Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

Volume 1

Chapter 26 - Traffic & Transport

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Glossary of Acronyms

BDC	Broadland District Council
CBS	Cement Bound Sand
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
DEP	Dudgeon Offshore Wind Farm Extension Project
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
GEART	Guidelines for the Environmental Assessment of Road Traffic
HDD	Horizontal Directional Drill
HE	Highways England
HGV	Heavy Goods Vehicle
HP3	Hornsea Project Three
HVAC	High-Voltage Alternating Current
km	Kilometre
LCV	Light Commercial Vehicle
MW	Megawatts
NB	Norfolk Boreas
NNDC	North Norfolk District Council
NCC	Norwich City Council
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NV	Norfolk Vanguard
OAMP	Outline Access Management Plan
OTMP	Outline Traffic Management Plan
OTP	Outline Travel Plan
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance

SCC	Suffolk County Council
SEP	Sheringham Shoal Extension Project
SNC	South Norfolk Council
SNS	Southern North Sea
TCC	Temporary Construction Compound
UK	United Kingdom

Glossary of Terms

The Applicant	Equinor New Energy Limited
Array cables	Cables which link the wind turbine generators to the offshore substation platforms.
Delivery	A delivery is the process of transporting goods from a source location to a predefined destination. A delivery will generate two vehicle movements (an arrival and departure).
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Groups (ETG)	As part of the EPP, Expert Topic Groups formed by specialist stakeholders to agree the approach, and information to support the EIA for certain topics.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable corridor which would house HDD entry or exit points.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable corridor to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor search area	The areas being considered within which the onshore cable corridor would be located. A single landfall location and onshore cable corridor will be identified prior to PEIR.
Onshore cable corridor	200m wide onshore corridor (wider than 200m in several locations) within which the onshore cable corridor will be refined.
Onshore scoping area	An area that encompasses all planned onshore infrastructure and allows sufficient room for receptor

	identification and environmental surveys. This will be refined following further site selection and consultation.
Onshore Substation sites	Parcels of land within onshore substation zones A and B, identified as the most suitable location for development of the onshore substation. Two sites have been identified for further assessment within the PEIR
Onshore Substation Zone	Parcels of land within the wider onshore substation search area identified as suitable for development of the onshore substation. Two substation zones (A and B) have been identified as having the greatest potential to accommodate the onshore substation.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension offshore wind farm boundary.
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Vehicle (HGV, Traffic) movement/Trip	A single trip (i.e. either an arrival to, or departure from site) for the transfer of employees or goods.

26 Traffic and Transport

26.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the potential impacts of the proposed Dudgeon Offshore Wind Farm Extension Project (DEP) and Sheringham Shoal Offshore Wind Farm Extension Project (SEP) on Traffic and Transport. The chapter provides an overview of the existing environment for the proposed onshore development, followed by an assessment of the potential impacts and associated mitigation for the construction, operation, and decommissioning phases of DEP and SEP.
2. This assessment has been undertaken with specific reference to the relevant legislation and guidance, of which the primary source are the National Policy Statements (NPS). Details of these and the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) are presented in **Section 26.4**.
3. The assessment should be read in conjunction with the following linked chapters:
   - **Chapter 24 Air Quality**;
   - **Chapter 25 Noise and Vibration**;
   - **Chapter 29 Socio-Economics**; and
   - **Chapter 30 Health**.
4. Additional information to support the traffic and transport assessment includes:
   - **Appendix 26.1 Transport ETG Meeting Minutes**;
   - **Appendix 26.2 Norfolk County Council Route Hierarchy**;
   - **Appendix 26.3 Summary of 2020 ATC Flows and Covid19 Uplift Factor**;
   - **Appendix 26.4 Link Sensitivity**;
   - **Appendix 26.5 Growth Factors**;
   - **Appendix 26.6 Construction Materials Demand**;
   - **Appendix 26.7 Derivation of Construction Material Quantities and Associated HGV Demand**;
   - **Appendix 26.8 HGV Assignment by Port**;
   - **Appendix 26.9 HGV Assignment by Access**;
   - **Appendix 26.10 HGV Distribution**;
   - **Appendix 26.11 In-migrant Labour Distribution**;
   - **Appendix 26.12 Resident Labour Distribution**;
   - **Appendix 26.13 LCV Distribution**;
   - **Appendix 26.14 Summary of HGV and LCV per Link**;
   - **Appendix 26.15 Pedestrian and Cycle Delay Assessment**;
   - **Appendix 26.16 Personal Injury Collision Summary**; and
   - **Appendix 26.17 Peak Hour Traffic Flows per Link**.

26.2 Consultation

5. Traffic and Transport consultation has been undertaken following the general process described in **Chapter 6 EIA Methodology**. The key elements have been scoping and the ongoing Evidence Plan Process (EPP) via the Traffic and Transport Expert Topic Group (ETG). The feedback received has been considered in preparing the PEIR. **Table 26-1** provides a summary of how the consultation responses have influenced the approach that has been taken.

6. This chapter will be updated following the consultation on the PEIR to produce the final assessment that will be submitted with the Development Consent Order (DCO) application. Full details of the consultation process will also be presented in the Consultation Report alongside the DCO application.

Table 26-1: Consultation responses.

Consultee	Date/ Document	Comment	Project Response
Planning Inspectorate	19/11/19 Scoping Response	The Inspectorate agrees that significant operational effects from traffic and transport are unlikely and that this matter can be scoped out of the assessment.	**Section 26.3.2.3** details the rationale for scoping out the operational assessment.
		The onshore traffic associated with offshore construction is an impact arising from the Proposed Development and the Inspectorate considers that the likely significant effects of the whole scheme should be assessed. Therefore, the transport of elements for the Proposed Development should be assessed where significant effects could occur.	Norfolk County Council (NCC) agreed during traffic and transport ETG (minutes provided in **Appendix 26.1**) that onshore traffic associated with offshore construction can be dealt with by means of a requirement for a Port Traffic Management Plan.
		The Inspectorate agrees that significant transboundary effects from traffic and transport are unlikely and therefore this matter can be scoped	**Section 26.4.5** details the rationale for scoping out the transboundary effects from the assessment.

Consultee	Date/ Document	Comment	Project Response
		out of the Environmental Statement (ES).	
		The assumptions made in deriving the traffic demand should be clearly explained within the ES and the maximum parameters should be applied in terms of the Rochdale envelope approach to the assessment.	**Section 26.3.2** provides details of the realistic worst case scenario following the Rochdale envelope approach to assessment. **Section 26.6** provides full details of traffic demand.
		The Inspectorate considers that the assessment should assess cumulative impacts with Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas in respect of Oulton airfield and Cawston village.	**Section 26.7** sets out traffic flows from Hornsea Project Three (HP3), Norfolk Vanguard (NV) and Norfolk Boreas (NB) and details the methodology for a cumulative impact assessment (CIA) to be provided with the DCO application.
		The Inspectorate expects clear definitions of magnitude of effect to be provided within the ES for all environmental effects.	**Section 26.4.3.3** contains the definitions of magnitude of effect for all identified environmental effects.
Norfolk County Council	19/11/19 Scoping Response	The applicants will need to submit a full Transport Assessment (TA). The TA will need to assess the effects of the anticipated traffic upon driver delay; severance; pedestrian delay; pedestrian amenity; accidents; road safety; and impact from abnormal loads.	A preliminary Transport Assessment (TA) is contained within this Chapter of the PEIR. A full TA will be provided with the DCO Application.

Consultee	Date/ Document	Comment	Project Response
		The applicants need to provide details of Vehicles. • Define the nature of the traffic likely to be generated. In addition, for the largest vehicles proposed to use each access route(s) this must include: - • Minimum width (including unhindered horizontal space). • Vertical clearance. • Axle weight restriction.	**Table 26-18** of **Section 26.6** details types of Heavy Goods Vehicles (HGVs) that will be utilised in the construction of onshore infrastructure.
		The applicants need to provide details of Access and Access Routes • The anticipated volume of construction traffic needs to be identified for each individual route • Detailed plans of site accesses incorporating sightline provision. • Details of any routes to be stopped up. • Confirmation of any weight restrictions applicable on the route.	**Section 26.6** provides details of anticipated volume of construction traffic for each link in the Traffic and Transport Study Area (TTSA) . An Outline Access Management Plan (OAMP) will be provided with the DCO application and will include access details. An Outline Traffic Management Plan (OTMP) will be provided with the DCO application and will include applicable weight restrictions and stopping up details on identified access routes.

Consultee	Date/ Document	Comment	Project Response
		• Details of any street furniture along each route that may need to be temporarily removed/ relocated. • Any roads to be crossed by open cut trench methods need to be agreed in advance with the Highway Authority.	An Abnormal Indivisible Load Study will be included with the DCO application and will include details on potential street furniture removal. Details of roads requiring open cut trenching are provided in **Section 26.6.**
		The applicants need to provide details of Impacts During Construction and mitigation measures. • Restrictions on the timing of construction works. • Removal of parked vehicles along the route(s) and potential mitigation measures. • Identification of the highway boundary along the construction traffic route (if required). • Any modifications required to the alignment of the carriageway or verges/over-runs.	**Section 26.6** discusses potential mitigation measures required for identified significant environmental impacts. This mitigation will be captured in a future OTMP and Outline Travel Plan (OTP) to be submitted as part of the DCO application.

Consultee	Date/ Document	Comment	Project Response
		• Identification of sensitive features along the route together with proposed mitigation measures. • Confirmation of any extraordinary maintenance agreement/s required by the Highway Authority. • A Construction Traffic Management Plan. • Measures proposed to avoid Impacts upon traffic during the tourist season • Requirements for a Travel Plan (TP).	
		The cable route passes close to Oulton airfield which is intended to serve as a main compound for Hornsea 3; a mobilisation area for Norfolk Vanguard; and also a mobilisation area for Norfolk Boreas. The applicants need to identify any cumulative impacts arising from their proposals.	**Section 26.7** details the cumulative projects and methodology to inform a CIA assessment to be provided with the DCO application.
		The cable route passes close Cawston village which accommodates construction traffic for Hornsea 3; Norfolk	**Section 26.7** details the cumulative projects and methodology for a CIA assessment to be

Consultee	Date/ Document	Comment	Project Response
		Vanguard and also Norfolk Boreas. The applicants need to identify any cumulative impacts arising from their proposals.	provided with the DCO application. No HGV construction traffic will route through Cawston Village. This commitment is included as embedded mitigation (**Table 26-3**) and will be captured within a future OTMP to be submitted as part of the DCO application.
		The signalised junction at Harford has been identified as already being over capacity. It is anticipated this project will need to utilise this junction for construction works to reach the substation. Highways England have previously expressed concern with this junction due to potential for traffic to stack back to the A47(T) roundabout.	**Table 26-30** details identified sensitive junctions to inform further discussions with NCC / Highways England (HE) regarding the need for junction capacity assessment Post PEIR.
Oulton Parish Council	19/11/19 Scoping Response	Oulton Parish Council commented on the access strategy of HGV movements via the 'A' road network. OPC state the cable route proposed will be accessed mostly by 'B' roads and unclassified roads. OPC requested early consultation with NCC,	NCC are included in the Traffic and Transport Expert Topic Group and will be consulted at all stages of the planning process. The information in this PEIR will be used to consult with Local Planning Authorities and people with an interest in the land to which the application relates (under Section 42 of the

