes reference to pre-application advice provided by THC which was received on the 10th February 2021. As such this advice has also been included.

[1] MS-LOT have since been renamed Marine Directorate - Licensing Operations Team (MD-LOT).

[2] The Scoping Report was also submitted to Orkney Islands Council (OIC), as the scoping exercise included consideration of power export to the Flotta Hydrogen Hub, however, this scope is not covered in this Onshore EIA Report and will be subject to a separate planning application to OIC.

Further consultation has been undertaken throughout the pre-application stage. Table 16-3 summarises the consultation activities carried out relevant to access, traffic and transport.

Table 16-3 Consultation activities for access, traffic and transport

CONSULTEE AND TYPE OF CONSULTATION	DATE	SUMMARY
THC Transport Planning / THC Roads and Infrastructure – meeting	21st July 2022	THC discussed lessons learned from previous projects including: • Eight-wheel lorries and high volumes of smaller vehicles tends to cause damage to roads; • Larger Heavy Goods Vehicles (HGVs) over 44 tonnes in weight are generally easier to manage as these require a permit; • More sporadic, higher volumes of lighter HGVs have been an issue, and are harder to manage and monitor. The Principal Contractor should be responsible and accountable for these movements; and • Laybys should be sufficient to allow two HGVs to pass. These points have been taken into consideration and in response to THC, suggested construction routes and estimated daily traffic volumes have been included in an outline Construction Traffic Management Plan (CTMP) which is provided alongside the Planning Permission in Principle (PPP) (Outline Management Plan (OMP) 2: Outline CTMP). It is understood that the Principal Contractor will have overall responsibility for managing and monitoring construction traffic, and will liaise with THC on a regular basis. The location and dimensions of laybys will be agreed with THC and constructed prior to commencement; these details will be provided as part of the final CTMP which will be developed post-consent.
Transport Scotland – meeting	9th April 2023	Relating to the A9 trunk road, TS indicated that if the access road to the onshore substation will be in place for more than 6 months then standard requirements, such as planning permission, will apply. A Road Safety Audit (RSA), and a Walking, Cycling and Horse-Riding Assessment (WCHAR) would also be required. Offshore Wind Power Limited (OWPL) note the comment from TS regarding a new onshore substation access road, however, the current preferred option is to use the existing access road. SYSTRA has prepared drawings showing an upgraded access junction from the A9 and these are provided in the Onshore EIA Report, SS15: Abnormal Loads Assessment (ALA). TS also indicated that for A9 accident information, data from TS should be used, rather than data from the Crashmap website. Both data sources have been used in this assessment, as described in section 16.4.4.2.
Network Rail Scotland – meeting	26th April 2023	An introduction to the Project was provided, including the need to undertake Horizontal Directional Drilling (HDD) under the railway line. The implications of such works at the railway line was discussed and it was agreed that disruption would be minimal due to the extent of use in the area and the fact it is single-track. Network Rail Scotland outlined the requirements for and prior to construction, including Network Rail Scotland standards that should be followed. The onshore Project will ensure to adhere to Network Rail Scotland requirements. The assessment of impacts from HDD activity under the railway line is undertaken in chapter 12: Land use and other users, including forestry.

Table 16-4 Comments from the Scoping Opinion relevant to access, traffic and transport

CONSULTEE	COMMENT	RESPONSE
THC	THC's Transport Planning Team have reviewed the content of the Scoping Report and respond to the questions in its response (attached for information) the response below relates to impacts on the local public road network in Highland. In summary, they are broadly content but further information is required in line with the pre-application advice previously provided. Please see the response attached to this letter for further information. Transport Scotland do not generally provide comment at this stage, but we recommend that you consult them direct on the likely impact on the trunk road network and the level of assessment they wish you to undertake.	Specific comments from THC and the response is provided below. TS has been consulted separately on the proposals as detailed above in Table 16-3.
THC	The content of the submitted Scoping Report is noted; however, our earlier pre-application consultation response, 21/04850/PREMAJ, essentially sets out the transport related requirements for any subsequent planning application. A further copy of that response is attached below for ease of reference.	The points raised by THC in their previous pre-application consultation response are included within the table below – they have essentially been treated as if they are part of 9th May 2022 scoping response.
THC	With regard to the submitted Scoping Report, 3.9.9 – Scoping Questions, we would respond as follows. • No objection in principle to the study area defined; however, the area may require to be expanded depending on sources of construction materials. • No objection in principle to the embedded mitigation measures proposed. The full extent of road mitigation/improvement measures will be dependent on the level of construction traffic generated and the nature and condition of the roads impacted. • Notwithstanding the comments above, no objection in principle to the receptors and impacts that have been identified. • Details of any other developments or infrastructure schemes to be considered in terms of cumulative impact should be obtained from the Planning service. • No objection in principle to operational impacts being scoped out of the EIA.	The access, traffic and transport study area covers all of the proposed construction routes and access points with the assessment of impacts provided in section 16.6. Full details of proposed mitigation measures are provided in Table 16-15 and in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP). The list of cumulative projects to be considered has been agreed in consultation with THC's Planning Service, and is set out in Section 16.7.

CONSULTEE	COMMENT	RESPONSE
THC	Transport Planning's interest will relate largely to the impact of the development on the local road network during the onshore construction phase. The impacts of development traffic may include; impact on road carriageway, verges and associated structures; and impact on road users and adjacent communities.	This chapter focuses on the impact on the strategic and local road network. Each of the impacts listed from construction traffic have been considered and are assessed in section 16.6.
THC	A short cable route between landfall and connection to the National Grid would of course help limit the impact of construction traffic; nevertheless, of the cable routes identified, all should be possible subject to appropriate road mitigation / improvement measures.	The location for connection of the Project to the National Grid was specified by National Grid. The routeing of construction traffic aims to make as much use of off-road tracks alongside the cable routes, rather than public roads, as possible, as discussed in the CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	It should be noted, however, that the roads to the west of Spittal and up towards Shebster are generally quite weak due to the underlying ground conditions. Roads in this area are likely to require major improvement works in order to accommodate significant construction traffic.	The proposals aim to restrict construction traffic to the most suitable roads, such as the A9 and A836, as much as possible, as discussed in section 16.6. There will also be a new scheme of passing places on single-track roads on construction routes as set out in the CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	Roads to the east of Thurso tend to be stronger and, therefore, less likely to fail due to significant increases in HGV traffic.	As discussed above, the proposals aim to restrict construction traffic to the most suitable roads, such as the A9 and A836, as much as possible, as discussed in section 16.6.
THC	Key to the interests of the Council will be the implementation of mitigation measures which shall ensure that, as far as reasonably possible, the safety of the local road network and the integrity of roads infrastructure will not be adversely affected by construction traffic.	Mitigation measures employed for the onshore Project will ensure, as far as reasonably possible, the safety of the local road network and integrity of the road infrastructure as detailed in Table 16-15 and set out in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).

CONSULTEE	COMMENT	RESPONSE
THC	A Transport Assessment (TA) for the project will be required.	It was agreed at the consultation meeting with THC held on 21st July 2022 that a stand-alone Transport Assessment (TA) would not be required. Instead, the TA is included in this chapter and provided alongside an ALA (Onshore EIA Report, SS15: ALA) and an outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	I encourage you to liaise directly with Transport Scotland on impacts on the Trunk Road network	Transport Scotland have been consulted on the proposals, as set out in in Table 16-3. SYSTRA has prepared drawings showing an upgraded access junction from the A9 and these are provided in the Onshore EIA Report, SS15: Abnormal Loads Assessment (ALA).
THC	The TA shall ideally include a construction programme for the full extent of the development and its component parts and set out the anticipated number and type of vehicles, including abnormal loads, that will be generated at each stage of construction.	An indicative construction programme has been included in Table 16-18. This sets out the expected number of vehicle trips generated during each stage of construction. An ALA is also provided in the Onshore EIA Report, SS15: ALA.
THC	A schedule of likely access and egress points to / from the adopted road network and a summary of predicted traffic generation at each will be required.	The schedule of likely access and egress points to / from the adopted road network and a summary of predicted traffic generation is included an outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	Taking account of expected equipment and material sources, the routes to site shall be clearly identified.	Proposed construction routes are identified in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP) and will be suitably signposted.
THC	The condition and suitability of each route shall be assessed in detail, and appropriate mitigation measures proposed. The full extent of any mitigation required shall be agreed through the CTMP referred to below.	Pre-commencement and post-construction Road Condition Surveys on each construction route is proposed within the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP). These condition surveys would cover all roads, apart from the A9 and A836.

CONSULTEE	COMMENT	RESPONSE
THC	THC Transport Planning will require any application for planning permission associated with this proposal to submit a Construction Traffic Management Plan (CTMP) for the approval of the Planning Authority. A CTMP will normally detail the following issues, however this is not an exhaustive list and the CTMP should be tailored to reflect the issues pertinent to this development: • Identification of all Council maintained roads likely to be affected by the various stages of the development. • Predicted volume, type and duration of construction traffic. • Location of site compound, staff parking and visitor parking. • Proposed measures to mitigate the impact of general construction traffic and abnormal loads on the local road network following detailed assessment of relevant roads. • Details of any traffic management signage required for the duration of the construction period. • Measures to ensure that all affected public roads are kept free of mud and debris arising from the development. • The developer may also be requested to enter into a Section 96 agreement with the Highland Council to cover any abnormal wear and tear to the Council roads. This will include a requirement for pre and post construction surveys to be undertaken and agreed with the Council and for the provision of a suitable bond. • If the development involves any abnormal loads a detailed protocol, route and delivery programme will be required and agreed with any interested parties such as Highland Council, the Police, Transport Scotland and community representatives. The protocol shall identify any requirement for convoy working and/or escorting of vehicles and include arrangements to provide advance notice of abnormal load movements in the local media.	The details required for a CTMP, as noted by THC, has been included in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).

CONSULTEE	COMMENT	RESPONSE
THC	Cumulative impact with any other developments in progress or committed shall be considered in the TA, the details of which should be obtained from the Council's planning service.	The list of cumulative projects to be considered has been agreed in consultation with THC's Planning Service, and is set out in section 16.7.
THC	A robust and comprehensive assessment of the potential traffic impacts of construction traffic will be expected.	An assessment of the potential impacts of construction traffic is presented within this chapter and within the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	Previous underground and overhead cable works in Caithness generated much more construction traffic than was originally indicated, resulting in the need for significant remedial works to roads infrastructure and consequential delays to the projects.	The road traffic estimates used in this chapter of the Onshore EIA Report have been calculated using robust assumptions, as detailed further in section 16.4.
THC	The removal of materials used in the construction of access tracks and haul roads was also problematic; in that much of the material was sold to third parties and uncontrolled haulage to various locations resulted in further damage to local roads.	It is expected that a significant proportion of the excavated material will be re-used on other construction sites within the onshore Project (e.g., as bunding for the onshore substation).
THC	Construction traffic during the works will require to be closely monitored and controlled.	The outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP) provides further details of the controls which will be in place.
THC	Early contact with the local Roads Operations Manager is strongly recommended regarding the general condition of the local road network, any restrictions that will apply, and the scale and detail of mitigation measures require.	Consultation has been undertaken with the Roads Operations Manager, and pre-commencement condition surveys are proposed.
THC	Similarly, early consultation with the Council's Structures Section is recommended regarding any Council maintained structures that may be affected.	THC's Structures Section has provided input through the consultation process.

CONSULTEE	COMMENT	RESPONSE
THC	The TA should be prepared in accordance with the Transport Scotland document, Transport Assessment Guidance.	It was agreed at the consultation meeting with THC held on 21st July 2022 that a stand-alone Transport Assessment (TA) would not be required. Instead, the TA is included in this chapter and provided alongside an ALA (Onshore EIA Report, SS15: ALA) and an outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	Prior to preparation of the TA, the Applicant shall undertake a scoping exercise in consultation with the Council's Transport Planning team and Transport Scotland.	A scoping exercise has been undertaken with both THC and TS. The advice from the Scoping Opinion is detailed within this table.
THC	Mitigation required may include; new or improved infrastructure, road safety measures and traffic management.	Mitigation measures employed for the onshore Project will ensure, as far as reasonably possible, the safety of the local road network and integrity of the road infrastructure as detailed in Table 16-15 and set out in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	The proposals for any new or improved access onto the public road network shall be provided on suitable dimensioned drawings and include details of junction radii, surfacing and drainage as well as the required visibility splays. Any access required shall satisfy the requirements of the Council's Roads and Transport Guidelines for New Developments document.	Where access locations have been confirmed, suitable drawings have been provided. SYSTRA has prepared drawings showing an upgraded access junction from the A9 and these are provided in the Onshore EIA Report, SS15: Abnormal Loads Assessment (ALA). Following detailed design post-consent, where further detail on access locations is known and identified the appropriate drawings, will be provided.
THC	A Framework Construction Traffic Management Plan (CTMP) shall be included within any subsequent planning submission. The framework shall set out appropriate mitigation measures, including measures to ensure that development traffic adheres to approved routes and avoids conflict with peaks in local traffic movements.	The details required for a CTMP, as noted by THC, has been included in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).
THC	Prior to commencement of the works the framework shall be developed into a detailed operational CTMP in consultation and agreement with the Council's Roads Operations Manager.	The outline CTMP which is provided alongside the PPP application (OMP2: Outline CTMP) will be finalised post-consent in consultation with THC.

CONSULTEE	COMMENT	RESPONSE
THC	Consultation with other stakeholders is likely to be required regarding the detailed content and implementation of the CTMP.	In addition to consultation with THC, Transport Scotland has been consulted, as detailed in Table 16-3. Other stakeholders will be consulted as part of the finalisation of the CTMP, which will take place post-consent and prior to commencement of consultation.
THC	Notwithstanding the above requirements, there will remain a risk of damage to Council maintained roads from development related traffic. To protect the interests of the Council, as roads authority, a suitable agreement relating to Section 96 of the Roads (Scotland) Act will be necessary. The agreement will require pre and post condition surveys of affected roads and include the provision of an appropriate Road Bond or similar security.	A section 96 agreement will be undertaken with THC post-consent, prior to construction. Pre-commencement and post-construction Road Condition Surveys on each construction route is proposed within the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP). These condition surveys would cover all roads, apart from the A9 and A836.
THC	The agreement shall take account of any nearby developments that might progress concurrent with the proposed development and provide, as necessary, a mechanism for apportionment of costs between respective developers.	It is expected that a suitable agreement will be required to ensure that any restoration costs are fairly apportioned, and this will be discussed post-consent.

16.4 Baseline characterisation

This section outlines the current baseline for access, traffic and transport within the access, traffic and transport onshore study area.

The baseline characterisation has been identified through a combination of desk-based research to identify the available routes and their standard, and further on-site Automatic Traffic Counter (ATC) surveys to calculate the current and future baseline traffic flows to understand the current operation of the network and to identify capacities of the surrounding road network.