Consultee	Date/ Document	Comment	Project Response
		District Councils and Parish Councils as these bodies have local knowledge and specific concerns.	Planning Act), with local communities (under Section 47) and more widely through the general notification of a proposed application (under Section 48).
Weybourne Parish Council	19/11/19 Scoping Response	Weybourne Parish Council raised concerns that the road infrastructure is inadequate to gain access to the Landfall location by HGVs. Also request that Equinor consider the use of barges and pontoons to bring construction machinery and materials to the Landfall site.	The assessment is based on a worst case scenario where all materials are transported via the road network. The assessment has considered the maximum size of vehicle to be used at the landfall location. **Figure 26.1** details the TTSA.
Highways England	17/01/20 Traffic and Transport ETG 1	Baseline Data - Highways England would require baseline traffic data to be less than three years old for the Strategic Road Network (SRN).	A Method Statement was produced to inform the second meeting of the ETG (**Appendix 26.1**) which included the proposed method of traffic data collection. A subsequent note (produced by HE's highway consultants Aecom) reviewed the Method Statement raising no concerns relating to the proposed data collection methodology.
		Junction Delay - Highways England advised that a vehicle threshold of more than 30 two-way construction	**Table 26-29** details peak hour traffic flows of more than 30 two-way on all links within the TTSA to inform further discussions

Consultee	Date/ Document	Comment	Project Response
		vehicle movements per hour could require junction capacity assessments. However, the effect may only be significant when traffic blocks back toward another junction.	with NCC / HE regarding the requirement for junction capacity assessment post-PEIR.
Norfolk County Council	17/01/20 Traffic and Transport ETG 1	NCC stated that if Oulton was to be considered as a location for a compound that traffic impacts would need to be investigated.	**Figure 26.4** details current locations of proposed Temporary Construction Compounds (TCCs) assessed within this PEIR. The location of all TCCs will be confirmed post-PEIR and assessed as part of the ES submitted as part of the DCO application.
		NCC stated that when establishing sensitivity of routes, consideration should be given to routes where there would be higher seasonal holiday traffic and routes identified as 'traffic sensitive' by NCC.	**Section 26.5.3** provides the rationale for the sensitivity of all links within the TTSA. **Section 26.5.3.1** details 'traffic sensitive' routes.
		NCC stated caps on vehicle movements might need to be agreed for certain links.	**Section 26.5.3.1** provides details on 'traffic sensitive routes' on all links within the TTSA to inform further discussions with NCC / HE regarding the requirement for traffic management measures post-PEIR.
		NCC suggested that access to the existing Norwich Main substation via the A140 would be preferred due to existing	At this stage, the Applicant is considering options for accessing the substation from either the A140 or the B1113. The

Consultee	Date/ Document	Comment	Project Response
		capacity constraints at the B1113 Harford signalised junction.	final access strategy will be finalised post-PEIR for inclusion in the DCO application. **Section 26.6** provides full details of traffic demand, distribution and assignment associated with the construction of the substation and the potential impacts upon the A140 and B1113.
		NCC informed the applicant about a proposed planning application for commercial land use for a site located in the triangle of land between the A140 near Harford Bridge and the B1113. These proposals would need to be taken account for any AIL route assessment if access was taken from the B1113.	**Section 26.4.3.1.9** provides details of the routes to be used by AILs. No AILs are proposed to route via the A140 near Harford Bridge and the B1113.
		NCC identified roads between the A47 at Honingham and the Norwich Northern Distributor Road within the Wensum valley as a sensitive area. In particular NCC would not support the use of U78206 Church Lane. The C174 Taverham Road was highlighted as problematic.	**Section 26.6** provides full details of traffic demand, distribution and assignment incorporating NCC's feedback.
		NCC agreed that if available, the Norwich	**Section 26.6** provides full details of traffic demand,

Consultee	Date/ Document	Comment	Project Response
		Western Link (NWL) should be used (construction proposed to start 2022 and complete by 2025, if approved). However, a worst case assessment of using local roads may need to be developed.	distribution and assignment. A worst case assessment has been undertaken where only currently available roads are used for the impact assessment.
		NCC suggested that the Third River Crossing in Great Yarmouth should be considered in the Cumulative Impact Assessment.	**Section 26.4.4** and **Section 26.7** detail the inclusion of the Third River Crossing into the CIA.
		NCC agreed that where existing traffic counts from Norfolk Vanguard and Hornsea Project Three are available, these could be used to inform the baseline traffic data informing the assessment for roads managed by NCC.	**Section 26.4.2.1** details the traffic data collection methodology. **Section 26.5.2** provides details of the derivation of future baseline traffic flows.
		NCC suggested that Travel Planning measures should be developed for DEP and SEP.	An OTP will be provided with the DCO application and will include travel planning measures where appropriate.
		NCC agreed that onshore impacts from offshore construction can be scoped out and could be addressed by way of a DCO Requirement for a Port Traffic Management Plan.	To be incorporated in the draft DCO.
		NCC noted that where junction geometry constrains two-way traffic,	**Table 26-29** details peak hour traffic flows of more than 30 two-way

Consultee	Date/ Document	Comment	Project Response
		a small increase in construction traffic could lead to significant delays. NCC suggested reviewing mitigation measures proposed as part of the Hornsea Project Three.	movements on all links within the TTSA to inform further discussions with NCC / HE regarding the need for junction capacity assessment post-PEIR.
Highways England	18/10/20 Traffic and Transport ETG 2	HE indicated that they would consider temporary access proposals for access off the A47.	**Figure 26.4** details locations of potential temporary access locations.
		HE stated that Cantley Road should not be used for construction traffic as it is not adequate for HGVS.	No construction traffic will use Cantley Road. This commitment is included within embedded mitigation (**Table 26-3**) and will be captured within a future OTMP to be submitted as part of the DCO application. **Figure 26.1** details the TTSA.
		HE outlined that junction capacity modelling may be required at the A47/A140 junction.	The A47/A140 'Harford' junction has been identified as a sensitive junction for capacity modelling post-PEIR.
		HE raised the possibility that further scenarios may need to be assessed based on future A47 RIS, which may be complete or still undergoing construction.	**Section 26.7** details the cumulative projects and methodology for a CIA to be provided with the DCO application.
Norfolk County Council	18/10/20 Traffic and Transport ETG 2	NCC suggested that the A149 and A148 experience high tourist traffic during the summer season, therefore link sensitivity and vehicle	**Section 26.5.3.1** details 'traffic sensitive' routes including the A148, A149, A1067 and the B1436 including details of

Consultee	Date/ Document	Comment	Project Response
		caps may be required during the summer period.	existing and potential HGV caps.
		NCC suggested that the A148 and the A1067 should have HGV caps for sensitive AM and PM commuting peaks.	
		NCC requested that the B1436 may require a HGV cap due to holiday season traffic.	
		NCC stated that traffic movements along Chapel Street and Church Road close to Barford should be limited.	**Section 26.5.3.1** details 'traffic sensitive' routes including Chapel Street and Church Road. **Section 26.6** provides full details of traffic demand, distribution and assignment.
		NCC requested that Blind Lane was not to be used due, to the high levels of mitigation that would be required to make it suitable for use.	No HGV construction traffic will use Blind Lane. This commitment is included within embedded mitigation (**Table 26-3**) and will be captured within a future OTMP to be submitted as part of the DCO application. DEP and SEP TTSA is detailed in **Figure 26.1**.
		NCC stated that traffic calming measures were due to be installed on Hempstead Road (October 2020). Construction traffic should avoid this route.	Hempstead Road (Link 60) has been identified as a construction access route. The Applicant will determine the scope of the traffic calming and any mitigation prior to

Consultee	Date/ Document	Comment	Project Response
			finalising the assessment to support the DCO application. **Section 26.6** provides full details of traffic demand, distribution and assignment.
		NCC requested a review of potential additional Horizontal Directional Drills (HDD) at the following locations • Inkwood Lane • Taverham Road • Ringland Lane • Oulton Street • B1149	Taverham Road, Inkwood Lane, Ringland Lane and Oulton Street are proposed as open cut construction. An assessment of the impacts of open cut construction upon these links is provided in **Section 26.6**. B1149 has been revised to a trenchless crossing method.
		NCC provided changes required to proposed sensitivity receptor levels including seasonal changes.	**Section 26.5.3** includes the requested changes to link sensitivity levels by NCC.
		NCC suggested that the assessment should include consideration of whether roads serve sensitive infrastructure, e.g. schools, bus routes or hospitals.	The sensitivity of links has been determined by the criteria as detailed in **Section 26.4.3.2.**
		NCC suggested the TMP should include a liaison strategy between all stakeholders to ensure any unforeseen or unplanned issues can be	An OTMP will be provided with the DCO application and will include details of the liaison strategy.

Consultee	Date/ Document	Comment	Project Response
		managed during construction.	
		NCC suggested the TMP should consider seasonal sensitivities and planned events.	An OTMP will be provided with the DCO application and will include measures for seasonal sensitivities and event planning.
		NCC agreed to scope out assessment of operational and decommissioning impacts.	**Section 26.3.2.3** and **Section 26.3.2.4** detail the scope of Operational and Decommissioning impacts assessment.
		NCC agreed the approach to assess a worst case scenario of DEP and SEP being built together)	**Section 26.3.2** details the realistic worst case assessment scenario of DEP and SEP being built concurrently as agreed with stakeholders.
		NCC agreed proposals to use 2025 as the construction assessment year and the use of TEMPro growth factors	**Section 26.5.5** provides detail of the derivation of future year traffic.
Highways England	22/10/2020 Traffic and Transport Method Statement Response (Ref: 60600479 / DN063.001	Direct access from the SRN should be avoided wherever possible; and if direct access is considered essential, appropriate evidence should be put forward as to the proposed design and traffic management measures to ensure its safe operation.	**Figure 26.4** details locations of potential access locations on the A47. Further details of access design and appropriate supporting evidence to be provided following PEIR feedback.
		A 5 year period should be adopted for collision analysis to identify collision clusters and better understand any causation factors, ensuring that this does	**Section 26.5.4** provides details of collision data capture for the SRN.

Consultee	Date/ Document	Comment	Project Response
		not include any dates where traffic flows were affected by the Covid-19 pandemic.	
		The background traffic growth approach should be clarified in the Transport Assessment and traffic growth should be calculated from the year of the data for each data source and uplifted to the opening or reference year.	**Section 26.4.2.1** details the traffic data collection methodology. **Section 26.5.2** provides details of the derivation of reference baseline (2020) traffic flows. **Section 26.5.5** provides details of the derivation of future year traffic flows (2025).
		Information of the derivation of hotel beds per postcode and where the entry points for users of these hotels are within the network should be clearly outlined within the forthcoming TA so that the appropriate checks can be undertaken on the assignment of these trips.	**Section 26.6.1.4.3** provides evidence of journey origin for In-migrant works to support highway assignments. **Figure 26.8** details employee distribution into the TTSA including points of access.
		Network diagrams of the employee traffic distribution and assignment should be included within the future submitted TA. (Para 6.19)	Network Diagrams will be provided in the TA as part of the DCO submission
		HE advised Google traffic travel times that form the basis of the employee gravity model should be based upon the typical AM peak travel times on a	**Section 26.6.1.4.3** details an AM peak (7am to 8am) for a neutral weekday has been used for the derivation of HGV and employee gravity models.

Consultee	Date/ Document	Comment	Project Response
		neutral weekday rather than live journey time.	
		HE requested that the inter-relationship between the A47 Corridor Improvement Programme (as part of the Governments RIS) and DEP/SEP be investigated.	**Section 26.7** details the cumulative projects and methodology for a CIA assessment to be provided with the DCO application.
		HE requested that for the PEIR, hourly derivation of construction vehicle movements through junctions be made available for scrutiny. Further junction capacity modelling may be required for junctions that exceed 30 two-way movements per hour.	**Section 26.6.1.10** details the hourly movement of construction vehicles and identifies links which exceed 30 two-way movements.
		HE identified specific junctions on the SRN that would require review in relation to collisions, junction capacity and relationship with relevant RIS. The junctions included the following; • A47 / Taverham Road junction • A47 to the west of Easton • A47 Easton Roundabout • A11 / Station Lane Junction • A11 / A47 Thickthorn Junction	**Section 26.6.1.9** details road safety impacts for identified collision clusters. **Section 26.6.1.10** details the hourly movement of construction vehicles and identifies links which exceed 30 two-way movements. **Section 26.4.4** details the CIA methodology and inclusion of identified RIS for impact assessments.

Consultee	Date/ Document	Comment	Project Response
		• A47 / A140 Harford Junction	

26.3 Scope

26.3.1 Traffic and Transport Study Area

7. The Traffic and Transport Study Area (TTSA) for traffic and transport has been established through stakeholder engagement and by determining the most probable routes for traffic, for both the movement of materials and employees. The study area has been divided into highway sections known as links. In total the TTSA comprises 156 links; these are shown in **Figure 26.1**.

8. Routes that extend outside of the TTSA are assumed to be where construction traffic has a negligible magnitude of effect and significant impacts are unlikely.

26.3.2 Realistic Worst Case Scenario

26.3.2.1 General Approach

9. The final design of DEP and SEP will be confirmed through detailed engineering design studies that will be undertaken post-consent. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst case scenarios have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the realistic worst case scenario for each individual impact, so that it can be safely assumed that all lesser options will have less impact. Further details are provided in **Chapter 6 EIA Methodology**.

26.3.2.2 Construction Scenarios

10. The following principles set out the framework for how DEP and SEP may be constructed:

- Scenario 1 – Construct DEP and SEP in isolation requiring a four year period of construction for a single project;
- Scenario 2 – Construct DEP and SEP concurrently requiring a total construction period of four years; and
- Scenario 3 – Construct DEP and SEP sequentially with a gap of up to four years between the start of construction of the first Project, and the start of construction of the second Project. The duration of the gap between end of onshore construction of the first project, and the start of onshore construction of the second project may vary from 0 to 2 years.

11. The construction scenarios are described in detail in **Chapter 5 Project Description**. This PEIR has been developed on the basis of DEP and SEP concurrent scenario only and has been agreed with stakeholders through the traffic and transport ETG (**Appendix 26.1**). DEP and SEP concurrent scenario is considered to represent the worst case two project scenario as there would be an increased intensity of labour and deliveries of materials to construct DEP and SEP concurrently.

12. It is further proposed that Scenario 1 (to construct DEP and SEP in Isolation) will be assessed and provided as part of the DCO application. Noting that the likely construction traffic flows and resultant impacts will be less than DEP and SEP concurrent scenario presented in this PEIR.

26.3.2.3 Operation Scenarios

13. During the operational phase, traffic movements would be limited to those generated by the daily Operational & Maintenance (O&M) activity at the onshore substation. There is no ongoing requirement for regular maintenance of the onshore cables following installation, however access to the onshore export cables would be required to conduct emergency repairs, if necessary.

14. The onshore substation will not be manned; however, access will be required periodically for routine maintenance activities, estimated at an average of one visit per week.

15. No significant traffic impacts are anticipated during the O&M phase and as agreed with stakeholders through the EPP (**Appendix 26.1**) and as set out in the scoping opinion, no operational scenarios will be assessed within this traffic and transport impact assessment.

26.3.2.4 Decommissioning Scenarios

16. Decommissioning scenarios are described in detail in **Chapter 5 Project Description**. No final decision has yet been made regarding the final decommissioning policy for DEP and SEP infrastructure including landfall, onshore cable corridor and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that DEP and SEP equipment, including the cable, will be removed, reused or recycled where possible, with the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that, for the purposes of a worst-case scenario, the impacts will be no greater than those identified for the construction phase. Therefore, no separate assessment of decommissioning scenario impacts will be presented within the EIA.

26.3.2.5 Realistic Worst Case – DEP and SEP Concurrent Scenario

17. This section identifies the realistic worst case parameters of the onshore infrastructure that are relevant to potential impacts on traffic and transport during DEP and SEP concurrent scenario construction, operation and decommissioning phases of DEP and SEP. **Table 26-2** summarises the parameters and rationale for inclusion and are based on the detailed DEP and SEP parameters described in **Chapter 5 Project Description**.

Table 26-2: Realistic Worst Case Scenario.

Effects	Parameter	Notes and Rationale
Construction – DEP and SEP Concurrent Scenario		
Severance Pedestrian and cyclist amenity Pedestrian and cycle delay Road Safety Driver Delay (capacity) Driver Delay (road closures) Driver Delay (highway constraints)	Minimum construction duration for onshore DEP and SEP concurrent works of 36 months	The minimum realistic duration that the onshore works can be completed in, resulting in the highest traffic demand due to the intensity of activities.
	Minimum duration for individual construction activities.	Minimum durations for individual activities within the 36 month programme have been adopted to represent the peak traffic demand for each activity.
	Full overlap of the peak period for all discrete components of the onshore infrastructure, namely • Landfall location • Onshore cable corridor sections including trenchless crossings • Onshore substation	Represents maximum possible intensity of activities resulting in peak traffic generation.
	Earliest start of construction 2024	It is currently considered that the earliest date that construction could commence would be summer 2024, however the majority of work in 2024 would be enabling works (generating minimal traffic demand) with the main construction works likely to start in 2025 at the earliest. Therefore 2025 has been adopted as a baseline year for background traffic growth in order to consider the greatest potential for change and has been used for the traffic and transport assessment presented in this PEIR. Background traffic growth for a later start date would be subject to further growth and therefore

Effects	Parameter	Notes and Rationale
		increases in DEP and SEP traffic would be less significant.
	An employee per vehicle ratio of 1.	An employee to vehicle ratio of 1 employee per vehicle represents a worst case. An Outline Travel Plan will be submitted with the DCO application to improve the employee to vehicle ratio and reduce employee traffic.
	No reduction to project traffic applied for construction workers to allow for travel by non-car modes (e.g. bus, rail, walking and cycling) has been applied to traffic demand.	Distributing construction employee travel to work by car results in a higher traffic demand for the purpose of a worst case assessment. A potential sustainable travel mode share will be determined and incorporated into an OTP to be included with the DCO application.
	Haul road (6m wide, 0.4m deep) to be provided within the onshore cable corridor for the entire length (60km). A total of 259,200 tonnes of stone will be required for the construction of the haul road	A base assumption to inform the impact assessment. However, as detailed design progresses, any reduction in the length of haul road, through the implementation of construction techniques such as ground stabilisation, or use of tracked vehicles, would result in a reduction in HGV movements.
	Offsite removal of surplus material excavated (110,274 tonnes) due to ducting, joint bay construction and associated stabilised backfill such as Cement Bound Sand (CBS).	Although it is conventional to spread surplus spoil within the onshore cable corridor, this assessment assumes a worst case that a quantity of surplus excavated material cannot be spread and is removed off site.
	Assessment based upon a five day working week. Noting that it is likely that there will be a requirement for Saturday working (7am – 1pm) and Sunday working	Results in robust peak traffic generation as deliveries are condensed over five days rather than five and a half.

Effects	Parameter	Notes and Rationale
	for critical activities; such as HDD	
	Daily HGV movements derived based upon 22 working days per month (equivalent to five day working).	
	HGVs deliveries profiled over a 10 hour window	A 7 am to 7pm (12hr) 'delivery window' has been assumed with ten hours delivery time allocated
	Workers arriving for work in the morning and departing for home at night are assumed to overlap with the morning and evening peak hours	Ensures the assessment of driver delay impacts considers a worst case of peak construction worker movements overlapping with peak background traffic.
	An appropriate level of contingency (reflecting the uncertainties in the design) has been applied to all material quantities, full details are contained within **Appendix 26.7**	Ensures minor omissions or design changes can be accommodated within the assessed traffic flows.
Abnormal Loads	Onshore substation transformers Number: 4 (2 per Project) Length: 11.6m Width: 4.7m Height: 4.6m Weight: 224 tonnes To be transported by a Special Order Abnormal Indivisible Load vehicle (with 20/24 axle girder frame trailer)	The largest load to determine the potential impact upon structures, highway condition, and manoeuvrability.
	Onshore Cable Corridor Cable Drums	

Effects	Parameter	Notes and Rationale
	To be transported on an articulated HGV with a low loader/load bed trailer.	
Operation		
It anticipated that the onshore substation and National Grid substation would not normally be staffed. During the operational phase, vehicle movements would therefore be limited to occasional repair, maintenance and inspection visits at the substation(s) and periodic checks of the onshore cable corridor.		
Decommissioning		
HGV and Light Commercial Vehicle (LCV) traffic demand as per construction, assuming minimal opportunities to leave components in-situ or recycle materials on site.	Represents peak decommissioning traffic impacts.	

26.3.3 Summary of Mitigation Embedded in the Design

18. This section outlines the embedded mitigation relevant to the traffic and transport assessment, which has been incorporated into the design of DEP and SEP (**Table 26-3**). Where other mitigation measures are proposed, these are detailed in the impact assessment (**Section 26.6**).

Table 26-3: Embedded Mitigation Measures

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP
General	
Site Selection	DEP and SEP has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. Considerations include (but are not limited to) adhering to the Horlock Rules (for explanation see **Chapter 4 Site Selection and Alternatives**) for the onshore substation and associated infrastructure and developing construction methodologies to minimise potential impacts, including:

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP
	• Avoiding key constraints e.g. height or weight restrictions on the highway network, where possible; • Avoiding populated areas, where possible; • Avoiding proximity to residential dwellings; • Minimising impacts to local residents in relation to access to services and road usage, including road and footpath closures; and • Preference for the shortest cable corridor to minimise the overall footprint and the number of receptors that will be affected;
Duct Installation Method	The onshore cable duct installation method is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on sections of up to 1km at a time and once the cable ducts have been installed, the section would be back filled and the top soil replaced before moving onto the next section. This would minimise the amount of land being worked on at any one time and would also minimise the duration of works on any given section of the route. This strategy has informed suitable access points and optimum routes for construction traffic
HDD at Landfall	HDD at landfall to avoid restrictions or closures to the Weybourne Beach during construction[1].
Trenchless Crossings	Commitment to trenchless crossing techniques to minimise impacts to the following specific features; • HP3, NV and NB Cables • Rivers Bure, Wensum, Tud, Yare, Tiffey • North Norfolk Railway • Cambridge to Norwich Railway • Roads: A11, A47, A148, A149, A1067, B1145, B1149, B1354, Old Fakenham Road • Norwich Western Link Road (not yet constructed)

1 Whilst the HDD works should not require any prolonged periods of restrictions or closures to the beach for public access, it is possible that some work activities will be required to be performed on the beach that may require short periods of restricted access. For example, use of a temporary seawater pipe and pump to supply seawater to the onshore HDD temporary works compound for use with the drilling fluid, as well as the use of vehicles to transport the ducting across the beach. Any areas subject to short-term restricted access would be agreed in advance with the Countryside Access Officer at Norfolk County Council prior to construction.