16.4.1 Study area

The access, traffic and transport onshore study area (hereafter referred to as the study area) comprises the public road network that will be used by development traffic during the construction and operational stages of the development, as shown on Figure 16-1. The following road links are included within the study area:

- The A836 between Lybster and Burnside A9 junction;
- The A9 between Scottish and Southern Electricity (SSE) Spittal Converter Station and the Burnside A836 junction;
- The U1871 between the B874 in Halkirk and the B870 to the west;
- The U2052 between the Hallam Burn four-arm junction and the A836;
- The U2090 between St Mary's Chapel Car Park and the A836;
- The U2105 between the A836 and C1001;
- The U2110 between Lythmore and Forss Water;
- The C1001 between the U2105 junction and the B874 junction;
- The B874 between the A9 in central Thurso, and the A9 Roadside junction;
- The B870 between the B874 and the C1018;
- The C1018 between the Harpsdale Fishery Park and the B874 junction in Halkirk; and
- The C1014 between the A9 and C1018 junctions.

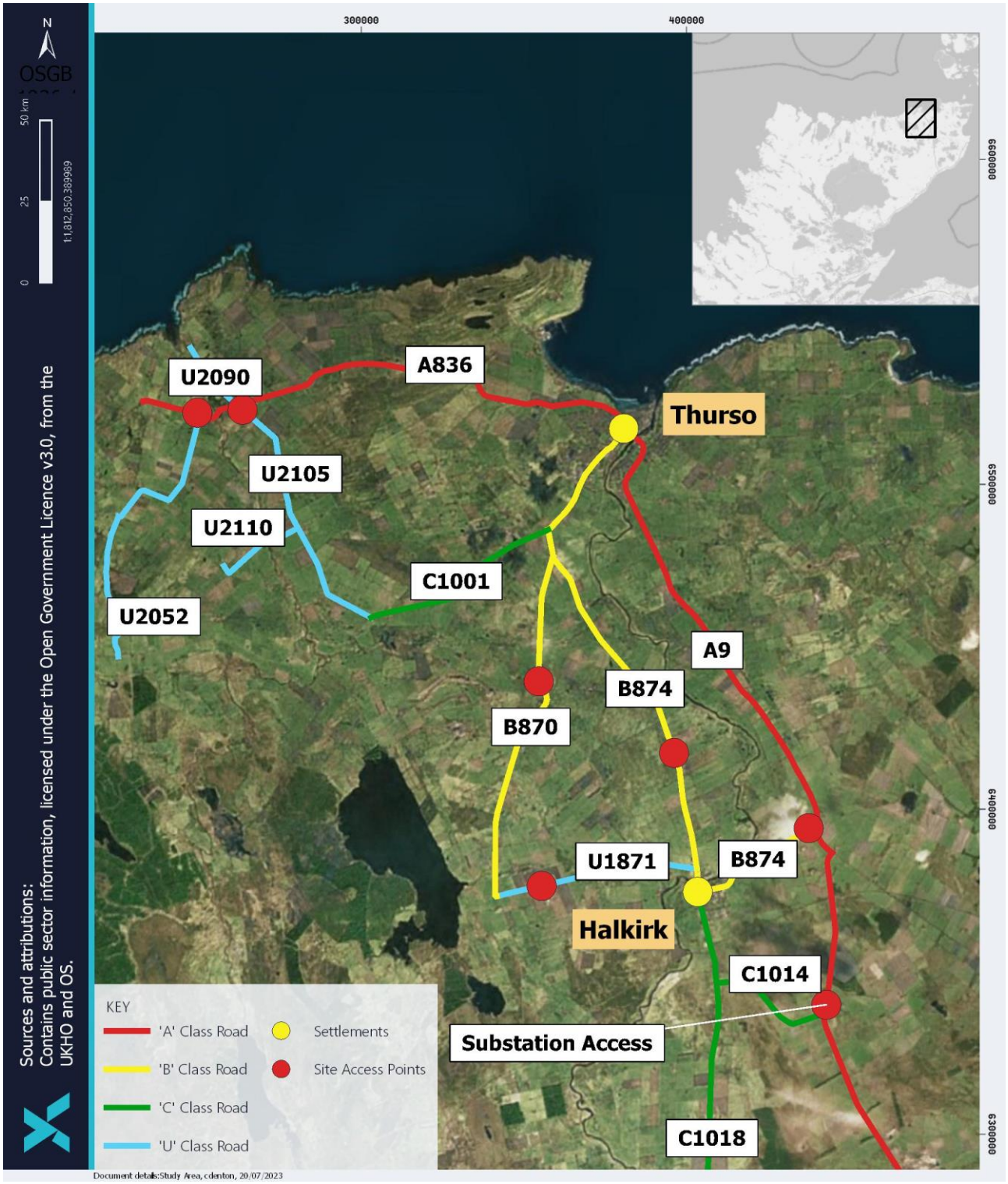


Figure 16-1 Access, traffic and transport onshore study area

16.4.2 Data sources

A review was undertaken of the key literature and data relevant to this assessment relating to access, traffic and transport and was used to give an overview of the existing baseline. The main data sources used in the preparation of this chapter are listed below in Table 16-5. Any other sources used are referenced in the text.

Table 16-5 Summary of key datasets and reports

TITLE	SOURCE	YEAR	AUTHOR
Accident Data (Local road network)	www.crashmap.co.uk,	2023	Crash Map
Accident Data (Trunk Road network)	Transport Scotland Road's Directorate	2023	Transport Scotland
Cogle Moss Windfarm Environmental Statement, Appendix 15: Access, Traffic and Transport	https://her.highland.gov.uk/api/LibraryLinkWebServiceProxy/FetchResource/298403/full_298403.pdf	2015	Cogle Moss Renewables LLP
Construction Traffic Estimates	OWPL	2023	OWPL
Dounreay Tri Onshore Substation Environmental Statement, Appendix 28.1: Traffic Statement	https://wam.highland.gov.uk/wam/ Application Ref: 21/03686/S42	2016	Dounreay Tri Ltd
Electricity Supply Board (ESB) Spittal Synchronous Compensator Environmental Report	https://wam.highland.gov.uk/wam/ Application Ref: 20/05118/FUL	2020	ESB Asset Development (UK) Ltd
Forss Windfarm Extension EIA Report Environmental Statement, Chapter 15: Traffic and Transport	https://wam.highland.gov.uk/wam/ Application Ref: 20/04455/FUL	2020	Abbey Properties Cambridgeshire Ltd
Kirkton Energy Park EIA Report Volume 2, Chapter 12. Site Access, Traffic and Transport	Scottish Government - Energy Consents Unit Application Ref: ECU00003244	2023	SLR
Level Crossing Data	https://www.networkrail.co.uk/communities/safety-in-the-community/level-crossing-safety/active-level-crossings/	2023	Network Rail Scotland

TITLE	SOURCE	YEAR	AUTHOR
Limekiln Windfarm Extension **Environmental Statement, Chapter 7: Traffic and Transport**	https://wam.highland.gov.uk/wam/ Application Ref: 20/01905/S36	2020	Infinergy
Melvich Wind Energy Hub, Appendix 11.1 – Transport Assessment	Scottish Government - Energy Consents Unit Application Ref: ECU00004514	2023	Pell Frischmann
Pentland Floating Offshore Windfarm Onshore Substation Environmental Statement, Chapter 14: Traffic and Transport	https://wam.highland.gov.uk/wam/ Application Ref: 22/04722/PIP	2022	Highland Wind Limited
Traffic Count Data for A9 in Thurso	Road traffic statistics - Manual count point: 40956 (dft.gov.uk)	2022	Department for Transport

16.4.3 Project site-specific surveys

Automatic Traffic Counter (ATC) surveys on each of the road links shown in Figure 16-1 were undertaken by Nationwide Data Collection Ltd in November 2022 (see Onshore EIA Report, SS14: Traffic survey report). These were used to identify baseline traffic flows in the study area.

16.4.4 Existing baseline

A review of literature and available data sources, augmented by consultation and Project site-specific surveys has been undertaken to describe the current baseline environment for access, traffic and transport.

The following section provides a description of each of the road links within the study area and presents the results of the 2022 traffic survey in relation to baseline traffic flow levels. It should be read in conjunction with Onshore EIA Report, SS14: Traffic survey report and Figure 16-1.

The A9(T) is a single-carriageway trunk road that runs north from Inverness to Mybster in the south of the study area, passes to the east of Halkirk, runs through the town of Thurso, and terminates at Scrabster. As a trunk road, the A9 is designed to carry higher volumes of traffic, and a higher percentage of HGVs than local roads. Outside of urban areas it has a speed limit of 60 miles per hour (mph), within Thurso the A9 has a 30 mph speed limit.

The A836 is a single-carriageway road, suitable for two-way traffic, that runs in a westerly direction from the A9(T) to the north of Thurso. The route heads west and generally follows the north coast passing through Forss, Lybster, Reay and Tongue. At Tongue, the route turns south and runs to Lairg and eventually meets the A9 just south of the Dornoch Bridge. Within the Thurso urban area, the A836 has a speed limit of 30 mph, which rises to 60 mph to the west of the Wolfburn Distillery.

The A9 and A836 form part of the NC500, approximately 500 miles of scenic route which circles the east, north and west coasts of the north of Scotland, and starts and finishes in Inverness. This contributes to increased traffic flows on these routes, particularly in the summer months.

The B874 is a single carriageway road, suitable for two-way traffic, which runs north-south, parallel with, and to the west of the A9(T). It commences in Thurso and runs south, passing through the small settlement of Halkirk before re-joining the A9(T) to the east of the village. Within both settlements, it has a speed limit of 30 mph but is subject to a 60 mph limit in other locations. Between Halkirk and the A9, the B874 crosses over a rail line, where an Automatic Half Barrier Level Crossing is in operation (see Section 16.4.4.3).

The B870 is a single-track road, with regular passing places, that runs in a south-westerly direction from the B874, to meet the U1871 to the west of Halkirk. It has a speed limit of 60 mph, and passes through a rural area, providing access to isolated farms and steadings.

The C1018 runs south from the centre of Halkirk. Within the village it has a speed limit of 30 mph, which rises to 60 mph to the south of the level crossing on the southern edge of the village. Between the centre of Halkirk and the C1014 junction, the C1018 is a single-carriageway road that is suitable for two-way traffic. To the south of the C1018 junction, it becomes a single-track road with passing places.

The C1014 links the C1018 to the A9 to the east. It is a single-track road, with occasional passing places, and has a speed limit of 60 mph.

The C1001 continues west from the B874, and is a single-carriageway road that is suitable for two-way traffic. It has a speed limit of 60 mph.

The U2105, U2110, U2052, U1871 and U2090 are all single-track, minor roads that provide access to isolated farms and steadings. The U2090 runs north from the A836 and provides access to the potential landfall point near St Mary's Chapel (Crosskirk landfall option).

16.4.4.1 Baseline traffic flows

Baseline traffic flows were obtained from a series of traffic counts that were undertaken in November 2022, and are presented in the Onshore EIA Report, SS14: Traffic survey report.

ATCs were in place at the 16 locations indicated by Figure 16-2 between Sunday 6th November and Saturday 12th November 2022. The ATCs recorded classified traffic volumes and speeds. Results were recorded in hourly bins and by direction. Recorded traffic flows at each location are presented in Table 16-6.

The baseline traffic flows indicate that current traffic levels on all of the roads within the study area are low, apart from in the centre of Thurso. This includes both strategic and main roads (A9, A836, B874 and B780), and the minor road network. The maximum recorded Average Annual Daily Flow (AADF) outside of Thurso was 3,516 vehicles on the A9 between Roadside and Sordale. Within Thurso, the recorded AADF on the A9 was 12,193 vehicles.

HGVs currently comprise a low percentage of the overall traffic flows, ranging from less than 1% on the minor road network to a maximum of 4.1% on the A9.

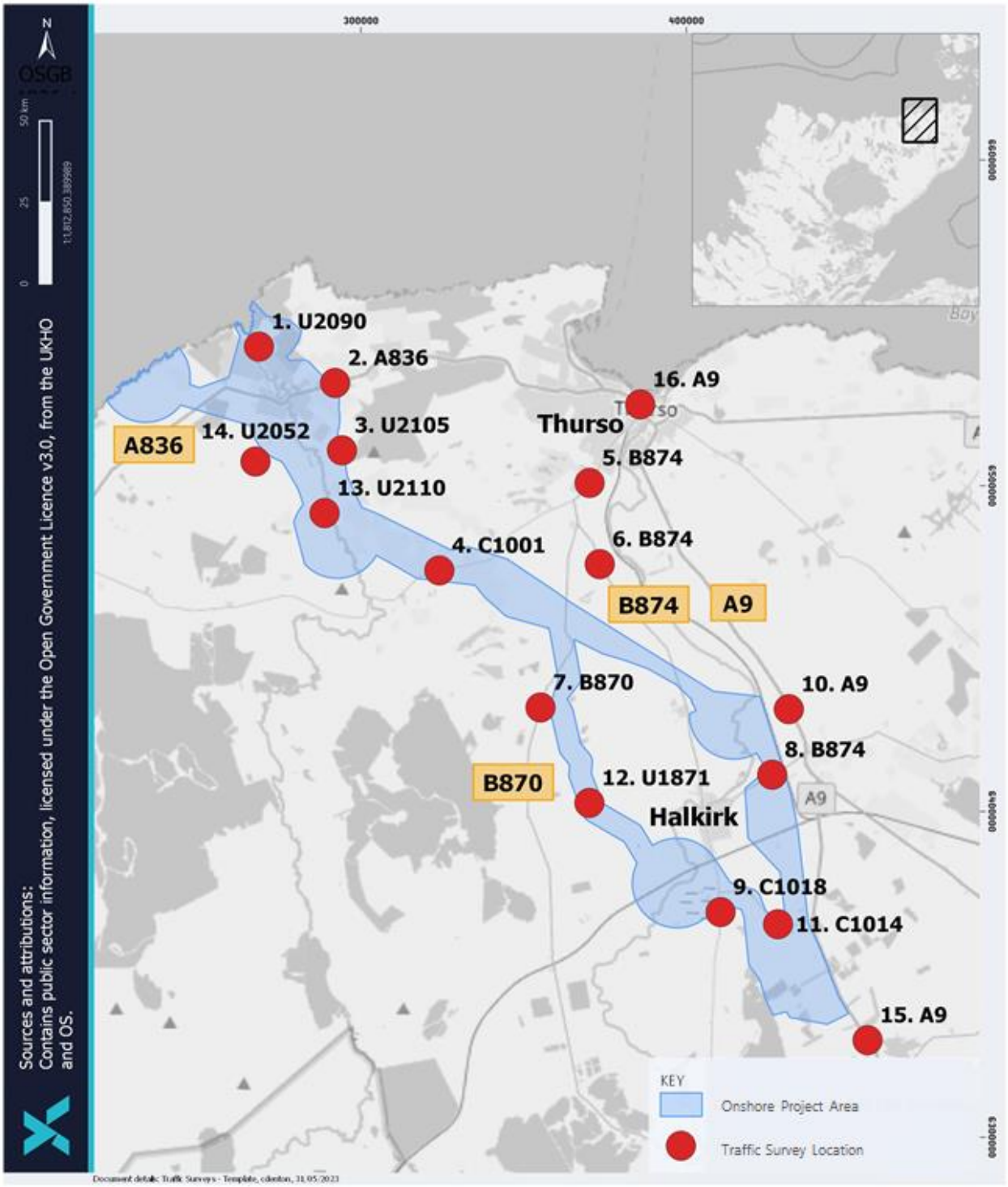


Figure 16-2 Traffic survey locations and AADF (two-way) in the study area

Table 16-6 ATC locations and baseline 2022 traffic flows in the study area

LINK REF	ROAD LINK	2022 BASELINE AVERAGE ANNUAL DAILY FLOW (AADF) (5-DAY AVERAGE)	2022 BASELINE HGV (5-DAY AVERAGE)	HGV %
1	U2090 north of A836	25	0	0%
2	A836 west of Thurso	2,512	15	0.6%
3	U2105 between A836 and C1001	155	0	0%
4	C1001 between B874 and U2105	1,294	17	1.3%
5	B874 between A9 and C1001	3,036	21	0.7%
6	B874 between C1001 and Halkirk	1,473	12	0.8%
7	B780 between B874 and U1871	158	1	0.6%
8	B874 between Halkirk and Roadside	1,347	11	0.8%
9	C1018 south of C1014	544	8	1.4%
10	A9 between Roadside and Thurso	3,516	93	2.6%
11	C1014 south of A825	364	5	1.4%
12	U1871 between B871 and B870	182	3	1.6%
13	U2010 west of U2015	28	0	0%
14	U2052 south of B836	84	1	1.2%
15	A9 south of C1014	1,485	61	4.1%
16	A9 within Thurso (between A836 and Princess St)	12,193	266	2.2%

16.4.4.2 Accident statistics

Accident data has been obtained from two sources:

- Trunk Road accident data (A9) have been obtained from Transport Scotland's Roads Directorate team. This has been obtained for the latest available 5-year period, between January 2018 and January 2023; and
- Accident data on the local road network has been obtained from the CrashMap database. The CrashMap website is an online resource that provides details of the location, date and severity of reported road personal injury accidents on UK roads. The severity of accidents is recorded as either 'Slight', 'Serious' or 'Fatal', and is determined by the severity of the injury to the most severely injured casualty. Data was obtained for the period 2017-2021, which is the latest 5-year period available.

A fatal accident is an accident in which at least one person is fatally injured. A serious accident is one in which at least one person is seriously injured, but no-one suffers a fatal injury. A slight accident is one in which at least one person suffers slight injuries, but no-one is seriously injured, or fatally injured.

Table 16-7 and Table 16-8 provides details of the accidental statistics with additional commentary added where any serious accidents or fatalities have occurred.

Table 16-7 Accident statistics (Crashmap; 2017 – 2021)

LINK REF	ROAD LINK	SLIGHT	SERIOUS	FATAL	COMMENT
1	U2090 north of A836	-	-	-	N/A.
2	A836 west of Thurso	5	-	2	A fatal accident occurred in 2018 on the bridge over Forss Water, and another fatal accident occurred in 2021 to the west of the junction with the U2090.
3	U2105 between A836 and C1001	-	-	-	N/A.
4	C1001 between B874 and U2105	1	-	-	N/A.
5	B874 between A9 and C1001	4	-	-	N/A.
6	B874 between C1001 and Halkirk	1	-	-	N/A.
7	B780 between B874 and U1871	-	-	-	N/A.

LINK REF	ROAD LINK	SLIGHT	SERIOUS	FATAL	COMMENT
8	B874 east of Halkirk	-	-	-	N/A.
9	C1018 south of C1014	8	1	-	A serious accident occurred in 2018 to the east of the junction with the B874 at Roadside.
11	C1014 south of A825	-	-	-	N/A.
12	U1871 between B871 and B870	-	-	-	N/A.
13	U2010 west of U2015	-	-	-	N/A.
14	U2052 south of B836	2	-	-	N/A.
	TOTAL	21	1	2	

Table 16-8 Accident statistics (Transport Scotland; 2018 – 2023)

LINK REF	ROAD LINK	SLIGHT	SERIOUS	FATAL	COMMENT
10	A9 between Roadside and Thurso	6	1	-	A serious accident occurred at the A9 / B874 junction, involving two vehicles, and resulting in two casualties.
15	A9 south of C1014	2	-	-	N/A.
16	A9 between Millbank Road and A836 in Thurso	1	-	-	N/A.
	TOTAL	9	1	-	

Table 16-7 and Table 16-8 indicates that a total of 34 accidents have occurred, 30 of slight severity, two of serious severity, and two of which were fatal, over a period of six years. It is noted that both fatal accidents occurred a short distance away from each other on the A836, by the bridge over Forss Water, and at the junction with U2090, approximately 400 metres (m) apart.

Measures to reduce the chance of accidents are addressed within the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP), and the potential effect of construction traffic on accidents and safety is assessed within section 16.6.

16.4.4.3 Railway lines

There are two Network Rail Scotland railway lines within the study area. The Wick to Thurso line runs north to south to the west of the A9 and carries 16 trains per day. This line overlaps the onshore Project area and crosses the B874 to the east of Halkirk, where an Automatic Half Barrier Level Crossing is in operation. The line speed is 40 mph.

The second line branches off the main Wick to Thurso Line at the Georgemas junction and runs west towards Scotscalder and is located outwith the eastern boundary of the onshore Project area. It crosses the C1018 to the south of Halkirk, where an Automatic Half Barrier Level Crossing is in operation (which is also outside of the Project area). Ten trains per day cross the crossing. The line speed is 50 mph.

Construction traffic using the C1018 will use the level crossing to cross the rail line. This will not affect the normal operation of the level crossing, or the train services that use the line.

During construction, the onshore export cable route will pass underneath the rail line to the south of Halkirk. A trenchless cable technique (e.g., HDD) will be used to install the onshore export cable at a suitable depth below the rail line, which will not have an effect on the operation of the railway.

Consultation with Network Rail Scotland has started and will continue throughout the Project. The Project will adhere to all necessary processes and procedures ahead of construction. Taken these factors into account, the impact on rail lines from the onshore Project is not considered further within this Onshore EIA Report chapter.

16.4.4.4 Ports

There are no ports within the study area, so general construction traffic will have no impact on the operation of the nearest ports. Scrabster harbour is located 3.2 km to the north of Thurso and is accessed directly from the A9. The harbour may be used for the delivery of abnormal loads, such as transformers, which would be delivered via the A9 to the onshore substation site. It is also possible that other abnormal loads will be delivered from Wick Harbour, via the A99 and A9. See Onshore EIA Report, SS15: ALA for further information on abnormal loads.

The movements of abnormal loads will be agreed and managed through the standard abnormal loads procedure, involving THC, TS and Police Scotland. Appropriate mitigation measures will be put in place for each movement and this is detailed in the Onshore EIA Report, SS15: ALA.

Taking these factors into account, the impact on ports is not considered further within this Onshore EIA Report chapter.

16.4.5 Future baseline

It is important to note that the future baseline is a projection, with a range of possible future conditions, and it is subject to uncertainty associated with the available projections. Across the lifetime of the Project, it is considered highly likely that the future baseline will be broadly comparable to the existing baseline described above.

The National Road Traffic Forecast (NRTF) 'central growth' rate has been applied to the 2022 baseline data for all of the roads within the study area to factor the data up to 2027 (expected opening year of construction). This equates to a factor of 1.046 (see Table 16-9).

Table 16-9 Baseline 2027 traffic flows

LINK REF	ROAD LINK	2027 BASELINE AADF (5-DAY AVERAGE)	2027 BASELINE HGV (5-DAY AVERAGE)	HGV %
1	U2090 north of A836	26	0	0%
2	A836 west of Thurso	2,628	16	0.6%
3	U2105 between A836 and C1001	162	0	0%
4	C1001 between B874 and U2105	1,354	18	1.3%
5	B874 between A9 and C1001	3,176	22	0.7%
6	B874 between C1001 and Halkirk	1,541	13	0.8%
7	B780 between B874 and U1871	165	1	0.6%
8	B874 between Halkirk and Roadside	1,409	12	0.8%
9	C1018 south of C1014	569	8	1.5%
10	A9 between Roadside and Thurso	3,678	97	2.6%
11	C1014 south of A825	381	5	1.4%

LINK REF	ROAD LINK	2027 BASELINE AADF (5-DAY AVERAGE)	2027 BASELINE HGV (5-DAY AVERAGE)	HGV %
12	U1871 between B871 and B870	190	3	1.6%
13	U2010 west of U2015	29	0	0%
14	U2052 south of B836	88	1	1.2%
15	A9 south of C1014	1,553	64	4.1%
16	A9 within Thurso (between A836 and Princess St)	12,754	278	2.2%

As presented in Table 16-9, future baseline traffic flows and patterns are therefore expected to be very similar to the 2022 baseline.

16.4.6 Summary and key issues

Table 16-10 summarises the key findings from the baseline review.

Table 16-10 Summary and key issues for access, traffic and transport

	ONSHORE STUDY AREA
SUMMARY AND KEY ISSUES	• The baseline traffic flows indicate that current traffic levels on all of the roads within the study area, outside of Thurso, are low. This includes both strategic and main roads (A9, A836, B874 and B780), and the minor road network. The maximum recorded AADF was 3,516 vehicles on the A9 between Roadside and Sordale. This means that small absolute increases in traffic will result in large percentage increases. Within Thurso, the recorded AADF was 12,193 vehicles; • HGVs currently comprise a low percentage of the overall traffic flows, ranging from less than 1% on the minor road network to a maximum of 4.1% on the A9. This means that only small absolute increases in the number of HGVs will result in large percentage increases; • The majority of the minor road network, and some of the 'B' road network comprises single-track roads with passing places, that are not currently suitable for HGV construction traffic. This means that on these road links there are currently few locations where two-way traffic can pass efficiently; • Accident analysis identifies a low number of accidents across the study area although two fatalities have occurred on the A836 (2017 – 2023); and • The impact of traffic on the two main settlements of Thurso and Halkirk will be key issues, as will traffic impact on minor rural roads that currently provide access to scattered steadings and farms.

16.4.7 Data limitations and uncertainties

There are not considered to be any data limitations in the information that has been used to assess baseline conditions in the study area.

The main uncertainties in terms of the overall access, traffic and transport assessment are:

- The assumptions that have necessarily had to be made in the calculation of traffic during the construction stage, primarily relating to material volumes and quantities, and how the overall construction programme will be implemented. Wherever possible, conservative estimates have been provided, as set out in the description of the assessed 'worst case scenario'. The assessment provided in this chapter is therefore reliant to a degree on an estimation of construction traffic based on professional knowledge of other developments of the proposed scale; and
- Within the cumulative assessment, where there is uncertainty relating to exactly when nearby developments will be constructed, the cumulative assessment robustly assumes that cumulative developments will be constructed at the same time as the peak traffic period for the onshore Project.

16.5 Impact assessment methodology

16.5.1 Impacts requiring assessment

The impacts identified as requiring consideration for access, traffic and transport are listed in Table 16-11. Information on the nature of impact (i.e. direct or indirect) is also described.

The text in brackets refers to the relevant impacts as set out in the IEMA guidance (IEMA, 1993) and shows how they relate to the potential impacts as described below.

Table 16-11 Impacts requiring assessment for access, traffic and transport

POTENTIAL IMPACT	NATURE OF IMPACT
Construction and decommissioning*	
Temporary impacts on road users as a result of the increased generation of traffic (Driver delay, dust and dirt)	Direct
Temporary impact on road safety as a result of the generation of increased traffic (Accidents and safety)	Direct
Temporary impacts on the local community	Direct

POTENTIAL IMPACT	NATURE OF IMPACT
(Severance, pedestrian delay and amenity, dust and dirt)	
Temporary impact on road carriageway, verges and associated structures	Direct

**** In the absence of detailed information regarding decommissioning works, and unless otherwise stated, the impacts during the decommissioning of the onshore Project considered analogous with, or likely less than, those of the construction stage. Where this is not the case, decommissioning impacts have been listed separately and have been assessed in section 16.6.2.***

16.5.2 Impacts scoped out of the assessment

The impacts scoped out of the assessment during EIA scoping, and the justification for this, are listed in Table 16-12.

Table 16-12 Impacts scoped out for access, traffic and transport

IMPACT SCOPED OUT	JUSTIFICATION
Operation and maintenance	
All operational and maintenance impacts	Operational traffic flows are expected to be minimal and related to regular maintenance trips to the onshore substation and along the onshore export cable route corridor. THC's Transport Planning Pre-Application Consultation (21/04850/PREMAJ, May 2022) noted that there was no objection to the assessment of operational traffic being scoped out of the Onshore EIA Report.

16.5.3 Access, traffic and transport assessment methodology

16.5.3.1 Overview

An assessment of potential impacts has been undertaken for the construction stage. The criteria for the assessment for access, traffic and transport differ slightly from those set out in chapter 7: EIA methodology. The road links to be assessed are first identified through a screening process, which is as set out in the IEMA guidance, "Guidelines for the Environmental Assessment of Road Traffic" (IEMA, 1993), following which a detailed assessment of road links where identified thresholds are breached is undertaken.

16.5.3.2 Initial screening

An initial screening exercise was undertaken to identify routes where an adverse effect could potentially occur. The IEMA guidance (2023) suggests that in order to determine the scale and extent of the assessment, and the level of impact the development would have on the surrounding road network, the following two 'rules' should be followed:

- Rule 1 – include highway links where flows are predicted to increase by more than 30% where the number of HGVs is predicted to increase by more than 30%; and
- Rule 2 – include any other specifically sensitive area where traffic flows are predicted to increase by 10% or more.

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

16.5.3.3 Full assessment

Following this initial screening exercise, an assessment of the potential environmental effects associated with the increased traffic levels on the identified road links is undertaken as per the principles set out in chapter 7: EIA methodology.

The sensitivity of the receptors is combined with the magnitude of effect to determine the impact significance. Topic-specific sensitivity and magnitude criteria are assigned based on professional judgement, as described in Table 16-13 and Table 16-14.