Parameter	Mitigation Measures Embedded into the Design of DEP and SEP
Embedded mitigation for traffic and transport	
Temporary Construction Compounds (TCCs)	TCC locations have been located close to main A roads wherever possible minimising impacts upon local communities and utilising the most suitable roads. TCCs are located away from population centres where practical to reduce impact on local communities and population centres.
Onshore Infrastructure access	Access points located to minimise impacts on sensitive receptors, road safety and local routes.
Vehicle Movement	Construction of an (up to) 6m wide haul road with an approximate length of 60km to reduce the number of access points and HGV movements on the local road network. Carefully selected delivery routes to minimise impact on the sensitive receptors within the TTSA.
Vehicle Routing	Links 91 (Blind Lane), 120 (Cantley Road) and Cawston Village prohibited for use by HGV traffic at the request of highway stakeholders.

26.4 Impact Assessment Methodology

26.4.1 Policy, Legislation and Guidance

26.4.1.1 National Policy Statements

19. The assessment of potential impacts upon receptors within the TTSA has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:

- Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).

20. The specific assessment requirements for traffic and transport as detailed in the NPS, are summarised in **Table 26-4** together with an indication of where each stipulation is addressed. Where any part of the NPS has not been followed within the assessment, an explanation as to why the requirement was not deemed relevant, or has been met in another manner, is provided.

Table 26-4: NPS Assessment Requirements.

NPS Requirement	NPS Reference	Section Reference
NPS for Energy (EN-1)		
If a project is likely to have a significant transport implications, the applicant's ES should include a Transport Assessment, using the New Approach To Appraisal (NATA) / Transport Analysis Guidance (WebTAG) methodology stipulated in Department for Transport (DfT) guidance, or any successor to such methodology.	Section 5.13.3	This chapter has been produced in accordance with current transport guidance. Full details are provided in **Section 26.4** and guidance is referenced where relevant throughout the chapter.
Where appropriate, the applicant should prepare a Travel Plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for car parking associated with the proposal and to mitigate transport impacts.	Section 5.13.4	**Section 26.6** outlines the mitigation measures for construction including demand management measures and HGV controls. Demand management measures will be secured in an OTP and an OTMP which will be submitted as part of the DCO application.

26.4.1.2 Local Planning Policy

21. EN-1 states that the planning Inspectorate will also consider Development Plan Documents or other documents in the Local Development Framework to be relevant to its decision making.

22. The onshore highway TTSA falls under the jurisdiction of NCC and Suffolk County Council (SCC) as the Local Highway Authorities and would potentially include the following Local Planning Authorities:

- North Norfolk District Council (NNDC);
- South Norfolk Council (SNC);
- Broadlands District Council (BDC);
- Norwich City Council (NCC);
- Breckland Council (BC);
- East Suffolk Council (ESC);
- Borough of Kings Lynn and West Norfolk; and
- Great Yarmouth Borough Council (GYBC).

23. NNDC have produced a Local Plan which includes the Core Strategy and Site Allocation Plans (North Norfolk District Council, 2008) setting out detailed, site specific policies providing the context for development across North Norfolk. North Norfolk District Council is currently working on an Emerging Local Plan 2016-2036.

24. South Norfolk Council, Broadland District Council and Norwich City Council each use an individual adopted Local Plan, which includes the Joint Core Strategy (JCS) (a partnership between Broadland, Norwich and South Norfolk Councils). All three authorities supplement the Local Plan via individual Development Management Policies Documents. South Norfolk Council, Broadland and Norwich are currently working on emerging Greater Norwich Local Plan (GNLP) to 2038, which is due to replace the JCS.

25. Breckland Council adopted a new Local Plan in November 2019 (Breckland Council, 2019) The plan aims to set a spatial vision and strategy for the district, with clear economic, social and environmental objectives.

26. East Suffolk Council, was created by parliamentary order in April 2019 covering the former districts of Suffolk Coastal and Waveney District Councils. A local plan covering the former Waveney Local Planning Authority was adopted in March 2019 (East Suffolk Council, 2019) which supersedes the previous Development Plan Documents but retains the Supplementary Planning Documents.

27. The Borough of Kings Lynn and West Norfolk have produced a Local Plan which includes the Core Strategy and Site Allocation and Development Management Policies Plan setting out detailed, site specific policies providing the context for development across the Borough. The Borough is currently working on an Emerging Local Plan 2016-2036.

28. Great Yarmouth Borough Council have produced a Local Plan Part 1, which includes the Core Strategy adopted in December 2015 (Great Yarmouth Borough Council, 2015), with the Local Plan Part 2 (Development Management Policies and Site Allocations) currently in examination by the Planning Inspectorate. Once adopted it will supersede the remaining 'saved' policies from the 2001 Local Plan.

29. **Table 26-5** provides details of the local planning policy documents and the policies contained within these which are relevant to traffic and access. These policies have been considered within the development of this PEIR.

Table 26-5: Relevant Local Planning Policies

Document	Policy	Policy / Guidance purpose
Norfolk County Council		
Local Transport Plan 3 (2011 - 2026) adopted April 2011.	Policy 4: Protecting the Environment	Transport decisions should take account of the character of the historic environment, landscape and local biodiversity. In particular: • Negative impacts should be mitigated; • Reasonable opportunities for creating habitats taken;

Document	Policy	Policy / Guidance purpose
		• Due regard should be given to ecological networks and European designated sites; and • Impact assessments should be undertaken where necessary.
Suffolk County Council		
Local Transport Plan (2011 – 2031)	No specific policies.	The local transport plan sets out SCC's long-term transport strategy for the next 20 years. The key focus of the plan is to support Suffolk's economy as it recovers from the recession and to support future sustainable economic growth. The council wants to maintain and, over time, improve Suffolk's transport networks, reduce congestion, and improve access to jobs and markets.
North Norfolk District Council		
Local Development Framework – Core Strategy adopted September 2008	Policy SS 2: Development in the Countryside	In areas designated as countryside development will be limited to that which requires a rural location and can include the following: • Renewable energy projects; and • Transport.
	CT5: The Transport Impact of New Development	Development will be designed to reduce the need to travel and to maximise the use of sustainable forms of transport appropriate to its particular location. Development proposals will be considered against the following criteria; • The proposal provides for safe and convenient access on foot, cycle, public and private transport addressing the needs of all, including those with a disability; • The proposal is capable of being served by safe access to the highway network without detriment to the amenity or character of the locality;

Document	Policy	Policy / Guidance purpose
		• Outside designated settlement boundaries the proposal does not involve direct access on to a principal route, unless the type of development requires a principal route location; • The expected nature and volume of traffic generated by the proposal could be accommodated by the existing road network without detriment to the amenity or character of the surrounding area or highway safety; and • If the proposal would have significant transport implications, it is to be accompanied by a transport assessment, the coverage and detail of which reflects the scale of development and the extent of the transport implications, and also, for non-residential schemes, a travel plan.
South Norfolk Council		
Development Management Policies Document.	Policy DM 3.11 Road Safety and the Free Flow of Traffic	On all sites, development will not be permitted that endangers highway safety or the satisfactory functioning of the highway network. Planning permission will be granted for development involving the formation or intensified use of a direct access onto a Corridor of Movement providing it would not: • Prejudice the safe and free flow of traffic or planned proposals for sustainable transport initiatives along the Corridor of Movement; • Be practical to gain access from the site to the Corridor of Movement via a secondary road; and

Document	Policy	Policy / Guidance purpose
		• Facilitate the use of the Corridor of Movement for short local journeys.
Broadland District Council		
Development Management Policies Document.	Policy GC5: Renewable Energy	Proposals for renewable energy technology, associated infrastructure and integration of renewable energy technology will be encouraged where its impacts are (or can be made) acceptable.
	Policy TS2 – Travel Plans and Transport Assessments	In the case of major development, or where a particular need is identified, a Transport Assessment and/or Travel Plan will be required. Developers will need to include proposals to deal with any consequences of their development in terms of maximising access by foot, cycle and public transport and the means by which this will be secured in perpetuity.
	Policy TS3: Highway Safety	Development will not be permitted where it would result in any significant adverse impact upon the satisfactory functioning or safety of the highway network.
Norwich City Council		
Development Management Policies Document. adopted January 2011	Policy DM30: Access and Highway Safety	Development must seek opportunities to remove unnecessary access points onto the principal or main distributor routes (as defined in the Norwich Area Transportation Strategy route hierarchy). New vehicular accesses onto these routes will only be permitted where there is no practical alternative from a more minor route and (where adjacent to an existing or proposed bus rapid transit corridor) they would not prevent or restrict the implementation of necessary highway or junction improvement works associated with the transit corridor. Any new access point must allow for access and egress in a forward gear.
Joint Core Strategy		

Document	Policy	Policy / Guidance purpose
Joint Core Strategy (Broadland, Norwich and South Norfolk) Adopted January 2014	Policy 6: Access and Transportation	The transportation system will be enhanced to develop the role of Norwich as a Regional Transport Node. This will be achieved by a number of Factors including; • Implementation of the Norwich Area Transportation Strategy (NATS) • Promoting improvements to the A11 and A47; and • Continuing to recognize that in the most rural areas the private car will remain an important means of travel.
Breckland Council		
Breckland Local Plan - Core Strategy and Development Control Policies Document adopted December 2009	Policy CP13: Accessibility	Travel Plans should be submitted for major schemes or those schemes where there are significant transport implications, such as those where a Transport Assessment is required.
	Policy DC 15: Renewable energy	Proposals for renewable energy development will be supported in principle. Permission will be granted for these developments unless it, or any related infrastructure such as power lines or access roads etc, has a significant detrimental impact or a cumulative detrimental impact upon: • Sites of international, national or local nature and heritage conservation importance; • The surrounding landscape and townscape; • Local amenity as a result of noise, fumes, electronic interference or outlook through unacceptable visual intrusion; and • Highway safety. Where development is permitted, mitigation measures will be required as appropriate to minimise any