Table 16-13 Sensitivity criteria

SENSITIVITY OF RECEPTOR	DEFINITION
High	The receptor / resource has little capacity to accommodate a particular effect without fundamentally altering its present character, and/or is of international or national importance. This could include: • Minor roads which are unsuitable for HGV traffic, and which provide the sole means of access to properties; • Roads that pass community receptors such as schools, colleges, hospitals; • Roads that contain accident hotspots; and/or • Roads / junctions that are close to capacity at present.
Medium	The receptor / resource has low capacity to accommodate a particular effect without significantly altering its present character, or is of high importance. This could include: • Two-way roads which are not particularly suitable for HGV traffic, and which provide key routes between settlements.
Low	The receptor / resource has some capacity to accommodate a particular effect without detriment to its character and/or is of low local importance. This could include: • Sections of trunk road that are designed to accommodate higher levels of traffic, and higher percentages of HGV traffic, and are not located within urban areas; and/or • Roads / junctions that are not close to capacity at present.

SENSITIVITY OF RECEPTOR	DEFINITION
Negligible	Receptor is generally tolerant and can accommodate a particular effect without the need to recover or adapt. This could include: • Sections of inter-urban trunk roads that are not close to capacity, and designed to accommodate high levels of traffic, and higher percentages of HGV traffic.

Table 16-14 Magnitude criteria

MAGNITUDE CRITERIA	DEFINITION
High	• Total change or major alteration to key elements / features of the baseline conditions; • Impact occurs over a large scale or spatial geographical extent and/or is long-term or permanent in nature; and • Generally, a >70% change in traffic is considered to be a high magnitude.
Medium	• Partial change or alteration to one or more key elements / features of the baseline conditions; • Impact occurs over a medium scale / spatial extent and/or has a medium-term duration; and • Generally, a 40% - 70% change in traffic is considered to be a medium magnitude.
Low	• Minor shift away from the baseline conditions; • Impact occurs over a local to medium scale / spatial extent and/or has a short to medium-term duration; and • Generally, a 10% - 40% change in traffic is considered to be a low magnitude.
Negligible	• Very slight change from baseline conditions; • Impact is highly localised and short term with full rapid recovery expected to result in very slight or imperceptible changes to baseline conditions or receptor population; and • Generally, a rule of <10% change in traffic is considered to be a negligible magnitude.

Many of the roads within the study area are minor roads with very low AADF. Where traffic flows on existing roads are less than 200 AADF, then even small increases in construction traffic will result in large percentage increases in AADF. In these instances, the magnitude of change has been ascribed as follows:

- Absolute increase in AADF <200 = Negligible change;
- Absolute increase in AADF >200 and <400 = Low change;
- Absolute increase in AADF >400 and <600 = Medium change; and
- Absolute increase in AADF >600 = High change.

The consequence and significance of effect is then determined using the matrix provided in chapter 7: EIA methodology.

16.5.4 Embedded mitigation

As described in chapter 7: EIA methodology, certain measures have been adopted as part of the onshore Project development process in order to reduce the potential for impacts to the environment, as presented in Table 16-15. These have been accounted for in the assessment presented below. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on access, traffic and transport.

In accordance with the onshore PPP application, the embedded mitigations listed below have been attributed to particular Development Zones within the onshore Project area. These are detailed in Table 16-15 and shown in Figure 16-3.

16.5.5 Worst case scenario

As detailed in chapter 7: EIA methodology, this assessment considers the worst case scenario for the onshore Project parameters which are predicted to result in the greatest environmental impact, known as the 'worst case scenario'. The worst case scenario represents, for any given receptor and potential impact on that receptor that which would result in the greatest potential for change.

Given that the worst case scenario is based on the design option (or combination of options) that represents the greatest potential for change, the development of any alternative options within the design parameters will give rise to no worse effects than those assessed in this impact assessment. Table 16-16 presents the worst case scenario for potential impacts on access, traffic and transport during construction and decommissioning.

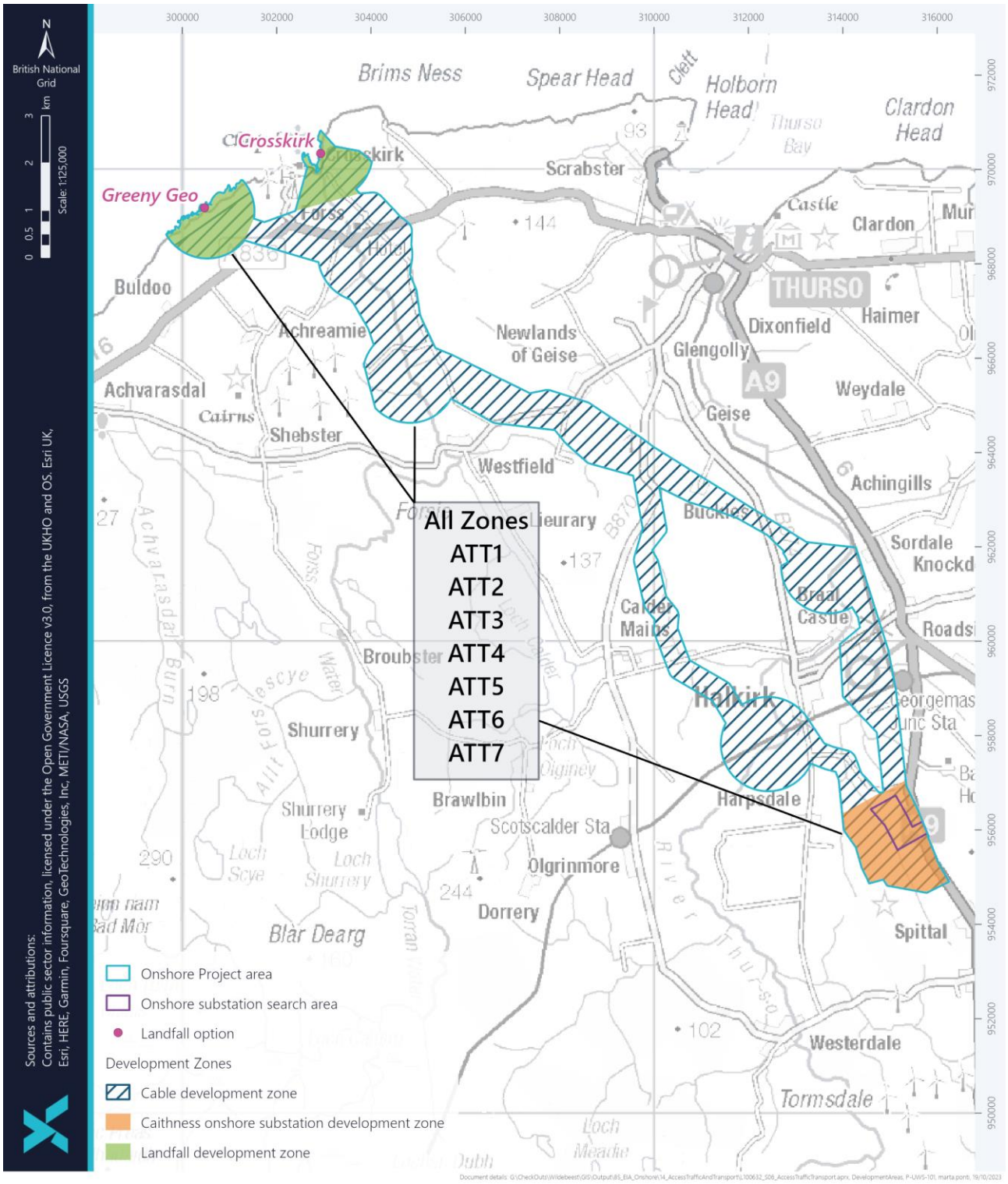


Figure 16-3 Development Zones for the onshore PPP application

Table 16-15 Embedded mitigation measures relevant to access, traffic and transport

ID	MITIGATION MEASURE	TYPE	DESCRIPTION	HOW MITIGATION WILL BE SECURED	DEVELOPMENT ZONE
ATT1	Roadworthy HGVs	Primary	All HGVs delivering materials to the site will be roadworthy, adequately maintained and sheeted as required.	As per OMP2: Outline CTMP, these measures will be established within the final CTMP. The CTMP will be secured through a condition attached to the PPP.	All zones.
ATT2	Traffic management	Primary	Adequate traffic management and banksmen[3] will be deployed for the movement of HGVs.	As per OMP2: Outline CTMP, these measures will be established within the final CTMP. The CTMP will be secured through a condition attached to the PPP.	All zones.
ATT3	Maximised HGVs	Primary	Full HGV loads will be maximised to ensure that part-load deliveries would be minimised, where possible.	As per OMP2: Outline CTMP, these measures will be established within the final CTMP. The CTMP will be secured through a condition attached to the PPP.	All zones.

[3] *A worker who supervises the use of vehicles and heavy machinery.*

ID	MITIGATION MEASURE	TYPE	DESCRIPTION	HOW MITIGATION WILL BE SECURED	DEVELOPMENT ZONE
ATT4	CTMP	Tertiary	The management of construction traffic within the onshore Project area is detailed within OMP2: Outline CTMP, which is provided alongside the application for PPP. In summary, the CTMP will include the following measures: • Identification of Designated Construction Routes, to restrict traffic to suitable roads in the study area; • The re-use of excavated materials on-site wherever possible, and the re-use of excavated material between work sites wherever possible (i.e. retained within the overall development) to minimise traffic generation; • Comprehensive traffic-related Health and Safety Measures (both on and off-site) to reduce the risk of accidents. These to include speed limits for construction traffic, a Driver Code of Conduct, and signage on local roads; • The means by which the CTMP will be communicated to stakeholders (local communities, landowners, Network Rail Scotland, THC etc), and how the above groups will be further engaged; • The provision of laybys on single-track roads to allow HGVs and general traffic to pass each other; and • The appointed Contact for Road Safety will communicate with all neighbouring residents and businesses to ensure they are aware of the construction programme and upcoming activities which may give rise to increased construction vehicle movements. The CTMP will be finalised at post-consent in consultation with THC, the Roads Authority and any potentially affected Community Councils once the design of the onshore Project is finalised.	As per OMP2: Outline CTMP, these measures will be established within the final CTMP. The CTMP will be secured through a condition attached to the PPP.	All zones.

ID	MITIGATION MEASURE	TYPE	DESCRIPTION	HOW MITIGATION WILL BE SECURED	DEVELOPMENT ZONE
ATT5	Access Management Plan	Tertiary	A Design and Access Statement has been submitted along with the PPP application to provide an overview of measures to maintain access during construction. An Access Management Plan will be developed post-consent to finalise these measures.	These measures will be established within the Access Management Plan. The Access Management Plan will be secured through a condition attached to the PPP.	All zones.
ATT6	CEMP	Tertiary	The CEMP will outline how the onshore Project will ensure the suitable implementation and control of the mitigation measures during construction. An outline CEMP (OMP1: Outline CEMP) is provided alongside the application for PPP.	As per OMP1: Outline CEMP, the final CEMP will be provided at post-consent. The CEMP will be secured through a condition attached to the PPP.	All zones.
ATT7	Decommissioning, Restoration and Aftercare Plan.	Tertiary	A Decommissioning, Restoration and Aftercare Plan will be prepared for the onshore Project and agreed with THC prior to decommissioning works being undertaken. The plan will include any measures required for traffic during decommissioning which are likely to be similar to those proposed within the CTMP.	Established within the design principles (secured via the Construction Method Statements (CMSs)) and the Decommissioning, Restoration and Aftercare plan which will be secured through a condition attached to the PPP.	All zones.

Table 16-16 Worst case scenario specific to access, traffic and transport impact assessment

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Construction and decommissioning		
All potential construction impacts	Construction traffic calculations have been based upon the busiest construction month in the 4-year construction period. In addition, for each of the key development zones within the onshore Project area (landfall, onshore export cable corridor and onshore substation), constructed traffic calculations have also been undertaken and impacts are based on busiest month within these areas. For each road link, traffic flows have been presented for the stage with the highest levels of traffic flow on that particular road link. Calculated traffic flows from this worst case scenario are presented in further detail in section 16.5.5.1.	The use of the worst case scenario models the busiest construction month occurring simultaneously in each part of the study area, and therefore presents a robust assessment of the impacts.

16.5.5.1 Construction traffic flows

16.5.5.1.1 Overview

The calculation of construction traffic volumes has been undertaken using the methodology as detailed below. It has been informed by the Project Design Envelope (PDE), which sets out the current assumptions on onshore substation access, permanent and temporary access tracks and how local road improvements will be implemented. This information has been used by OWPL to estimate material quantities, and by SYSTRA to identify construction routes and likely vehicle numbers.

The volumes of construction materials (e.g. amounts of concrete, aggregate, topsoil, steel etc.) for each element of the Project have been calculated. These were split into three main elements:

- Landfall works;
- Onshore export cable works; and
- Onshore substation work.

Each element comprises of several sub-tasks:

- The number of HGVs required to transport the volumes / materials has been calculated, see Table 16-17;
- The total number of HGVs for each sub-task has been split into quarterly and daily numbers of HGVs using an indicative Project programme, see Table 16-18 and Table 16-19;
- The period with the highest volume of construction traffic (Q3, Year 2) has been identified and used in the assessment;
- The onshore Project area has been split into 7 work areas, each with a construction traffic site access point. There are three indicative programme options which set out which work areas might be in operation at different times.
- Based upon this, traffic has been assigned to the road network. All construction traffic has been assumed to originate from the A9 south of the study area with travel to the operational work areas and travel back to the same location. In reality, there may be a small number of trips which originate and destinate elsewhere, but the vast majority of trips will arrive from the A9 south;
- All construction traffic (HGVs and construction worker vehicles) will travel on designated construction routes to each site access point (as identified within Figure 16-4);
- This process has identified the worst case (i.e. highest) construction traffic flows on each road link in each potential stage; and
- Trips associated with construction workers travelling to site have been included in addition to the above, along with a small number of maintenance trips to the construction sites.

Further details on construction trip generation and distribution is provided in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP).

16.5.5.1.2 Total construction vehicles

Table 16-17 presents the estimated number of construction vehicles for each sub-task in the programme. These figures have been calculated based upon the volume, materials and components that will need to be transported during each stage.

Table 16-17 Estimated total number of construction vehicles

ELEMENT	SUB-TASK	APPROXIMATE NUMBER OF LOADS
Landfall works	Enabling works	835
	HDD works	1,870
	Transition Joint Bay (TJB) construction	2,270
Onshore export cable works	Establishment of compounds	21
	Enabling works	295
	Cable trenching (including foreseen crossings)	4,416
	Ducts/duct bank installation	77,322
	Joint bay excavation and installation	7,930
	Cable installation	100
	Cable jointing and testing	3,182
	Cable trench backfilling	11,138
	Reinstatement of joint bay sites	1,447
Onshore substation works	Enabling works	3,440
	Onshore substation civil works	10,146
	Onshore substation Mechanical and Electrical (M&E) works	4,416
	Onshore substation cold commissioning	192
	Onshore substation energised & hot commissioning	134
	Final reinstatement and landscaping works	1,779
HGV totals		
	HGV total one-way	130,933
	HGV total two-way	261,867
Construction workers totals		
	Construction workers one-way	72,720
	Construction workers two-way	145,440
Maintenance Totals		
	Maintenance two-way	1,280

The above figures assume:

- Typically, 100 two-way vehicle trips to the onshore Project area associated with construction workers travelling by car, van or minibus; and
- Small number of maintenance trips throughout the construction period.

16.5.5.1.3 Construction programme

Using the indicative construction programme, the number of HGV deliveries anticipated per quarter during the construction period has been calculated and presented in Table 16-18.

Table 16-18 Estimated total number of HGV trips per quarter

CONSTRUCTION TASK	YEAR 1				YEAR 2				YEAR3				YEAR 4				YEAR 5[4]				TOTAL
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Landfall works																					
Enabling works						835															835
HDD works							935	935													1,870
TJB construction										1,135	1,135										2,270
Onshore export cable works																					
Establishment of compounds		21																			21
Enabling works			59	59	59	59	59														295
Cable Trenching (incl. foreseen crossings)				736	736	736	736	736	736												4,416
Ducts/duct bank installation				5,948	11,896	11,896	11,896	11,896	11,896	11,896											77,322
Joint bay excavation and installation					1,322	1,322	1,322	1,322	1,322	1,322											7,930
Cable installation						20	20	20	20	20											100
Cable jointing and testing						289	579	579	579	579	579										3,182
Cable trench backfilling						1,013	2,025	2,025	2,025	2,025	2,025										11,138
Reinstatement of joint bay sites							289	289	289	289	289										1,447
Onshore substation works																					
Enabling works						1,720	1,720														3,440
Onshore substation civil works							1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268							10,146
Onshore substation M&E works									736	736	736	736	736	736							4,416
Onshore substation cold commissioning														96	96						192
Onshore substation energised & hot commissioning																134					134
Final reinstatement and landscaping works													593	593				593			1,779
HGV TOTAL ONE-WAY	0	21	59	6,743	14,012	17,889	20,849	19,070	18,871	19,270	6,032	2,004	2,597	2,693	96	134	0	593	0	0	
HGV TOTAL TWO-WAY	0	42	118	13,486	28,025	35,779	41,697	38,139	37,741	38,539	12,065	4,009	5,195	5,387	192	268	0	1,186	0	0	

[4] *Cable pull through only.*

The programme presented in Table 16-18 does not include the cable pull, which would occur in Years 5 and 6. This will not generate a significant amount of construction traffic.

Assuming an average of 22 working days per month, the daily number of HGV trips anticipated during the construction period is presented in Table 16-19.

Table 16-19 Estimated total number of daily HGV trips[5]

CONSTRUCTION TASK	YEAR 1				YEAR 2				YEAR3				YEAR 4				YEAR 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Landfall works																				
Enabling works						13														
HDD works							14	14												
TJB construction										17	17									
Onshore export cable works																				
Establishment of compounds		0																		
Enabling works			1	1	1	1	1													
Cable trenching (incl. foreseen crossings)				11	11	11	11	11	11											
Ducts/duct bank installation				90	180	180	180	180	180	180										
Joint bay excavation and installation					20	20	20	20	20	20										
Cable installation						0	0	0	0	0										
Cable jointing and testing						4	9	9	9	9	9									
Cable trench backfilling						15	31	31	31	31	31									
Reinstatement of joint bay sites							4	4	4	4	4									
Onshore substation works																				
Enabling works						26	26													
Onshore substation civil works							19	19	19	19	19	19	19							
Onshore substation M&E works									11	11	11	11	11							
Onshore substation cold commissioning													1	1						
Onshore substation energised & hot commissioning															2					
Final reinstatement and landscaping works													9	9				9		
HGV TOTAL ONE-WAY	**0**	**0**	**1**	**32**	**212**	**271**	**316**	**289**	**286**	**292**	**91**	**30**	**39**	**41**	**1**	**2**	**0**	**9**	**0**	**0**
HGV TOTAL TWO-WAY	**0**	**1**	**2**	**64**	**425**	**542**	**632**	**578**	**572**	**584**	**183**	**61**	**79**	**82**	**3**	**4**	**0**	**18**	**0**	**0**

[5] *Total number of daily HGV trips are rounded to the nearest whole number, hence the reason some of the values are zero.*

Table 16-19 identifies that the busiest construction period on terms of HGV trips is anticipated to be between Year 2 Q2 and Year 3 Q2, when cable installation is due to take place across the study area. The highest number of daily HGV trips is predicted in Year 2 Q3, when 632 two-way trips are predicted, and this has been taken forward to the assessment stage.

Table 16-20 presents the daily predicted impact on each road link during Y2 Q3.

Table 16-20 Impact of construction traffic

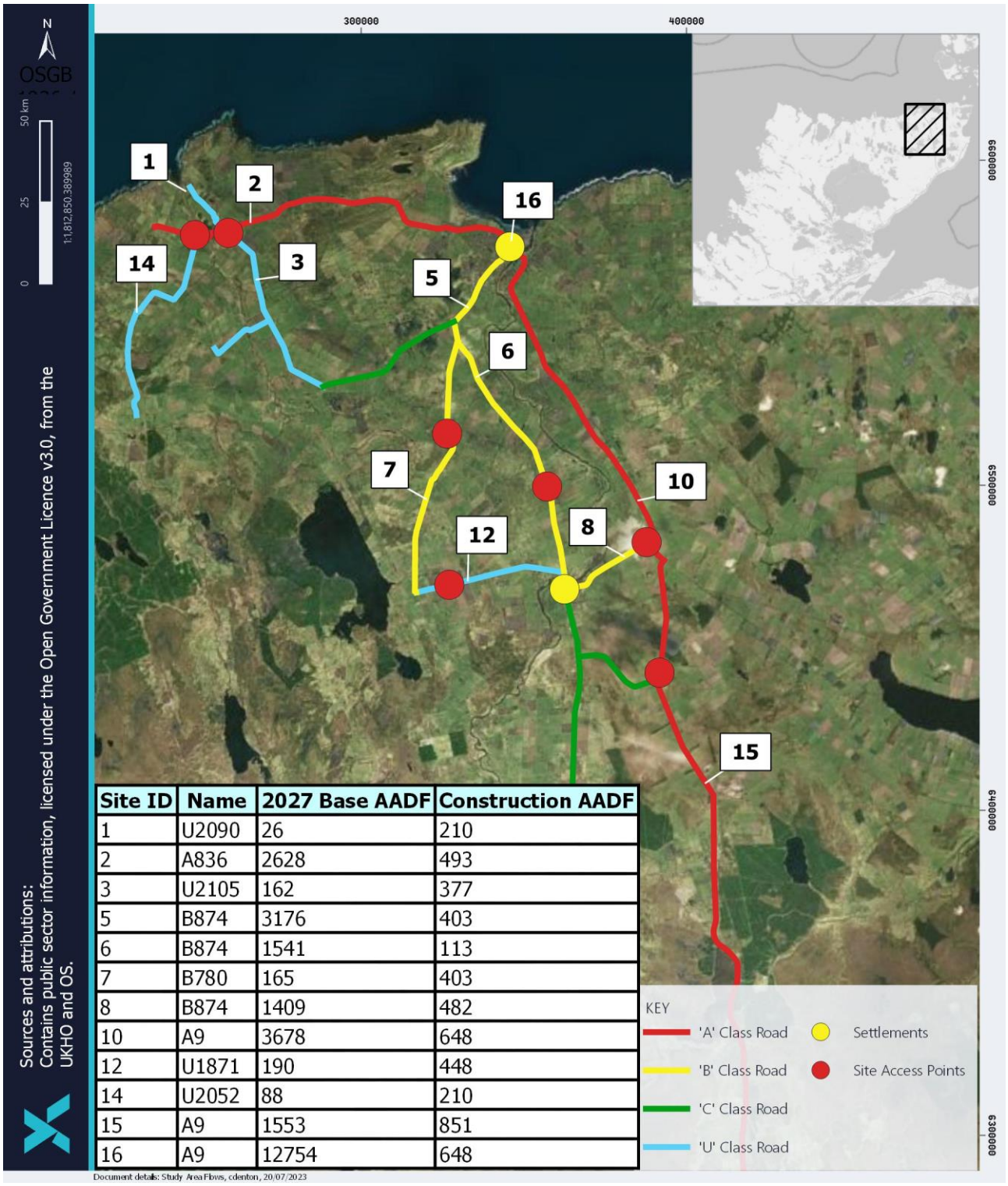
LINK REF	ROAD LINK	2027 BASELINE		CONSTRUCTION TRAFFIC		% IMPACT[6]	
		AADF	HGV	AADF	HGV	AADF	HGV
1	U2090 north of A836	26	0	210	156	802%	No current HGV flows
2	A836 west of Thurso	2,628	16	493	273	19%	1743%
3	U2105 between A836 and C1001	162	0	377	273	233%	No current HGV flows
4	C1001 between B874 and U2105	1,354	18	0	0	0%	0%
5	B874 between A9 and C1001	3,176	22	403	299	13%	1362%
6	B874 between C1001 and Halkirk	1,541	13	113	84	7%	667%
7	B780 between B874 and U1871	165	1	403	299	244%	28610%
8	B874 between Halkirk and Roadside	1,409	12	482	358	34%	3109%
9	C1018 south of C1014	569	8	0	0	0%	0%

[6] *Percentage impact is calculated as Construction AADF over Baseline AADF, or Construction AADF (HGV) divided by Baseline AADF (HGV).*

LINK REF	ROAD LINK	2027 BASELINE		CONSTRUCTION TRAFFIC		% IMPACT[6]	
		AADF	HGV	AADF	HGV	AADF	HGV
10	A9 between Roadside and Thurso	3,678	97	648	429	18%	441%
11	C1014 south of A825	381	5	0	0	0%	0%
12	U1871 between B871 and B870	190	3	448	333	235%	10596%
13	U2010 west of U2015	29	0	0	0	0%	No current HGV flows
14	U2052 south of B836	88	1	210	156	239%	14875%
15	A9 south of C1014	1,553	64	851	632	55%	990%
16	A9 within Thurso (between A836 and Princess St)	12,754	278	648	429	5%	154%

Based upon the results in Table 16-20, and the IEMA guidance thresholds set out in Section 16.5.3, a detailed assessment of the following road links is required: 1, 2, 3, 5, 6, 7, 8, 10, 12, 14, 15 and 16 (see Figure 16-4). Construction traffic is not expected to use road links 4, 9, 11 or 13.

.



Site ID	Name	2027 Base AADF	Construction AADF
1	U2090	26	210
2	A836	2628	493
3	U2105	162	377
5	B874	3176	403
6	B874	1541	113
7	B780	165	403
8	B874	1409	482
10	A9	3678	648
12	U1871	190	448
14	U2052	88	210
15	A9	1553	851
16	A9	12754	648

Figure 16-4 Future baseline 2027 AADF (two-way) and construction traffic AADF

16.6 Assessment of potential effects

16.6.1 Potential effects during construction

16.6.1.1 Impacts on road users as a result of the increased generation of traffic (driver delay)

Some driver delay may be experienced when construction traffic is travelling along the trunk and local road networks to and between the onshore substation, construction compounds and site access points. The IEMA guidance (IEMA, 2023) advise that "*delays are only likely to be significant when the traffic on the network surrounding the site is already at, or close to, the capacity of the* system".

Delay to non-project related traffic may occur at numerous points on the road network within the study area including:

- Construction site entrance points where there will be additional turning movements;
- Junctions on the trunk and local road networks, where construction traffic may need to wait to turn, and on side roads where the ability to find gaps in traffic may be reduced, thereby lengthening delays;
- On any single-track sections of the network, where vehicles must wait in passing places for opposing vehicles to pass before proceeding on their journey. Increases in traffic on these links will increase these wait times; and
- At the points at which cables are installed across minor roads, where lane closures or traffic controls will be temporarily required.

The assessment takes into account that embedded mitigation, in the form of regularly-spaced passing places will be in place on all single-track roads. These passing places will allow general traffic to pass construction traffic. As set out in the outline CTMP, which is provided alongside the PPP application (OMP2: Outline CTMP), passing places will be created on the following road links:

- Road link 1 – U2090 north of A836;
- Road link 3 – U2105 between A836 and C1001;
- Road link 7 - B870 between B874 and U1871;
- Road link 12 - U1871 between B871 and B870; and
- Road link 14 – U2052 south of B836.

The assessed sensitivity of each road link is given in Table 16-21.

The assessed magnitude of change on each road link is given in Table 16-22.

Table 16-21 Road link sensitivity (driver delay)[7]

LINK REF	ROAD LINK	ASSIGNED SENSITIVITY	REASONING
1	U2090	Low	Single-track road that provides the only access to ~5 properties.
2	A836 west of Thurso	Low	'A' Class single-carriageway road, suitable for two-way traffic, and with only one point where construction traffic is likely to turn.
3	U2105 between the A836 and C1001	Low	Minor, single-track road with an AADF of only 159 vehicles.
5	B874 between A9 and C1001	Medium	Single-carriageway road, suitable for two-way traffic, which passes through the south of the Thurso urban area where there are numerous side roads and frontages, and on-street parking.
6	B874 between C1001 and Halkirk	Low	Single-carriageway road, suitable for two-way traffic, that predominantly passes through a rural area with few side roads.
7	B780 between B874 and U1871	Low	Rural road with an AADF of only 162 vehicles.
8	B874 between Halkirk and Roadside	Medium	B874 provides the main route into Halkirk from the A9.
10	A9 between Roadside and Thurso	Medium	Trunk road that passes through an urban area, with an AADF of 3,614.
12	U1871 between B871 and B870	Low	Minor road with an AADF of only 187 vehicles.
14	U2052 south of A836	Low	Minor road with an AADF of only 86 vehicles.
15	A9 south of C1014	Low	Trunk road which can accommodate high traffic levels, and with an existing AADF of just 1,527 vehicles.
16	A9 within Thurso	Medium	Trunk road within an urban area, with an AADF of 12,534 vehicles.