Document	Policy	Policy / Guidance purpose
		environmental impacts, such measures will be secured via condition or legal agreement. All development proposals for a renewable energy generation scheme should, as far as is practicable, provide for the site to be reinstated to its former condition should the development cease to be operational.
Breckland Council Local Plan adopted November 2019	Policy TR02: Transport Requirements	Major development proposals should include an assessment of the impacts of new development on the existing transport network; and demonstrate how they will maximise connectivity within and through a development and to the surrounding areas, including the provision of high quality and safe pedestrian and cycle routes. Where potential transport impacts are identified, developers will be expected to produce Transport Assessments to assess the impacts and identify appropriate mitigation, together with Travel Plans where appropriate.
East Suffolk Council		
Waveney Local Plan adopted March 2019	WLP8.21 – Sustainable Transport	Development proposals should be designed from the outset to incorporate measures that will encourage people to travel using non-car modes to access home, school, employment, services and facilities. Developments should connect into the existing pedestrian and cycle network. Where possible, proposals are to include measures set out in the Waveney Cycle Strategy (2016 and subsequent updates) and demonstrate they have considered how the scheme will encourage people to walk and cycle to access services and facilities where practical. Subject to design considerations under Policies WLP8.29, WLP8.30 and WLP8.31, new developments will be required to provide parking that meets the requirements set out in the Suffolk

Document	Policy	Policy / Guidance purpose
		Guidance for Parking issued by SCC (2014 and subsequent updates). In consultation with the Local Highway Authority, the scale, location and nature of development will be considered in determining how the transport impacts of development should be assessed.
Borough of Kings Lynn and West Norfolk		
Site Allocations and Development Policies Plan adopted September 2016	Policy DM 12 – Strategic Road Network	The Strategic Road Network within the Borough, comprising the A10, A17, A47, A134, A148, A149, A1101 & A1122 and shown on the Policies Map, will be protected as follows outside of the settlements specified within Core Strategy policy CS02: • New development, apart from specific plan allocations, will not be permitted if it would include the provision of vehicle access leading directly onto a road forming part of this Strategic Road Network; • New development served by a side road which connects to a road forming part of the Strategic Road Network will be permitted provided that any resulting increase in traffic would not have a significant adverse effect on: ○ The route's national and strategic role as a road for long distance traffic ○ Highway safety ○ The route's traffic capacity ○ The amenity and access of any adjoining occupiers. In appropriate cases, a Transport Assessment will be required to demonstrate that development proposals can be accommodated on the local road network, taking into account any infrastructure improvements proposed.

Document	Policy	Policy / Guidance purpose
	Policy DM13 - Railway Trackways	The following existing and former railway trackways and routes, as indicated on the Policies Map, will be safeguarded from development which would prejudice their potential future use for paths, cycleways, bridleways, new rail facilities, etc. unless the proposals for trackway use are accompanied by appropriate alternative route provision that makes the safeguarding unnecessary: • King's Lynn Harbour Junction - Saddlebow Road; • King's Lynn east curve; • King's Lynn docks branch to Alexandra Dock and Bentinck Dock; • Denver - Wissington; • King's Lynn to Hunstanton; and Part of the former King's Lynn to Fakenham line route from the West Winch Growth Area to the Bawsey/Leziate countryside sports and recreation area.
Great Yarmouth Borough Council		
Great Yarmouth Local Plan: Core Strategy 2013 – 2030 adopted December 2015	Policy CS16 – Improving accessibility and transport	The Council and its partners will work together to make the best use of, and improve, existing transport infrastructure within and connecting to the Borough, having first considered solutions to transport problems that are based on better management and the provision and promotion of sustainable forms of travel. This will be achieved by: • Directing new development towards the most sustainable locations in accordance with Policy CS2, thereby reducing the need to travel and maximising the use of sustainable transport modes;

Document	Policy	Policy / Guidance purpose
		• Ensuring that new development does not have an adverse impact on the safety and efficiency of the local road network for all users; • Seeking developer contributions towards transport infrastructure improvements, including those made to sustainable transport modes, in accordance with Policy CS14; • Minimising the impact of new development on the existing transport infrastructure by encouraging applicants to: • Produce and implement Transport Assessments and Travel Plans, as appropriate • Improve accessibility to sustainable transport modes • Ensure that adequate access routes are available for emergency services, waste collection and delivery vehicles • Ensure that necessary transport improvements are addressed prior to development, where possible • Ensuring that development proposals contribute to the implementation of the Norfolk Local Transport Plan to deliver improved accessibility through integrated and sustainable transport modes

26.4.1.3 Further Policy and Guidance

26.4.1.3.1 The Strategic Road Network and the Delivery of Sustainable Development

30. The DfT Circular 02/2013 entitled 'The Strategic Road Network and the Delivery of Sustainable Development' sets out the ways in which the Highways Agency (now Highways England) will engage with communities and developers to deliver sustainable development and, thus economic growth, whilst safeguarding the primary function and purpose of the Strategic Road Network.

31. Under the heading of Environmental Impact 02/2013 notes that:

"…developers must ensure all environmental implications associated with their proposals, are adequately assessed and reported so as to ensure that the mitigation of any impact is compliant with prevailing policies and standards. This requirement applies in respect of the environmental impacts arising from the temporary construction works and the permanent transport solution associated with the development, as well as the environmental impact of the existing trunk road upon the development itself".

32. The Circular 02/2013 details access requirements specifically for wind turbines and states that:

"The promoter of a wind farm should prepare a report covering the construction, operation and de-commissioning stages of the development. From this, the acceptability of the proposal should be determined, and any mitigating measures should be identified"

Access to the site for construction, maintenance and de-commissioning should be obtained via the local road network and, normally, there should be no direct connection to the strategic road network"

Swept path analyses should be provided by the developer for the abnormal load deliveries to the site."

33. Under the heading of 'Access, The Strategic Road Network' Circular 02/13 notes that:

"The creation of new accesses to the strategic road network can impact on its ability to fulfil the function of facilitating the safe and effective movements of goods and people in support of economic growth by compromising traffic movement and flow"

34. Whilst there is a presumption against new or intensification of access on the motorway network,

"The Highways Agency will adopt a graduated and less restrictive approach to the formation or intensification of use of access to the remainder of the strategic road network, However, the preference will always be that new development should make use of existing junctions. Where a new junction or direct means of access is agreed, the promotor will be expected to secure all necessary consents, and to fund all related design and construction works"

35. Circular 02/2013 requirements have been discussed with Highways England and are addressed within this PEIR.

26.4.1.3.2 Traffic Management Act 2004

36. The Traffic Management Act (TMA) 2004 was introduced to deal with congestion and disruption on the road network. The TMA places a duty on Local Traffic Authorities to ensure the expeditious movement of traffic on their road network and those networks of surrounding Local Planning Authorities.

37. The TMA directs effective communication between Local Highway Authorities and parties interested in carrying out street work. The TMA encourages a disciplined approach and advance communication to plan the street works.

26.4.1.3.3 Road Traffic Regulation Act 1984

38. The Road Traffic Regulation Act (RTRA) 1984 was introduced to regulate or restrict traffic on the road network in the interest of safety.

39. The RRTA enables highway authorities to lawfully restrict and manage traffic. In particular, it sets out (in Part I) how Traffic Regulation Orders (or Traffic Management Orders) can be employed to limit or prevent the use of the road by a particular form of traffic.

26.4.1.3.4 Highways Act 1980

40. The Highways Act (1980) was introduced to deal with the management and operation of the road network. This Act provides for the creation, improvement and maintenance of roads and for acquisition of land.

41. Under Section 38 of the Act, the highway authority may enter into an agreement with a developer of land on either side or both sides of a private street. The relevant authority can agree to adopt the street as a highway maintainable at public expense when all the street works have been carried out to their satisfaction, and the developer agrees to carry them out within a stated time. It is customary for the developer to enter into a bond for their performance with a bank or building society.

42. Also, Section 278 of the Act allows private developers to either fund or complete works to public highways outside or beyond the development site itself, such as traffic calming and capacity improvements.

26.4.1.3.5 The Guidelines for the Environmental Assessment of Road Traffic

43. The Guidelines for the Environmental Assessment of Road Traffic (GEART) (published in January 1993 by the Institute of Environmental Assessment) are guidelines for the assessment of the environmental impacts of road traffic associated with new developments, irrespective of whether the developments are subject to formal EIAs.

44. The purpose of the guidelines is to provide the basis for systematic, consistent and comprehensive coverage for the appraisal of traffic impacts arising from development projects. Impacts that may arise include: pedestrian severance and amenity, driver delay, accidents and safety and noise, vibration and air quality.

45. GEART is the guidance that informs this assessment and **Section 26.4.3** of this chapter contains full details of how the guidance has been applied.

26.4.1.3.6 Planning Practice Guidance - Travel Plans, Transport Assessment and Statements

46. DfT Transport Assessment guidance referred to in NPS EN-1, was withdrawn in October 2014 and was replaced with DCLG Planning Practice Guidance (PPG). For the purpose of assessing the impact of DEP and SEP, the relevant PPG is 'Travel Plans, Transport Assessment and Statements' (henceforth referred to as the Transport PPG).

47. The Transport PPG sets out the key principles to be adopted when developing a Transport Assessment as follows:

- Proportionate to the size and scope of the proposed development to which they relate and build on existing information wherever possible;

- Established at the earliest practicable possible stage of a development proposal;
- Be tailored to particular local circumstances (other locally-determined factors and information beyond those which are set out in this guidance may need to be considered in these studies provided there is robust evidence for doing so locally); and
- Be bought forward through collaborative ongoing working between the Local Planning Authority / transport authority, transport operators, rail network operators, Highways Agency (now Highways England) where there may be implications for the strategic road network and other relevant bodies.

48. The Transport PPG key principles have shaped the development of this PEIR and can be seen throughout this chapter.

26.4.1.3.7 Further Technical Transport Guidance

49. Further supplementary technical transport guidance has been utilised in developing the EIA, these documents are outlined in **Table 26-6**.

Table 26-6: Supplementary Technical Transport Guidance

Document	Purpose/Application
Design Manual for Roads and Bridges (DMRB) CD 123 – Geometric design of at-grade priority and signal-controlled junctions (Highways England, 2020)	The DMRB has been prepared for trunk roads and motorways and has been adopted as best practice within this PEIR for the design of all accesses and to augment the GEART assessment of severance and amenity effects.
DMRB CD 116 – Geometric Design of Roundabouts (Highways England, 2020)	
GG 104 – Requirements for Safety Risk Assessments (Highways England, 2018)	Sets out the approach for safety risk assessments to be applied when undertaking activity that can have an impact on safety on the SRN. Provides a framework for identifying hazards, assessing, evaluating and managing safety risks.
GG 119 - Road Safety Audit (Highways England, 2020)	Provides the requirements for road safety audit for highway schemes on the SRN.
GG 142 - Walking, Cycling and Horse Riding Assessment and Review (Highways England, 2019)	Sets out the walking, cycling and horse-riding assessment and review process for highway schemes on the SRN.
LA 112 – Population and Human Health (Highways England, 2020)	Sets out rights of way sensitivity thresholds for walkers, cyclist and horse-riders when crossing roads.

Document	Purpose/Application
Manual for Streets (Chartered Institution of Highways and Transportation, 2007)	Guidance to inform the visibility requirements for junctions where measured speeds are below 40mph
Manual for Streets 2 (Chartered Institution of Highways And Transportation, 2010)	
Transport and Roads Research Laboratory in supplementary report 356 (Goldschmidt, 1977)	Provides formulas to facilitate the calculation of pedestrian delay.
Traffic Signs Manual Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations Part 1: Design (Department for Transport, 2009)	Provides guidance upon temporary traffic management that will be used to inform the assessment of driver delay impacts related to temporary traffic management/ road closures.