[7] *As set out in section 16.6, road links 4, 9, 11 and 13 will not be used by construction traffic, and are therefore not included in the assessment.*

Table 16-22 Magnitude of change (driver delay)

LINK REF	ROAD LINK	ASSIGNED MAGNITUDE OF CHANGE	REASONING
1	U2090	Low	Peak construction traffic is estimated to result in an AADF increase of 210 two-way vehicle trips (~30 vehicle trips per hour during the working day). In percentage terms this is an increase of 802%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.
2	A836 west of Thurso	Low	Peak construction traffic is estimated to result in an AADF increase of 493 two-way vehicle trips (~58 vehicle trips per hour during the working day), an increase of 19%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
3	U2105 between the A836 and C1001	Low	Peak construction traffic is estimated to result in an AADF increase of 377 two-way vehicle trips (~54 vehicle trips per hour during the working day). In percentage terms this is an increase of 233%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.
5	B874 between A9 and C1001	Low	Peak construction traffic is estimated to result in an AADF increase of 403 two-way vehicle trips (~58 vehicle trips per hour during the working day), an increase of 13%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
6	B874 between C1001 and Halkirk	Negligible	Peak construction traffic is estimated to result in an AADF increase of 113 two-way vehicle trips (~16 vehicle trips per hour during the working day), an increase of 7%. With reference to Table 16-14, this is considered to be a **negligible** magnitude of change.
7	B780 between B874 and U1871	Low	Peak construction traffic is estimated to result in an AADF increase of 403 two-way vehicle trips (~58 vehicle trips per hour during the working day). In percentage terms this is an increase of 244%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement), this is considered to be a **low** magnitude of change.
8	B874 between Halkirk and Roadside	Low	Peak construction traffic is estimated to result in an AADF increase of 482 two-way vehicle trips (~69 vehicle trips per hour during the working day), an increase of 34%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
10	A9 between Roadside and Thurso	Low	Peak construction traffic is estimated to result in an AADF increase of 648 two-way vehicle trips (~93 vehicle trips per hour during the working day), an increase of 18%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
12	U1871 between B871 and B870	Low	Peak construction traffic is estimated to result in an AADF increase of 448 two-way vehicle trips (~64 vehicle trips per hour during the working day). In percentage terms this is an increase of 235%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.
14	U2052 south of A836	Low	Peak construction traffic is estimated to result in an AADF increase of 210 two-way vehicle trips (~30 vehicle trips per hour during the working day). In percentage terms this is an increase of 239%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.

LINK REF	ROAD LINK	ASSIGNED MAGNITUDE OF CHANGE	REASONING
15	A9 south of C1014	Medium	Peak construction traffic is estimated to result in an AADF increase of 851 two-way vehicle trips (~122 vehicle trips per hour during the working day), an increase of 55%. This is considered to be **medium** magnitude of change.
16	A9 within Thurso	Negligible	Peak construction traffic is estimated to result in an AADF increase of 648 two-way vehicle trips (~92 vehicle trips per hour during the working day), an increase of 5%. This is considered to be **negligible** magnitude of change.

The evaluation of significance of driver delay on each road link, is provided below.

Evaluation of significance

Given the low to medium sensitivity of the road links and the low to medium magnitude of impact, the overall effects are considered to be **negligible to minor**, and therefore, **not significant** in EIA terms.

LINK REF	ROAD LINK	SENSITIVITY	MAGNITUDE OF CHANGE	CONSEQUENCE
1	U2090	Low	Low	Minor
2	A836 west of Thurso	Low	Low	Minor
3	U2105 between A836 and C1001	Low	Low	Minor
5	B874 between A9 and C1001	Medium	Low	Minor
6	B874 between C1001 and Halkirk	Low	Negligible	Negligible
7	B780 between B874 and U1871	Low	Low	Minor
8	B874 between Halkirk and Roadside	Medium	Low	Minor
10	A9 between Roadside and Thurso	Medium	Low	Minor
12	U1871 between B871 and B870	Low	Low	Minor
14	U2052 south of A836	Low	Low	Minor
15	A9 south of C1014	Low	Medium	Minor
16	A9 within Thurso	Medium	Negligible	Minor

Impact significance - NOT SIGNIFICANT

16.6.1.2 Impact on road safety as a result of the generation of increased traffic (accidents and safety)

The Project construction stage could result in an increase in the number of road accidents within the study area, due to an increase in the number of vehicle-km driven by construction vehicles.

All roads within the study area have been assumed to be of high sensitivity in terms of accidents and safety. This rating reflects the importance of receptors to potential accidents and their safety on all road links.

The likelihood of an accident occurring is commonly expressed in accidents per million vehicle-km. Accidents that are appraised in relation to transport are predominantly those in which personal injury is sustained by those involved, known as Personal Injury Accidents (PIAs).

Accident rates on different road types are provided in TS's Cost Benefit Analysis (COBA) Manual (Table 4.1) (Transport Scotland, 2014). For the purposes of the assessment, it has been assumed that all of the assessed roads are classified as 'Other S2 Roads (60 mph)', with the exception of the A9 and A836, which are classified as 'Older S2 (Single lane, two-way carriageway) 'A' Roads (60 mph)'. Combined link and junction accident rates from the DMRB for this standard of road are:

- Older S2 Roads (60 mph) – 0.381 PIA per million vehicle-km (mvkm); and
- Other S2 Roads (60 mph) – 0.404 PIA per mvkm.

Table 16-23 presents the results of the accident assessment on all road links in the study area. Table 16-23 also indicates that over the course of the year, the onshore Project construction is predicted to result in an increase of 2.3 PIA (increase from 11.7 PIA to 14.0 PIA). Most of the traffic generated by the onshore Project construction is expected to occur over a three-year period (Year 1 Q4 – Year 4 Q2), which would result in an increase of approximately 6.9 PIA over the whole construction period. This is assessed as being a low magnitude of change.

OMP2: Outline Construction Traffic Management Plan proposes a comprehensive set of safety measures to reduce the chances of construction-related road accidents. These include:

- Speed limits of 20 mph for construction traffic on the local 'B' roads and unclassified roads on construction traffic routes;
- Warning signs along all construction routes, notifying other road users, pedestrians and cyclists of the presence of construction vehicles. Signage will be particularly concentrated around site access points; and
- Briefings for all site delivery drivers which will clearly set out delivery protocols, and the need to ensure that road safety is the top priority.

Taking account of these embedded mitigation measures, the evaluation of significance of accidents and safety for all construction routes is provided below.

Evaluation of significance

Taking the high sensitivity and the low magnitude of the impact, the overall effect on accidents and safety is considered to be minor, which is not significant in EIA terms.

SENSITIVITY	MAGNITUDE OF CHANGE	CONSEQUENCE
High	Low	Minor
Impact significance - NOT SIGNIFICANT		

Table 16-23 Accident impact analysis (annual impact)[8]

LINK REF	ROAD LINK	ROAD CATEGORY	ACCIDENT RATE		LENGTH		BASELINE 2027		BASE + CONSTRUCTION TRAFFIC 2027	
			(PIA/MVKM)	(KM)	AADF	MVKM / YEAR	PIA	AADF	MVKM / YEAR	PIA
1	U2090 north of A836	Other S2 Road (60mph)	0.404	1.5	26	9,845	0.0	236	88,766	0.0
2	A836 west of Thurso	Older S2 A Roads (60mph)	0.381	10.2	2,628	6,727,059	2.6	3,120	7,988,855	3.0
3	U2105 between A836 and C1001	Other S2 Road (60mph)	0.404	5.1	162	207,543	0.1	540	690,627	0.3
5	B874 between A9 and C1001	Other S2 Road (60mph)	0.404	2.7	3,176	2,152,142	0.9	3,579	2,425,382	1.0
6	B874 between C1001 and Halkirk	Other S2 Road (60mph)	0.404	7.7	1,541	2,977,823	1.2	1,654	3,195,843	1.3

[8] *As set out in Section 16.7, Links 4, 9, 11 and 13 will not be used by construction traffic, and are therefore not included in the assessment.*

LINK REF	ROAD LINK	ROAD CATEGORY	ACCIDENT RATE		LENGTH		BASELINE 2027		BASE + CONSTRUCTION TRAFFIC 2027	
			(PIA/MVKM)	(KM)	AADF	MVKM / YEAR	PIA	AADF	MVKM / YEAR	PIA
7	B780 between B874 and U1871	Other S2 Road (60mph)	0.404	6.9	165	286,228	0.1	568	984,508	0.4
8	B874 between Halkirk and Roadside	Other S2 Road (60mph)	0.404	2.8	1,409	990,218	0.4	1,891	1,328,961	0.5
10	A9 between Roadside and Thurso	Older S2 A Roads (60mph)	0.381	9.9	3,678	9,138,806	3.5	4,326	10,750,110	4.1
12	U1871 between B871 and B870	Other S2 Road (60mph)	0.404	4.1	190	195,912	0.1	638	656,934	0.3
14	U2052 south of B836	Other S2 Road (60mph)	0.404	1.8	88	39,697	0.0	297	134,402	0.1
15	A9 south of C1014	Older S2 A Roads (60mph)	0.381	1.3	1,553	506,845	0.2	2,404	784,583	0.3
16	A9 within Thurso	Older S2 A Roads (60mph)	0.381	2.1	12,754	6,722,569	2.6	13,402	7,064,361	2.7
						TOTAL PIA	11.7			14.0

16.6.1.3 Impacts on local community (severance)

The IEMA guidance (IEMA, 2023) advise that "*Severance is the perceived division that can occur within a community when it becomes separated by major transport infrastructure*".

The potential for construction traffic associated with the onshore Project to cause severance is assessed on a case-by-case basis using professional judgement where non-negligible traffic increases are predicted on roads through residential settlements.

Increased severance can result in the isolation of areas of a settlement or individual properties. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. Severance effects could equally be applied to residents, motorists or pedestrians.

Severance effects have been assessed as occurring on the following road links, where construction routes will pass through residential areas, where community facilities and pedestrians are present:

- Road link 5, on the B874 within Thurso;
- Road link 6, on the B874 within Halkirk;
- Road link 8, on the B874 within Halkirk; and
- Road link 16, on the A9 within Thurso.

The assessed sensitivity of each road link is given in Table 16-24.

Table 16-24 Road link sensitivity (severance)

LINK REF	ROAD LINK	ASSIGNED SENSITIVITY	REASONING
5	B874 between A9 and C1001	High	The majority of the Thurso urban area lies to the north-west of the road, and numerous local shops, Thurso Railway Station, Thurso High School, University of the Highlands and Islands (UHI) North Highland, Miller Academy Primary School, and other community facilities, lie to the south-east of the road.
6	B874 between C1001 and Halkirk	High	Residential areas lie on both the east and west sides of the road.
8	B874 between Halkirk and Roadside	High	Road passes through the village, with the majority of the residential area being to the south of the road, and with the village centre, primary school and doctor's surgery lying to the north.
16	A9 within Thurso	High	The A9 forms the main route through the town, separating the beach, harbour and shopping area to the north-east of the road from the more residential areas to the south-west.

The assessed magnitude of change on each road link is provided in Table 16-25.

Table 16-25 Magnitude of change (severance)

LINK REF	ROAD LINK	MAGNITUDE OF CHANGE	REASONING
5	B874 between A9 and C1001	Low	Peak construction traffic is estimated to result in an AADF increase of 403 two-way vehicle trips (~58 vehicle trips per hour during the working day), an increase of 13%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
6	B874 between C1001 and Halkirk	Negligible	Peak construction traffic is estimated to result in an AADF increase of 113 two-way vehicle trips (~16 vehicle trips per hour during the working day), an increase of 7%. With reference to Table 16-14, this is considered to be a **negligible** magnitude of change.
8	B874 between Halkirk and Roadside	Low	Peak construction traffic is estimated to result in an AADF increase of 482 two-way vehicle trips (~69 vehicle trips per hour during the working day), an increase of 34%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
16	A9 within Thurso	Negligible	Peak construction traffic is estimated to result in an AADF increase of 648 two-way vehicle trips (~93 vehicle trips per hour during the working day), an increase of 5%. With reference to Table 16-14, this is considered to be a **negligible** magnitude of change.

The evaluation of significance of local community (severance) on specified road links with embedded mitigation in place is provided below.

Evaluation of significance

Given the high sensitivity of the road links assessed and the low to negligible magnitude of impact, the overall effect is considered to be **minor to negligible**, which is **not significant** in EIA terms.

LINK REF	ROAD LINK	SENSITIVITY	MAGNITUDE OF CHANGE	CONSEQUENCE
5	B874 between A9 and C1001	High	Low	Minor
6	B874 between C1001 and Halkirk	High	Negligible	Negligible
8	B874 between Halkirk and Roadside	High	Low	Minor
16	A9 within Thurso	High	Negligible	Negligible

Impact significance - NOT SIGNIFICANT

16.6.1.4 Impacts on local community (pedestrian delay and amenity)

Traffic volumes, traffic composition, traffic speed, the existence of pedestrian footways and the existence of pedestrian crossings all contribute to the level of general pleasantness, fear, intimidation and delay experienced by pedestrians and other vulnerable road users.

The onshore Project will increase traffic levels during the construction stage, as well as increasing the number of HGVs, both of which could increase pedestrian delay, and reduce pedestrian amenity.

Pedestrian delay and amenity effects have been assessed as occurring on the following road links, where construction routes will pass through residential areas, where community facilities and pedestrians are present:

- Road link 5, on the B874 within Thurso;
- Road link 6, on the B874 within Halkirk;
- Road link 8, on the B874 within Halkirk; and
- Road link 16, on the A9 within Thurso.

The assessed sensitivity of each link is given in Table 16-26.

Table 16-26 Link sensitivity (pedestrian delay and amenity)

LINK REF	ROAD LINK	ASSIGNED SENSITVITY	REASONING
5	B874 between A9 and C1001	High	Although the road is wide, and pedestrians are well-separated from traffic, many of the footways are narrow. In addition, there are no signalised crossing facilities in place at key community facilities including the rail station and Miller Academy Primary School, although a Puffin crossing is present at Thurso High School.
6	B874 between C1001 and Halkirk	Medium	There are footways present on both sides of the road, and pedestrian demands are likely to be low, however there are several locations where the footways are narrow, with traffic in relatively close proximity.
8	B874 between Halkirk and Roadside	Medium	There are footways present on both sides of the road, and pedestrian demands are likely to be low, however there are several locations where the footways are narrow, with traffic in relatively close proximity.
16	A9 within Thurso	Medium	As a trunk road, higher traffic volumes and higher percentages of HGVs are already experienced by pedestrians. Footways are in place along both sides of the A9 within Thurso, and the A9 is ~8 m wide as it passes through the town, meaning that pedestrians are typically well-separated from traffic. Signalised crossing facilities are present at two locations on the A9, at the A9 George St / Sinclair Street signalised junction, and on the corner of Rotterdam Street.

The assessed magnitude of change on each road link is given in Table 16-27.