26.4.2 Data and Information Sources

26.4.2.1 Traffic Flow Data

50. Traffic flow data has been captured for all 156 links. The datasets that are to be used in the assessment are summarised in **Table 26-7** and are presented graphically in **Figure 26.2**.

Table 26-7: Traffic Flow Data Sources.

Data set	Spatial coverage	Dates	Confidence	Notes
Classified* Automatic Traffic Counts (ATC)	7, 8, 10, 12, 15, 38, 39, 50, 55, 57, 58, 60-69, 71, 74, 75, 77, 81-85, 91-93, 99, 101-103, 109-113,115-119, 130, 134,135, 142, 144-151, and 153-156.	2020	Medium	Traffic counts commissioned by the Applicant which provide classified hourly and daily count and speed data. Undertaken during Covid19 pandemic.
Classified* Annual Average Daily Traffic (AADT)	1-6, 9, 16-36, 40-43, 45-49, 54, 56, 72, 73, 76, 78-80, 86-89, 94-97, 100, 104, 105, 108, 114, 120-122, 125, 126,	2018/ 2019	High	Data sourced from the DfT which provides classified AADT traffic count data.

Data set	Spatial coverage	Dates	Confidence	Notes
	128, 129, 131, 138-141, 143 and 152.			
Classified* ATCs	14, 37, 51 and 52.	2017	High	Data sourced from NV DCO application documents which provide classified hourly and daily traffic count data.
Classified* ATCs	11, 13, 44, 53, 59 and 123.	2017	High	Data sourced from the HP3 DCO application documents (RPS, 2018) which provide classified hourly and daily traffic data.
Classified* ATCs	70, 90, 98, 106, 107, 124 and 127.	2019	High	Data sourced from the HP3 DCO Examination documents which provide classified hourly and daily traffic count data.
Classified* ATCs	132, 133, 136 and 137.	2019	High	Data sourced from the HP3 DCO Examination documents (Create Consulting Engineers Ltd, 2019) which provide classified hourly and daily traffic count data.
*Classification of the vehicle type, e.g. cars, motorbikes, buses, HGVs etc.				

51. Further details regarding the traffic surveys are provided in **Section 26.5.2**.

26.4.2.2 Personal Injury Collisions

52. In addition to the data sources listed in **Table 26-7**, a desktop assessment was undertaken which included consideration of Personal Injury Collision (PIC) data utilising Google street view and mapping data.

53. High level open source PIC data was obtained for the TTSA from the website Crashmap (Crashmap, 2020).

54. More detailed PIC (STATS19) data has been obtained from NCC and SCC for collision clusters identified by the high level Crashmap search. Further details are provided **Section 26.5.4**.

26.4.2.3 Baseline Highway Network

55. A desk based assessment supported by site visits was undertaken to provide information with regard to the existing baseline highway network.

26.4.3 Impact Assessment Methodology

56. This section describes the assessment methodology, including data collation, effects and impact assessment criteria that were used in the traffic and transport assessment. The methodology was presented in a Traffic and Transport 'Method Statement' presented as part of the Evidence Plan Process, and agreed with the Expert Topic Group (**Appendix 26.1**).

57. The traffic and transport assessment methodology follows the principles set out in Chapter 6 EIA Methodology and adopts the 'project wide' significance evaluation. However, these principles have been augmented by traffic and access specific methodologies (as prescribed in GEART) to inform a significance evaluation.

26.4.3.1 Scale of Assessment

58. Having identified the traffic and transport study area, GEART suggests application of the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more (or where the number of HGVs is predicted to increase by 10% or more).

59. In justifying these rules GEART examines the science of traffic forecasting and states:

> *"It is generally accepted that accuracies greater than 10% are not achievable. It should also be noted that the day to day variation of traffic on a road is frequently at least some + or -10%. At a basic level, it should therefore be assumed that projected changes in traffic of less than 10% create no discernible environmental impact.*
>
> *…a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment."*

60. Therefore, changes in traffic flows below the GEART Rules (thresholds) are assumed to result in no discernible or negligible environmental effects and have therefore not been assessed further as part of the assessment.

61. The exception to the GEART Rule 1 and 2 is the consideration of the effects of driver delay and road safety. These effects can be potentially significant for lower changes in traffic flow when high baseline traffic flows are evident. Full details of the methodology adopted for these effects are set out later in **Sections 26.4.3.1.4** to **26.4.3.1.8**)

62. Following initial screening, GEART, sets out considerations and, in some cases, thresholds in respect of changes in the volume and composition of traffic to facilitate a subjective judgement of traffic impact and significance.

63. It was agreed during traffic and transport ETG (**Appendix 26.1**) with NCC and HE, that the potential traffic and transport effects to be assessed are:

- Severance;
- Pedestrian and Cyclist Amenity;
- Pedestrian and Cycle Delay;
- Road Safety;
- Driver Delay (capacity, highway constraints and road closures); and
- Abnormal Load effects.

64. The following sub-sections provide detail of the adopted methodology for assessing each of these effects.

26.4.3.1.1 Severance

65. Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to relatively minor traffic flows if they impede pedestrian access to essential facilities. Severance effects could equally be applied to residents, motorists, cyclists or pedestrians.

66. GEART suggests that changes in total traffic flow of 30%, 60% and 90% are considered to be slight, moderate and substantial respectively. However, GEART notes that these figures should be used cautiously, and the assessment should pay full regard to specific local conditions.

26.4.3.1.2 Pedestrian and Cyclist Amenity

67. Amenity is broadly defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width and separation from traffic. It can impact a range of non-motorised users such as pedestrians, cyclists and equestrians.

68. This definition also includes pedestrian fear and intimidation and can be considered to be a much broader category including consideration of the exposure to noise and air pollution, and the overall relationship between pedestrians and traffic.

69. GEART suggests that a threshold of a doubling of total traffic flow or the HGV component may lead to a negative impact upon pedestrian and cycling amenity.

70. The assessment of this effect also serves as a proxy for other non-motorised users (e.g. equestrians).

26.4.3.1.3 Pedestrian and Cycle Delay

71. Pedestrians can experience delays and difficulties crossing roads related to changes in traffic, volume, compositions and speed. GEART advises that, in general, increases in traffic will lead to increases in delay. However, GEART also notes that delays will be dependent upon the level of pedestrian activity, visibility and site conditions.

72. An assessment of changes in delay has been undertaken using research undertaken by the Transport and Roads Research Laboratory in supplementary report 356 (TRRL 356) (Goldschmidt, 1977)

73. The TRRL report identifies that levels of delay experienced by pedestrians trying to cross a road depends upon volumes of traffic and the types of crossing facility available. Where signal-controlled crossing points are provided, pedestrian delay is considered to be less susceptible to increases in traffic. This is because signal-controlled crossings have predefined times a pedestrian would be expected to wait, i.e. irrespective of changes in volumes of traffic, pedestrians would only be expected to wait for a predefined time.

74. In order to consider a worst-case, the assessment initially applies the following formula to calculate changes in delays that may be experienced by pedestrians waiting to cross the road where no facilities are provided:

> *"Pedestrian delay (seconds) = 1.26 + 4.56 x10^{-6} x traffic flow per hour past the crossing point"*

75. Similar to amenity effects, pedestrian delay also serves as a useful proxy for other categories of non- motorised user.

26.4.3.1.4 Road Safety

76. The salient GEART guidance on road safety is as follows:

> *"Where a development is expected to produce a change in the character of traffic (e.g. HGV movements on rural roads), then data on existing accidents levels may not be sufficient. Professional judgement will be needed to assess the implications of local circumstances, or factors which may elevate or lessen the risk of accidents, e.g. junction conflicts."*

77. In this context, an examination of the existing collisions occurring within the highway TTSA was undertaken to identify any areas of the highway with concentrations of collisions with similar patterns. These sites are considered to be sensitive to changes in traffic flows (Sensitive receptors) and therefore a more detailed analysis of significance has been undertaken in the context of the proposals.

78. In addition to considering existing patterns of collisions that could be exacerbated by DEP and SEP' traffic, the road safety assessment will also consider the potential for introduction of new risks associated with the formation of new points of access to DEP and SEP' associated onshore infrastructure.

26.4.3.1.5 Driver Delay

79. GEART recommends the use of proprietary software packages to model junction delay and hence vehicle delays. However, it is noted that vehicle delays are only likely to be significant when the surrounding highway network is at, or close to capacity.

80. During the traffic and transport ETG (Ref: PB8164-RHD-ZZ-ZZ-MI-PM-008) it was agreed that the assessment of driver delay should consider not only the impact of increases in traffic upon junction capacity but also delays related to highway constraints (e.g. routes where highway width is constrained) and roadworks.

26.4.3.1.6 Capacity

81. During ETG consultation with NCC and Highways England (Ref: PB8164-RHD-ZZ-ZZ-MI-PM-008), it was agreed that where DEP and SEP' traffic flows through a junction are forecast to be less than 30 two-way vehicle movements per hour, no further assessment would be required. The assessment therefore seeks to disaggregate the peak hour traffic movements for these junctions to enable a judgement of the potential significance of the driver delay effect.

26.4.3.1.7 Highway Constraints

82. Drivers can also experience delays where the existing width of the highway prevents two vehicles from passing and drivers are required to give-way to each other.

83. A review of the TTSA will be undertaken to identify all links where two vehicles would not be able to pass each other. An assessment of the potential changes in traffic flows and opportunities for vehicles to pass along these links (e.g. frequency of passing places) will be undertaken to inform a judgement regarding impact magnitude.

26.4.3.1.8 Road Closures

84. Road users are likely to experience delays where road or lane closures may be required. Currently, it is anticipated that temporary road or lane closures may be required during construction, for open cut techniques to install DEP and SEP cables across the public highway.

85. To assess the potential impacts of road closures the assessment will consider whether access can be maintained (via a single lane closure) or if a full road closure would be required. Where the normal width of the road is less than 7.2m kerb to kerb (typical width for two way traffic) then it may not be possible to undertake works in the road and maintain a single lane open for traffic. Where a full road closure is required the length and duration of the detour will be used to inform a judgement regarding the magnitude of impact.

86. Where a single lane can be maintained (i.e. through the use of shuttle working controlled by traffic signals or stop-go boards) a judgement will be made upon the significance of delays. Chapter 8 of the Traffic Signs Manual (Department for Transport, 2009) provides guidance upon when various forms of road works are likely to introduce significant delays.

26.4.3.1.9 Abnormal Loads (Including Indivisible Loads)

87. Abnormal load is a generic term applied when a vehicle or load exceeds the maximum standard parameters set out in The Road Vehicles Construction and Use Regulations 1986 (C&UR) for height, width and weight. This term covers a broad range of vehicles, ranging from limited load projections permitted for standard vehicles to Special Type Vehicles designed specifically for the purpose of moving loads well in excess of standard vehicle parameters.

88. Loads that require Special Type Vehicles are defined as Abnormal Indivisible Loads (AILs) in The Road Vehicles (Authorisation of Special Types) (General) Order 2003(SI 1998).

89. Where dimensions exceed 6.1m in width, 30m in rigid length or 150 tonnes gross weight, Special Order from Highways England is required.

90. Legislation[2] requires hauliers to notify the movement of most abnormal loads and abnormal vehicles to the police before moving them by road.

91. The importing of AILs may lead to delays on the highway network. The transformers for DEP and SEP substation will comprise of Special Order AILs. In addition, there may also be a requirement for non-Special Order AILs associated with large items of plant, cable drums, etc.

92. The size and number of the non-Special Order AILs cannot be confirmed at this stage. To ensure that delays are managed and coordinated, prior to the movement of any AILs the contractor would be required to submit notifications to the relevant authorities (police, highway authorities and bridge/ structure owners) through EDSAL (Electronic Service Delivery for Abnormal Loads). The EDSAL process would detail which proposed routes would be used and ensure the timing would be co-ordinated and potential impacts would not be significant.

93. An AIL study considering the impacts of transporting the transformers is currently being undertaken by Wynns Ltd (consulting engineers specialising in the transportation of AILs). The AIL study will inform the management measures required to deliver AILs to the onshore substation site. The full AIL Study will be provided within future ES submission and will detail the management measures required to minimise the disruption to baseline traffic.

26.4.3.1.10 Other Impacts

94. Traffic borne air quality effects and noise and vibration effects and will be informed by the traffic data outlined in this chapter. These impacts are assessed in Chapter 24 Air Quality and Chapter 25 Noise and Vibration, respectively.

26.4.3.2 Sensitivity

26.4.3.2.1 Identification of Sensitive Locations

95. Within the TTSA, it is necessary to further identify particular user groups and associated locations, which may be sensitive to changes in the traffic and transport network conditions. These user groups and locations are deemed to be receptors for the purpose of this assessment.

96. **Table 26-8** provides a summary of the potential effects in addition to an indication of the receptors and potential locations that will be considered within the assessment.

[2] The Road Vehicles (Authorisation of Special Types) (General) Order 2003 (SI 1998) STGO 2003 limits gross weight to 150 tonnes, axle weight to 16500kg, length to 30m and/or width to 6.1m, above which a Special Order is required from the Highways Agency.

Table 26-8: Potential Effects and Receptors

Potential Effects	Receptors	Location
Severance	Pedestrians, cyclists and equestrians	Local communities adjoining the highway network, designated routes (e.g. National Cycle Network) excluding motorways.
Pedestrian and Cyclist Amenity		
Pedestrian and Cyclist Delay		
Road Safety	All road users	The entire highway network
Driver Delay (Capacity)	Drivers and passengers in vehicles	Highway junctions
Driver Delay (Highway Constraints)	Drivers and passengers in vehicles	Highway links and junctions
Driver Delay (Road Closures)	All road users	Highway links
Abnormal Loads	All road users	Highway links and junctions

26.4.3.2.2 Severance, pedestrian and cycle amenity and delay

97. For the effects of severance, pedestrian and cycle amenity/delay, an evaluation of the TTSA has been undertaken to identify locations which may be sensitive to changes in traffic conditions.

98. Definitions of the different sensitivity levels for highway traffic receptors are given in **Table 26-9.** Sensitivity levels and definitions are derived from GEART.

Table 26-9: Definitions of Sensitivity Levels for Severance, Amenity and Pedestrian Delay

Sensitivity	Definition
High	Concentrations of sensitive receptors (e.g. hospitals, schools, residential dwellings, areas with high footfall) and limited separation from traffic provided by the highway environment; or a low concentration of sensitive receptors and no separation from traffic provided by the highway environment.
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines) and some separation from traffic provided by the highway environment.
Low	Few sensitive receptors and / or highway environment that can accommodate changes in volumes of traffic.

Sensitivity	Definition
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds and major 'A' roads with no pedestrian, cycle or equestrian environment

26.4.3.2.3 Road Safety

99. To consider the impacts on road safety, those areas with evidenced road safety patterns, termed 'collision clusters' (shown in **Figure 26.3**) will be assigned an appropriate level of sensitivity informed by a detailed review of the baseline characteristics.

100. To consider the impact of new road safety risks associated with the formation of new points of access to DEP and SEP, a series of outline access concepts will be developed appropriate to the different road classifications and included within the ES. Indicative locations of the proposed new points of access are shown in **Figure 26.4**. The final location and number of accesses will be confirmed within the DCO application.

26.4.3.2.4 Driver Delay (Capacity)

101. The potential increases in DEP and SEP construction traffic movements via each link within the TTSA has been calculated (**Section 26.6.1.10** provides further details).

102. The sensitivity of junctions along these links will be determined through a consideration of the existing junction's capacity. Junctions that are operating at or above their theoretical capacity could be considered to be of high sensitivity, whilst junctions operating with spare capacity would be of low to medium sensitivity.

103. The capacity of the junctions to be assessed will be informed through either detailed modelling or observations from the relevant highway authority.

26.4.3.2.5 Driver Delay (Highway Constraints)

104. A review of all the links within the TTSA has been undertaken to identify those links which would not permit two-way traffic movements. **Figure 26.5** highlights that within the TTSA there are 60 links (out of a total of 156 links) that would not permit two vehicles to pass. These links are considered to be sensitive to increases in traffic and will be assessed further for driver delay due to highway constraints. The remaining 96 links will not be considered further.

26.4.3.2.6 Driver Delay (Road Closures)

105. A review of all the links within the TTSA has been undertaken to identify those links where open trenching may be used to install DEP and SEP cables across the public highway. **Figure 26.6** highlights that the onshore cable corridor would cross approximately 56 roads. Detailed engineering studies are programmed to confirm the final crossing types proposed and the crossing locations, which will be reported within the DCO application. At this stage, nine roads have been identified as trenchless crossings in **Table 26-3**. The remaining 47 of 56 road crossings are identified as open cut crossings. Of the 47 locations, six have the potential for trenchless crossing techniques but further investigation is required by the engineers to determine the final method. As such, as a worst case, these six locations have been included as open cut trenching.

106. Roads currently proposed to be crossed by open cut techniques, which are considered to be potentially sensitive to driver delay impacts are assessed further within this chapter.

26.4.3.3 Magnitude

107. **Table 26-10** details the assessment framework for magnitude thresholds adapted from GEART. These thresholds are guidance only and provide a starting point by which transport data will inform a local analysis augmented by professional judgement of the impact magnitude.

Table 26-10: Traffic and Transport Assessment Framework

Effects	Magnitude of Effect			
	Negligible	**Low**	**Medium**	**High**
Severance	Changes in total traffic flows of less than 30%.	Changes in total traffic flows of 30 to 60%.	Changes in total traffic flows of 60 to 90%.	Changes in total traffic flows of over 90%.
Pedestrian and Cyclist Amenity	Change in traffic flows (or HGV component) less than 100%	Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall.		
Pedestrian and Cyclist Delay	Informed by a review of the existing pedestrian and cycle environment and forecast change in delay.			
Road Safety	Informed by a review of collision patterns and trends based upon the existing personal injury collision records and the forecast increase in traffic.			
Driver Delay (Capacity)	Increases in peak hour traffic flows of	Informed by projected traffic increases through identified sensitive junctions within the TTSA.		

Effects	Magnitude of Effect			
	Negligible	Low	Medium	High
	less than 30 vehicles per hour			
Driver Delay (Highway constraints)	Highway geometry allows two vehicles to pass	Informed by projected traffic increases along links and existing opportunities to pass and give-way.		
Driver Delay (Road Closures)	No single lane or full road closure required	Informed by an examination of likely length and suitability of diversion routes.		

26.4.3.4 Impact Significance

108. Following the identification of receptor value and sensitivity and magnitude of the effect, it is possible to determine the significance of the impact.

109. The matrix presented in **Table 26-11** provides a framework to aid understanding of how a judgement has been reached from the narrative of each impact assessment; however this does not replace professional judgement set out in the assessments and should not be seen as a prescriptive formulaic method. Reference will also be made to the temporal nature of impacts when determining significance.

Table 26-11: Impact significance Matrix

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	*Major*	*Major*	*Moderate*	*Minor*	*Minor*	*Moderate*	*Major*	*Major*
	Medium	*Major*	*Moderate*	*Minor*	*Minor*	*Minor*	*Minor*	*Moderate*	*Major*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*	*Negligible*	*Minor*	*Minor*	*Moderate*
	Negligible	*Minor*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*

110. Note that for purposes of the EIA, major and moderate impacts are deemed to be significant. In addition, whilst minor impacts are not significant in their own right, it is important to distinguish these from the non-significant impacts as they may contribute to significant impacts cumulatively or through interactions.

111. Embedded mitigation and existing commitments to good practice are included in the preliminary assessment of impact and are detailed in **Section 26.6.** If the impact does not require mitigation (or none is possible) the residual impact will remain the same. If additional mitigation is required there will be an assessment of the post-mitigation residual impact.

26.4.4 Cumulative Impact Assessment Methodology

112. The CIA considers other plans, projects and activities that may impact cumulatively with DEP and SEP. The assessment considers the residual impacts assessed for DEP and SEP and the potential to contribute to a cumulative impact. The data available informs the assessment and the resulting confidence in any assessment that is undertaken. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the CIA.

113. For traffic and transport, the onshore project area has the potential for temporal and geographical overlap with similar impacts arising from:

- Recent development, either built or under construction (which is not constructed as part of the baseline);
- Approved development, awaiting implementation; and
- Proposals awaiting determination within the planning process with design information in the public domain.

114. It was agreed during the traffic and transport ETG (Ref: PB8164-RHD-ZZ-ZZ-MI-PM-0010) that a CIA should be undertaken for the following projects:

- Norfolk Vanguard (an offshore windfarm);
- Hornsea Project Three (an offshore windfarm);
- Norfolk Boreas (an offshore windfarm);
- Norwich Western Link (a highway improvement scheme);
- A47 North Tuddenham to Easton (a highway improvement scheme);
- A47 Blofield to North Burlingham (a highway improvement scheme);
- A47/A11 Thickthorn junction improvement (a highway improvement scheme);
- A47 Great Yarmouth junction improvements including reconstruction of the Vauxhall Roundabout (a highway improvement scheme);
- Halford Triangle; and
- Great Yarmouth Third River Crossing.

115. It is currently considered that the earliest date that construction could commence would be summer 2024, however the majority of work in 2024 would be enabling works (generating minimal traffic demand) with the main construction works likely to start in 2025 at the earliest.

116. **Table 26-12** presents details of the currently anticipated construction programme for each of these projects, and when the peak period for deliveries are expected to occur and how this could overlap with DEP and SEP.