Table 16-27 Magnitude of change (pedestrian delay and amenity)

LINK REF	ROAD LINK	MAGNITUDE OF CHANGE	REASONING
5	B874 between A9 and C1001	Low	Peak construction traffic is estimated to result in an AADF increase of 403 two-way vehicle trips (~58 vehicle trips per hour during the working day), an increase of 13%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
6	B874 between C1001 and Halkirk	Negligible	Peak construction traffic is estimated to result in an AADF increase of 113 two-way vehicle trips (~16 vehicle trips per hour during the working day), an increase of 7%. With reference to Table 16-14, this is considered to be a **negligible** magnitude of change.
8	B874 between Halkirk and Roadside	Low	Peak construction traffic is estimated to result in an AADF increase of 482 two-way vehicle trips (~69 vehicle trips per hour during the working day), an increase of 34%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
16	A9 within Thurso	Negligible	Peak construction traffic is estimated to result in an AADF increase of 648 two-way vehicle trips (~93 vehicle trips per hour during the working day), an increase of 5%. With reference to Table 16-14, this is considered to be a **negligible** magnitude of change.

The evaluation of significance of local community (pedestrian delay and amenity) on specified road links with embedded mitigation in place is provided below.

Evaluation of significance

Given the medium to high sensitivity of the road links assessed and the negligible to low magnitude of impact, the overall effect is considered to be **negligible to minor**, which is **not significant** in EIA terms.

LINK REF	ROAD LINK	SENSITIVITY	MAGNITUDE OF CHANGE	CONSEQUENCE
5	B874 between A9 and C1001	High	Low	Minor
6	B874 between C1001 and Halkirk	Medium	Negligible	Negligible
8	B874 between Halkirk and Roadside	Medium	Low	Minor
16	A9 within Thurso	Medium	Negligible	Negligible

Impact significance – NOT SIGNIFICANT

16.6.1.5 Impacts on local community (dust and dirt)

The IEMA guidance (IEMA, 2023) states that, "*Dust generated from construction sites and the operations of certain types of development, such as quarrying and the transport of quarried materials can be a problem, particularly as a consequence of trackout*".

All roads within the study area are assumed to be of high sensitivity to dust and dirt, particularly those sections within close proximity to site access points.

Dust management measures on-site are embedded into the pre-assessment mitigation of the Project as 'good practice'. These include wheel-washing stations as vehicles leave site, the use of covered HGVs, and the regular sweeping of public roads close to site access points. As such the magnitude of change is considered to be low.

Evaluation of significance

Taking the high sensitivity and the low magnitude of the impact, the overall effect is considered to be minor, which is not significant in EIA terms.

SENSITIVITY	MAGNITUDE OF CHANGE	CONSEQUENCE
High	Low	Minor

Impact significance - NOT SIGNIFICANT

16.6.1.6 Impact on road carriageway, verges and associated structures

Construction traffic associated with the development, particularly from heavy vehicles, has the potential to cause attractional damage to road surfaces, to damage verges where vehicles over-run, and potentially to damage structures beneath or close to the road.

This damage is more likely on minor roads, where surfaces may be old and already damaged, and where road widths and junctions are narrower, meaning that the risk of over-run is greater. In the following assessment, these impacts have been grouped under the term 'Wear and Tear'. The assessed sensitivity of each road link is given in Table 16-28 and the assessed magnitude of change on each road link is given in Table 16-29.

Table 16-28 Link sensitivity (wear and tear)[9]

LINK REF	ROAD LINK	ASSIGNED SENSITIVITY	REASONING
1	U2090	High	As a single-track road, the U2090 is considered to be of **high** sensitivity to wear and tear, as it is of narrow width.
2	A836 west of Thurso	Low	As an 'A' Class single-carriageway road, suitable for two-way traffic, the A836 is considered to be of **low** sensitivity to wear and tear.
3	U2105 between the A836 and C1001	High	As a minor, single-track road the U2105 is considered to be of **high** sensitivity to wear and tear, as it is of narrow width.
5	B874 between A9 and C1001	Medium	As a single-carriageway road, suitable for two-way traffic, the B874 is considered to be of **medium** sensitivity to wear and tear.
6	B874 between C1001 and Halkirk	Medium	As a 'B' class single-carriageway road, the B874 is considered to be of **medium** sensitivity to wear and tear.
7	B780 between B874 and U1871	High	As a single-track road the B780 is considered to be of **high** sensitivity to wear and tear, as it is of narrow width.
8	B874 between Halkirk and Roadside	Medium	As a 'B' class single-carriageway road, the B874 is considered to be of **medium** sensitivity to wear and tear.
10	A9 between Roadside and Thurso	Low	As an 'A' Class trunk road, the A9 is considered to be of **low** sensitivity to wear and tear.
12	U1871 between B871 and B870	High	As a single-track road the U1871 is considered to be of **high** sensitivity to wear and tear, as it is of narrow width.
14	U2052 south of A836	High	As a single-track road the U1871 is considered to be of **high** sensitivity to wear and tear, as it is of narrow width.
15	A9 south of C1014	Low	As an 'A' Class trunk road, the A9 is considered to be of **low** sensitivity to wear and tear.
16	A9 within Thurso	Low	As an 'A' Class trunk road, the A9 is considered to be of **low** sensitivity to wear and tear.

[9] *As set out in Section 16.7, Links 4, 9, 11 and 13 will not be used by construction traffic, and are therefore not included in the assessment.*

Table 16-29 Magnitude of change (wear and tear)

LINK REF	ROAD LINK	MAGNITUDE OF CHANGE	REASONING
1	U2090	Low	Peak construction traffic is estimated to result in an AADF increase of 210 two-way vehicle trips (~30 vehicle trips per hour during the working day). In percentage terms this is an increase of 802%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.
2	A836 west of Thurso	Low	Peak construction traffic is estimated to result in an AADF increase of 493 two-way vehicle trips (~58 vehicle trips per hour during the working day), an increase of 19%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
3	U2105 between the A836 and C1001	Low	Peak construction traffic is estimated to result in an AADF increase of 377 two-way vehicle trips (~54 vehicle trips per hour during the working day). In percentage terms this is an increase of 233%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.
5	B874 between A9 and C1001	Low	Peak construction traffic is estimated to result in an AADF increase of 403 two-way vehicle trips (~58 vehicle trips per hour during the working day), an increase of 13%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
6	B874 between C1001 and Halkirk	Negligible	Peak construction traffic is estimated to result in an AADF increase of 113 two-way vehicle trips (~16 vehicle trips per hour during the working day), an increase of 7%. With reference to Table 16-14, this is considered to be a **negligible** magnitude of change.
7	B780 between B874 and U1871	Low	Peak construction traffic is estimated to result in an AADF increase of 403 two-way vehicle trips (~58 vehicle trips per hour during the working day). In percentage terms this is an increase of 244%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement), this is considered to be a **low** magnitude of change.
8	B874 between Halkirk and Roadside	Low	Peak construction traffic is estimated to result in an AADF increase of 482 two-way vehicle trips (~69 vehicle trips per hour during the working day), an increase of 34%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
10	A9 between Roadside and Thurso	Low	Peak construction traffic is estimated to result in an AADF increase of 648 two-way vehicle trips (~93 vehicle trips per hour during the working day), an increase of 18%. With reference to Table 16-14, this is considered to be a **low** magnitude of change.
12	U1871 between B871 and B870	Low	Peak construction traffic is estimated to result in an AADF increase of 448 two-way vehicle trips (~64 vehicle trips per hour during the working day). In percentage terms this is an increase of 235%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.

LINK REF	ROAD LINK	MAGNITUDE OF CHANGE	REASONING
14	U2052 south of A836	Low	Peak construction traffic is estimated to result in an AADF increase of 210 two-way vehicle trips (~30 vehicle trips per hour during the working day). In percentage terms this is an increase of 239%, but given the low existing AADF of <200, in absolute terms (and using SYSTRA's professional judgement) this is considered to be a **low** magnitude of change.
15	A9 south of C1014	Medium	Peak construction traffic is estimated to result in an AADF increase of 851 two-way vehicle trips (~122 vehicle trips per hour during the working day), an increase of 55%. This is considered to be **medium** magnitude of change.
16	A9 within Thurso	Negligible	Peak construction traffic is estimated to result in an AADF increase of 648 two-way vehicle trips (~92 vehicle trips per hour during the working day), an increase of 5%. This is considered to be **negligible** magnitude of change.

The evaluation of significance of impacts on road carriageway, verges and associated structures of specified road links with embedded mitigation in place is provided below.

Evaluation of significance

Given the high to low sensitivity of the road links assessed and the medium to negligible magnitude of impact, the overall effect is considered to be **minor to negligible** and **not significant** in EIA terms for all receptors.

LINK REF	ROAD LINK	SENSITIVITY	MAGNITUDE OF CHANGE	CONSEQUENCE
1	U2090	High	Low	Minor
2	A836 west of Thurso	Low	Low	Negligible
3	U2105 between A836 and C1001	High	Low	Minor
5	B874 between A9 and C1001	Medium	Low	Minor
6	B874 between C1001 and Halkirk	Medium	Negligible	Negligible
7	B780 between B874 and U1871	High	Low	Minor
8	B874 between Halkirk and Roadside	Medium	Low	Minor
10	A9 between Roadside and Thurso	Low	Low	Negligible
12	U1871 between B871 and B870	High	Low	Minor
14	U2052 south of A836	High	Low	Minor
15	A9 south of C1014	Low	Medium	Minor
16	A9 within Thurso	Low	Negligible	Negligible

Impact significance – NOT SIGNIFICANT

Although the five single-track roads which have been assessed as being of high sensitivity are only predicted to experience a minor significance of effect, SYSTRA would recognise that the potential for degradation of these roads is not necessarily directly linked to the volume of traffic on them, but the nature of the roads themselves, which may have weak verges and be in existing poor condition.

To mitigate these traffic impacts, (in terms of wear and tear), the following secondary mitigation will be put in place:

- Pre- and post-construction Roads Conditions Surveys will be undertaken along the 'B', 'C' and 'U' Class road networks, as it is recognised that the existing road surface could degrade as a result of construction traffic on these roads. These will identify any damage caused by construction vehicles and ensure that the developer is responsible for any repairs.

16.6.2 Potential effects during decommissioning

In the absence of detailed information regarding decommissioning works, the impacts during the decommissioning of the onshore Project are considered analogous with, or likely less than, those of the construction stage.

Decommissioning operations will be based on strategies that minimise the environmental impact and maximise efforts to recycle materials where possible and will be developed in consultation with the local authorities. The preference will be to remove infrastructure where possible, however the impact of removal will be assessed against environmental impacts. Whilst the detail of the decommissioning strategy is yet to be established, this assessment is based on the decommissioning strategy proposed in Table 5-7 of chapter 5: Project description, which is as close to full removal as possible, whilst recognising that this is subject to assessments and consultation closer to the time of decommissioning. It is expected that decommissioning follows a reverse order of the installation activities with some infrastructure potentially left in situ, therefore lessening the traffic impacts, as there is no requirement for intrusive works and therefore fewer vehicle trips will be generated.

Throughout the operational and construction stages, new and forthcoming legislation and policies would be acknowledged and adhered to, supporting, and guiding the decommissioning process. A Decommissioning Restoration and Aftercare Plan will be prepared prior to the decommissioning stage of the development which details these requirements.

The overall impact on access, traffic and transport during decommissioning is therefore considered to be, at worst, minor and not significant, in line with the impacts assessed for the construction stage.

16.6.3 Summary of potential effects

A summary of the outcomes of the assessment of potential effects from the construction, operation and maintenance and decommissioning of the onshore Project is provided in Table 16-30.

Table 16-30 Summary of potential effects

POTENTIAL EFFECT	RECEPTOR	SENSITIVITY OF RECEPTOR	MAGNITUDE OF CHANGE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Construction and decommissioning						
Impact on road users as a result of increased generation of traffic (driver delay)	Road users	Medium to low	Medium to negligible	Minor to negligible (not significant)	None required above embedded mitigation measures.	Minor to negligible (not significant)
Impact on road users as a result of increased generation of traffic (accidents and safety)	Road users, cyclists and pedestrians	High	Low	Minor (not significant)	None required above embedded mitigation measures.	Minor (not significant)
Impacts on local community (severance)	Members of local communities	High	Low to negligible	Minor to negligible (not significant)	None required above embedded mitigation measures.	Minor to negligible (not significant)

POTENTIAL EFFECT	RECEPTOR	SENSITIVITY OF RECEPTOR	MAGNITUDE OF CHANGE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Impacts on local community (pedestrian delay and amenity)	Members of local communities	High to medium	Low to negligible	Minor to negligible (not significant)	None required above embedded mitigation measures.	Minor to negligible (not significant)
Impacts on local community (dust and dirt)	Road users, members of local communities	High	Low	Minor (not significant)	None required above embedded mitigation measures.	Minor (not significant)
Impact on road carriageway, verges and associated structures (wear and tear)	Road users, members of local communities	High to low	Medium to negligible	Minor to negligible	Pre- and Post-construction Road Condition Surveys.	Minor to negligible (not significant)

16.7 Assessment of cumulative effects

16.7.1 Introduction

Potential impacts from the onshore Project have the potential to interact with those from other developments, plans and activities, resulting in cumulative impacts on access, traffic and transport receptors. The approach to the cumulative effects assessment is detailed in chapter 7: EIA methodology (see Figure 7-4), detailing the developments considered in relation to the onshore Project area. A summary of the approach is provided below.

The list of relevant developments for inclusion within the cumulative effects assessment is outlined in Table 16-31. This has been informed by a screening exercise, undertaken to identify relevant developments for consideration within the cumulative effects assessments for each EIA topic, based on defined Zones of Influence (ZoI).

Developments which are located within 15 km of the study area have the potential to result in a cumulative effect for access, traffic and transport receptors. Developments which are either operational or in the decommissioning stage are considered to be part of the baseline and are not considered within the assessment.

Information for each of the cumulative developments was obtained from publicly available planning information. For the relevant developments identified, which are set out in Table 16-31, the cumulative assessment was undertaken where relevant.

Table 16-31 List of developments considered for the access, traffic and transport cumulative impact assessment

LOCATION	DEVELOPMENT TYPE	DEVELOPMENT NAME	DISTANCE FROM ONSHORE PROJECT AREA (KM)	DISTANCE FROM ONSHORE SUBSTATION SEARCH AREA (KM)	STATUS	CONFIDENCE[10]
Watten, Caithness	Onshore Windfarm	Cogle Moss	10.98	11.34	Consented	Medium
Thurso, Caithness	Onshore Windfarm	Corsback Hill	6.2	7.6	Pre-application (Scoping) *No traffic information is available to undertake a cumulative assessment.*	Low
Thurso, Caithness	Onshore Windfarm	Forss Windfarm Extension	0.51	18.21	Application	Low
Wick, Caithness	Onshore Windfarm	Golticlay Windfarm	14.46	15.53	Pre-application (Scoping) *Development located to south-west of Wick. No impact on the study area.*	Low

[10] *Confidence ratings have been applied to each cumulative development where: 'Low' = pre-application or application, 'Medium' = consented and 'High' = under construction or operational.*

LOCATION	DEVELOPMENT TYPE	DEVELOPMENT NAME	DISTANCE FROM ONSHORE PROJECT AREA (KM)	DISTANCE FROM ONSHORE SUBSTATION SEARCH AREA (KM)	STATUS	CONFIDENCE[10]
Kirkton, Caithness	Onshore Windfarm	Kirkton Energy Park	12.84	25.87	Application *The windfarm will generate HGV and light-vehicle traffic on the A9 between Scrabster and the A836, on the A836 to west of Thurso, and the A9 south of Thurso, during the construction stage.*	Low
Reay, Caithness	Onshore Windfarm	Limekiln Extension	5.53	15.1	Consented	Medium
Mybster, Caithness	Onshore Windfarm	Loch Toftinghall Windfarm	3.28	4.37	Pre-application (Scoping) *No traffic information is available to undertake a cumulative assessment.*	Low
Lochend, Caithness	Onshore Windfarm	Lochend Extension	14.76	16.92	Pre-application (Scoping) *No traffic information is available to undertake a cumulative assessment. In addition, the development is located to the east of Thurso, so unlikely to interact with the study area.*	Low
Melvich, Sutherland	Onshore Windfarm	Melvich Wind Energy Hub	12.54	26.87	Application *The windfarm will generate HGV and light-vehicle traffic on the A9 between Scrabster and the A836, on the A836 to west of Thurso, and the A9 south of Thurso, during the construction stage.*	Low

LOCATION	DEVELOPMENT TYPE	DEVELOPMENT NAME	DISTANCE FROM ONSHORE PROJECT AREA (KM)	DISTANCE FROM ONSHORE SUBSTATION SEARCH AREA (KM)	STATUS	CONFIDENCE[10]
Latheron, Caithness	Onshore Windfarm	Stemster Windfarm	15.35	14.87	Pre-application (Scoping) *No traffic information is available to undertake a cumulative assessment. Development located to south of Wick, so unlikely to interact with the study area.*	Low
Tormsdale, Caithness	Onshore Windfarm	Tormsdale Windfarm	4.75	5.54	Pre-application (Scoping) *No traffic information is available to undertake a cumulative assessment.*	Low
Watten, Caithness	Onshore Windfarm	Watten Windfarm	5	6.1	Pre-application (Scoping) *No traffic information is available to undertake a cumulative assessment.*	Low
Dounreay, Caithness	Transmission infrastructure – Substation Plant	Scottish Hydro Electric Transmission plc (SHET-L) Dounreay West Substation	2.35	18.6	Consented *Development does not appear to be of type to generate much traffic.*	Medium

LOCATION	DEVELOPMENT TYPE	DEVELOPMENT NAME	DISTANCE FROM ONSHORE PROJECT AREA (KM)	DISTANCE FROM ONSHORE SUBSTATION SEARCH AREA (KM)	STATUS	CONFIDENCE[10]
Dounreay, Caithness	Transmission infrastructure – Substation Plant	Pentland Floating Offshore Windfarm (PFOWF) Onshore Substation	2.35	18.6	Consented	Medium
Spittal, Caithness	Transmission infrastructure – Substation Plant	ESB Development Synchronous Compensator	0	0	Consented	Medium
Spittal, Caithness	Transmission infrastructure – Cables	Spittal Synchronous Compensator Grid Connection	0	0.24	Consented *Development does not appear to be of type to generate much traffic.*	Medium

There were a number of developments detailed in Table 16-31 that either have no available information regarding construction traffic flows (typically due to the development being at an early development stage); or traffic from the development will not affect roads in the study area. These developments include:

- Corsback Hill Windfarm;
- Golitclay Windfarm;
- Loch Toftinghall Windfarm;
- Lochend Windfarm Extension;
- Stemster Windfarm;
- Tormsdale Windfarm;
- Watten Windfarm;
- SHET-L Dounreay West Substation; and
- Spittal Synchronous Compensator Grid Connection.

The same impacts have been considered for the assessment of cumulative effects as were considered for the Project alone, namely:

- Impacts on road users as a result of increased generation of traffic (driver delay, accidents and safety);
- Impacts on local community (severance, pedestrian delay and amenity, dust and dirt); and
- Impacts on road carriageway and associated structures (wear and tear).

16.7.2 Cumulative construction effects

The potential for each of the developments listed in Table 16-31 to interact cumulatively with the onshore Project has been considered.

For each of the developments considered, the highest predicted traffic flows were during the construction stage. Consistent information regarding the construction programmes (and hence traffic generation throughout the construction periods) is not available for each of the developments carried forward. It has therefore been assumed that the construction programmes will overlap with the onshore Project peak construction period. This assures a robust assessment. Table 16-32 presents the peak construction traffic flows from each of the developments on the road links within the study area. Data has been obtained from the Environmental Statements, or Transport Assessments associated with each application.

Cumulative traffic impacts are limited to the A9 and A836 as these are the only common access routes used by all the developments (road links 2, 10, 15 and 16), with no cumulative effects predicted on the minor road network.

Table 16-32 Cumulative traffic flows

LINK REF	ROAD LINK	COGLE MOSS AADF	FORSS WINDFARM EXTENSION AADF	LIMEKILN EXTENSION AADF	ESB DEVELOPMENT SYNCHRONOUS COMPENSATOR AADF	PENTLAND FLOATING OFFSHORE WINDFARM ONSHORE SUBSTATION AADF	TOTAL
2	A836 west of Thurso	-	155	99	-	65	319
10	A9 between Roadside and Thurso	74	150	124	70	65	483
15	A9 south of C1014	73	150	124	70	65	482
16	A9 within Thurso	74	150	124	70	65	483

Table 16-33 presents the cumulative traffic flows, assuming that each of the developments will be under construction at the same time as the onshore Project, which is a very conservative assumption.

Table 16-33 Cumulative traffic flows and potential impact

LINK REF	ROAD LINK	BASELINE 2027 AADF	CONSTRUCTION TRAFFIC AADF	CUMULATIVE DEVELOPMENTS AADF	CONSTRUCTION + CUMULATIVE AADF	% IMPACT
2	A836 west of Thurso	2,628	493	319	812	31%
10	A9 between Roadside and Thurso	3,678	648	483	1,131	31%
15	A9 south of C1014	1,553	851	482	1,333	86%
16	A9 within Thurso	12,754	648	483	1,131	9%

Table 16-33 indicates that AADF could increase by between 9% and 86% on the A9 at the assessed locations, and by 31% on the A836.

The overall impact of this additional traffic would slightly worsen driver delay, accidents and safety, severance, pedestrian delay and amenity and dust and dirt impacts.

Each of the developments detailed above will be required to develop project specific CTMPs to mitigate wear and tear on the road network.

Congestion Reference Flow (CRF) for the A836 and A9 has been calculated. The CRF of a road link is an estimate of the AADF at which the carriageway is likely to be 'congested' in the peak periods on an average day. For the purposes of calculating the CRF, 'congestion' is defined as the situation when the hourly traffic demand exceeds the maximum

sustainable hourly throughput of the link. The calculated CRF for the A836 is 7,648 vehicles, which compares with the calculated 'with construction and cumulative' AADF of 3,440 vehicles. The calculated CRF for the A9 is between 33,000 and 35,000 vehicles, which compares with the calculated 'with construction and cumulative' AADF of between 2,886 and 13,885 vehicles.

The results therefore show that even with the addition of construction traffic from the onshore Project, and cumulative construction traffic (from the cumulative flows presented in Table 16-32), the AADFs on both the A836 and A9 will remain well below the calculated CRF.

The overall sensitivity of the A836 and A9 to cumulative effects (as a result of passing through settlements) is assessed as high. The magnitude of change as a result of cumulative impacts are assessed as low, resulting in a minor significance of effect, which is not significant in EIA terms.

The OMP2: Outline CTMP includes a recommendation that the Principal Contractor will be responsible for liaising with other concurrent developments in the area (potentially through THC) to identify any potential issues with particular peaks in construction traffic, or abnormal load deliveries that may coincide.

16.7.3 Cumulative operation and maintenance effects

Not assessed as operational impacts scoped out of the assessment.

16.7.4 Cumulative decommissioning effects

As there is limited information on the decommissioning of the onshore Project and that of other developments, at present, a thorough assessment of decommissioning cumulative effects has not been undertaken. Nonetheless, it is expected that the cumulative effects are likely to be less than or equal to the construction stage, given the decommissioning will be a largely a reverse process to that of construction. Furthermore, decommissioning of multiple other developments would not be expected to occur at the same time as the decommissioning stage of the onshore Project.

A Decommissioning Restoration and Aftercare Plan will be developed and approved pre-construction to address the principal decommissioning measures for the onshore Project and will be written in accordance with applicable guidance. The Decommissioning, Restoration and Aftercare Programme will detail the environmental management, and schedule for decommissioning and will be reviewed and updated throughout the lifetime of the onshore Project to account for changing best practices.

16.7.5 Summary of cumulative effects

A summary of the outcomes of the assessment of cumulative effects for the construction and decommissioning stages of the onshore Project is provided in Table 16-34.

Table 16-34 Summary of assessment of cumulative effects

POTENTIAL IMPACT	RECEPTOR	SENSITIVITY OF RECEPTOR	MAGNITUDE OF IMPACT	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANT OF EFFECT)
Construction and decommissioning						
Driver delay, accidents and safety, severance, pedestrian delay and amenity.	Road users, cyclists and pedestrians, members of local communities.	High	Low	Minor (not significant)	None required above embedded mitigation measures.	Minor (not significant)

16.8 Inter-related effects

Inter-related effects are the potential effects of multiple impacts, affecting one receptor or a group of receptors. Inter-related effects include interactions between the impacts of the different stages of the onshore Project (i.e. interaction of impacts across construction, operation and maintenance and decommissioning), as well as the interaction between impacts on a receptor within an onshore Project stage. The potential inter-related effects for access, traffic and transport are described below.

16.8.1 Inter-related effects between onshore Project stages

The inter-related effects of different construction stages have been considered within the assessment of construction traffic (section 16.6), which assumes that different concurrent tasks will be undertaken at different locations throughout the study area at the same time, as per the worst case scenario.

16.8.2 Inter-related effects within an onshore Project stage

The generation of construction traffic has the potential to impact receptors in terms of noise and air quality. These impacts have been taken into account in chapter 15: Noise and vibration and chapter 14: Air quality of the Onshore EIA Report.

16.9 Whole Project assessment

The offshore Project is summarised in chapter 5: Project description and a summary of the effects of the offshore Project is provided in chapter 18: Offshore EIA Summary. These offshore aspects of the Project have been considered in relation to the impacts assessed in section 16.6.

In the case of access, traffic and transport, there is the potential for overlap relating to personnel travelling overland to ports where offshore components will be constructed. It is estimated that up to 50 personnel could travel each day to these locations, but at present the 'pre-assembly ports' have yet to be identified.

SYSTRA consider this effect to be negligible or minor, and not significant in EIA terms.

16.10 Transboundary effects

There is no potential for transboundary impacts upon access, traffic and transport receptors due to construction, operation and maintenance and decommissioning of the onshore Project. The potential impacts are localised and will not affect other European Economic Area (EEA) states. Therefore, transboundary effects for access, traffic and transport do not need to be considered further.

16.11 Summary of mitigation and monitoring

Secondary mitigation has been identified to reduce potentially significant effects on access, traffic and transport to acceptable levels. This mitigation has been identified within section 16.6 and is summarised in Table 16-35.

Table 16-35 Secondary mitigation requirements

SECONDARY MITIGATION	SECURED BY
Pre- and post-construction Roads Conditions Surveys will be undertaken along all of the construction routes (with the exception of the A9 and A836). These will identify any damage caused by construction vehicles and ensure that the developer is responsible for any repairs.	Provision of a wear and tear agreement under Section 96 of the Roads (Scotland) Act 1984 will be adhered to. Pre- and post-construction Roads Conditions Surveys will be undertaken along all of the construction routes, including passing places (with the exception of the A9 and A836). These will identify any damage caused by construction vehicles and ensure that the developer is responsible for any repairs. In addition, an appropriate financial bond will be required to THC in respect of any road reconstruction works.

The proposed secondary mitigation, as detailed above, will include surveys to monitor the condition of roads used by the Project. No further mitigation or monitoring is proposed for access, traffic and transport.

16.12 References

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16.13 Abbreviations

ACRONYM	DEFINITION
AADF	Average Annual Daily Flow
ALA	Abnormal Loads Assessment
APA	Asset Protection Agreement
ATC	Automatic Traffic Counter
BAPA	Basic Asset Protection Agreement
CaSPlan	Caithness and Sutherland Local Development Plan
CLO	Community Liaison Officer
CMS	Construction Method Statement
COBA	Cost Benefit Analysis
CRF	Congestion Reference Flow
CTMP	Construction Traffic Management Plan
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
EEA	European Economic Area
EIA	Environmental Impact Assessment
ESB	Electricity Supply Board
EU	European Union
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HwLDP	Highland-wide Local Development Plan
IEMA	Institute of Environmental Management and Assessment
IHT	Institute of Highways and Transportation
m	Metres
MD-LOT	Marine Directorate - Licensing Operations Team
M&E	Mechanical and Electrical
Mph	Miles per hour

ACRONYM	DEFINITION
MS-LOT	Marine Scotland - Licensing Operations Team
Mvkm	Millions of vehicle-kilometres
NPF	National Planning Framework
NC500	North Coast 500
NRTF	National Road Traffic Forecast
NTS	National Transport Strategy
OIC	Orkney Islands Council
OP	Outline Plan
OWPL	Offshore Wind Power Limited
PDE	Project Design Envelope
PFOWF	Pentland Floating Offshore Windfarm
PIA	Personal Injury Accidents
PPP	Planning Permission in Principle
RSA	Road Safety Audit
RTGND	Roads and Transport Guidelines for New Developments
S2	Single-carriageway, two-way road
SHET-L	Scottish Hydro Electric Transmission plc
SS	Supporting study
SSE	Scottish and Southern Electricity
TA	Transport Assessment
THC	The Highland Council
TJB	Transition Joint Bay
UHI	University of the Highlands and Islands
USB	Universal Serial Bus
WCHAR	Walking, Cycling and Horse-Riding Assessment
ZoI	Zones of Influence

16.14 Glossary

TERM	DEFINITION
Average annual daily flow	The average over a full year of the number of vehicles passing a point in the road network each day.
Congestion Reference Flow	The CRF of a road link is an estimate of the AADF at which the carriageway is likely to be 'congested' in the peak periods on an average day.
Over-run	Where vehicles, typically HGV, drive over the verge on the edge of a surfaced road, typically on narrow sections of minor roads, or at junctions that are too small to accommodate larger vehicles.
Personal injury accidents	An accident which results in harm to a person, rather than property.