Table 26-12: Cumulative Projects Construction Timelines

Projects	Years							
	2021	2022	2023	2024	2025	2026	2027	2028
DEP an SEP								
Norfolk Vanguard								
Hornsea Project Three								
Norfolk Boreas								
Norwich W. Link								
A47 North Tuddenham to Easton								
Great Yarmouth Third River Crossing								
A47 Blofield to North Burlingham	Planned start date of January-March 2022-2023 but currently there is no construction programme							
A47/A11 Thickthorn	Planned start date of January-March 2023 but currently there is no construction programme.							
A47 Great Yarmouth	No start date or construction program is currently available							
Halford Triangle								

Key	
	Forecast construction duration
	Forecast peak construction period
	Forecast commencement of operation

117. As outlined in **Table 26-12**, with the exception of NV (assuming it is re-consented and proceeds on its original timeline) and the Great Yarmouth Third River Crossing, a degree of overlap is forecast between DEP and SEP and the cumulative projects.

118. In order to quantify the potential impact from these cumulative projects, the respective TAs or Environmental Statements (ES) are reviewed to understand traffic demand and associated implementation dates. This traffic demand will then be assigned to the highway network as appropriate to facilitate a CIA. Only data available at the time of the DCO submission will be assessed within the CIA.

119. For further details of the methods used for the CIA for traffic and transport, see **Section 26.7.**

26.4.5 Transboundary Impact Assessment Methodology

120. There are no transboundary impacts with regard to traffic and transport as the onshore development area is entirely within the UK and would not be sited in proximity to any international boundaries. Transboundary impacts are therefore scoped out of the assessment and are not considered further.

26.4.6 Assumptions and Limitations

121. Traffic data collected via onsite Automatic Traffic Counters (ATCs) were undertaken during the Covid19 Pandemic (in agreement with NCC/HE). Factors have been applied to reflect neutral conditions, **Section 26.5.2** provides further details on the methodology.

122. Where further routine assumptions have been made in the course of undertaking the assessment, these are noted in **Sections 26.6** to **26.8**

26.5 Existing Environment

123. Characterisation of the existing environment in relation to traffic and transport has been informed through a number of sources, including:

- Desktop studies and site visits;
- Personal Injury collision data sourced using open source data;
- Personal Injury collision data sourced from NCC/SCC;
- Traffic count information sourced from the DfT;
- Traffic count information sourced from NV and HP3 Offshore Wind Farm DCO Application documents; and
- Traffic surveys commissioned for DEP and SEP.

26.5.1 Existing Highway Network

124. Within the TTSA (shown in **Figure 26.1**), the principal highway network includes the A149, A140 and the A1067 managed by NCC and the A146, A1117 managed by SCC. The A47 and A11 form part of the Strategic Road (Trunk Road) Network managed by Highways England.

125. A route hierarchy for the whole of Norfolk has been developed by NCC (Norfolk County Council , 2020) to encourage drivers to use the most appropriate route according to their destination and vehicle type. These routes have been classified by the following categories and are shown in **Appendix 26.2**:

- Trunk Roads;
- Principal routes;

- Main Distributor routes;
- HGV routes;
- Local Access routes;
- Special routes; and
- Tourist routes.

26.5.1.1 A-Roads (Trunk Roads and Principal Routes)

126. The A47 trunk route is identified in the NCC Local Transport Plan (Norfolk County Council, 2011). The A47 provides the main east-west road connection and routes from Great Yarmouth to the Midlands and the north of England. The A47 is predominately a single carriageway road, widening to dual carriageway around the major urban areas (Norwich, Dereham, Swaffham and King's Lynn).

127. As part of Highways England's RIS six improvement schemes are proposed along the A47 corridor with an expected start date of 2021. These improvements comprise of:

- A47 Wansford to Sutton dualling;
- A47/A141 Guyhirn junction improvement;
- A47 North Tuddenham to Easton dualling;
- A47 Blofield to North Burlingham dualling;
- A47/A11 Thickthorn junction improvement; and
- A47 Great Yarmouth junction improvements including reconstruction of the Vauxhall Roundabout.

128. The influence of these schemes on the project is considered later in **Section 26.7.**

129. The A146 is a principal rural single carriageway road that connects the A47 south of Norwich, with the A1145 at Lowestoft. This link joins to Lowestoft and onwards to Great Yarmouth, with both towns containing an operational port.

130. Diverging off the A146 is the A1145, a single carriageway road that leads into Lowestoft and terminates at its junction with the A12.

131. The A12 route operates between Lowestoft and areas to the south including Ipswich. The route connects to other Principal A class roads including the A146, A143 and A1145, as well as the A47 trunk road which allows travel to the north and to Great Yarmouth.

132. Leading north out of Great Yarmouth is the principal road A149, a single carriageway road that widens to dual carriageway along the Caister-on-Sea by-pass. This road continues north to Crossdale Street, the road traverses the TTSA in Sheringham and Weybourne.

133. The A1151 is a major road within the TTSA, providing links between Norwich, Hoveton and Stalham, as well as the A149.

134. The A1067 provides direct links with Norwich and Fakenham. The rural single carriageway road also offers connecting links to the B1145 and other minor roads.

135. The A11 is a two-lane dual carriageway road that runs south west of its roundabout with the A47 to Wymondham where it connects to the B1135 within the TTSA.

136. Bounding the northern extent of the TTSA is the A148, a rural single carriageway that extends from Fakenham, through Holt and connects to Cromer and further along the route to the A1065, A1067, A1082, B1149 and A140.

137. Heading north out of Norwich is the A140, a single carriageway A class road that by-passes Aylsham and connects to Roughton. The route links to the A148 and A149 allowing connection to the wider highway network.

138. The recently constructed A1270, (previously known as the Northern Distributor Road) is a two-lane dual carriageway road that links the south east of Norwich to the north west and was constructed to alleviate traffic congestion on local roads to the north of Norwich.

26.5.1.2 B-roads

139. A number of strategically important B class roads are located within, or offer access to, the wider highway network. These main roads offer access to minor roads and lanes located along the onshore cable corridor.

140. The B1145 is a single carriageway road that provides a link from Kings Lynn to Mundesley on the Norfolk coast. The B1145 crosses a number of A roads (A140, A149, A1065 and A1067) and runs through a number of small towns such as Reepham, Cawston, Aylsham and North Walsham.

141. Within the TTSA, the B1149 provides a direct link between Norwich and Holt. This single carriageway leads out of the City's outskirts through Horsford, providing a link with the town of Cawston.

142. The B1354 connects with the B1149 and routes south-east towards Aylsham. It is a single carriageway road and passes by the Blickling Estate.

143. Deviating off the A149 into Broomholm is the B1159, a single carriageway B class road located within the TTSA.

144. The B1147, accessible off the A47, is a single carriageway road located to the east of Dereham that offers connection to Dereham Road.

145. The B1436 is a single carriageway that offers links to Roughton via the A140 and A149.

146. The B1147 is a single carriageway that links the A1067 through Swanton Morley and onwards to Dereham.

147. The B1135 is a two-lane dual carriageway that connects the A11 to the B1172 in Wymondham. The B1172, a predominantly single carriageway road, runs east of its junction with the B1135 to the A11.

26.5.1.3 Other roads

148. There are a total of 72 unclassified links which serve the final part of the journey to the onshore cable corridor (Local Access routes). These links typically have narrow carriageways and are subject to very low baseline traffic flows.

26.5.2 Traffic Flow Data

26.5.2.1 COVID-19 Pandemic

149. To comply with DfT guidance, traffic surveys informing the EIA should be representative of typical neutral conditions (e.g. outside of school holidays).

150. Of the 156 links within the TTSA, flows on 63 links have been sourced via 52 ATC surveys (noting some links will have similar traffic flows) undertaken during the Covid-19 pandemic in October 2020.

151. Since the peak of the pandemic 'lockdown' restrictions, which came into force during March 2020, traffic volumes have been slowly recovering, however, traffic levels had not returned to pre Covid-19 at the time of the ATC surveys. Thus, traffic flows recorded by the surveys are likely to be lower than the considered 'typical neutral' periods for the TTSA.

152. To reconcile, it was agreed with NCC during consultation to undertake five 'control' ATCs which were installed upon roads where recent ATC surveys were undertaken for the recently submitted DCO applications of the NV Offshore Wind Farm and the HP3 Offshore Wind Farm.

153. The traffic flows from the proposed control ATC surveys have been compared to the historic Windfarm projects ATC surveys, allowing 'uplift' factors to be derived for light vehicles and HGVs.

154. The resultant uplift factors have then been applied to the projects remaining ATC surveys providing consolidation to pre-pandemic traffic levels.

155. To take into account geographical variations in traffic flows over the extensive TTSA, the 'control' ATC surveys were undertaken at a range of different geographical locations where existing Windfarm Project ATC surveys were available. The graphical location of these ATC surveys can be found in **Figure 26.2**.

Table 26-13: Control ATCs and Links Uplifted

Link ID	Road	Existing Control ATC Source	Links uplifted Utilising Control ATCs
11	A149 from Weybourne to Weybourne Road	HP3	7, 8, 10, 12, 15 and 102.
37	A149 from A1151 to B1159	NV	38 and 39.
52	B1148 from B1149 to A140	NV	50,55, 67-69, 71, 74, 75, 77, 81-85, 91 -93,130, 142, 145, 147 – 151, and 153 - 156.
59	B1149 from A148 to B1354	HP3	57, 58, and 60-66.
106	B1172 from Kettering Lane to A47	HP3	99, 101, 103, 109-113, 115-119, 134, 135, 144 and 146.

156. **Appendix 26.3** provides a summary of the recorded 2020 ATC traffic flows and calculated 'uplift' factors per Control ATC. The resultant final uplifted 2020 Reference baseline traffic flows that form the basis of the assessment has been presented in **Appendix 26.3,** which includes the date and type of survey from which the data has been derived and detailed within **Table 26-7** and **Table 26-13**.

26.5.3 Link Based Sensitive Receptors

157. A desktop exercise augmented by site visits has been undertaken to identify the sensitive receptors in the TTSA utilising the definitions outlined in **Table 26-9**. All 156 links within the TTSA have been assessed and assigned a sensitivity. **Appendix 26.4** including details of the rationale for assigned sensitivity per link and **Figure 26.7** illustrates these routes graphically.

Table 26-14: Link Based Sensitive Receptors

Link Sensitivity	Link ID	Rationale
Low	1, 3-6, 15, 17-20, 22, 25, 27, 31-35, 37, 39-41, 44-47, 50-58, 62, 63, 65, 67, 69-75, 77-82, 85-95, 97-99, 101, 103-107, 109-111, 113-116, 118-120, 122, 124-131, 134, 135, 137, 139, 140, 142-146, 148, 150-152, 154 and 155.	An A-road, B-road or minor road that can accommodate a high volume of traffic and / or has limited sensitive receptors. There is minimal, including sporadic, frontage development and footways are wide and / or buffered.
Medium	2, 10-14, 16, 21, 24, 26, 28-30, 36, 38, 42, 43, 49, 59, 61, 66, 96, 100, 108, 112, 117, 121, 123, 132, 133, 136 and 147.	A-roads, B-roads or minor roads that can accommodate high volumes of traffic. Direct frontage development will be present along these links with increases in sensitive receptors including schools, hospitals, churches, pubs and local shops.
High	7-9, 23, 48, 60, 64, 68, 76, 83, 84, 102, 138, 141, 149, 153 and 156.	A mixture of A-roads, B-roads and minor roads that will pass through built up areas. These areas will have significant frontage development and multiple sensitive receptors throughout, and/or pedestrianised areas.

26.5.3.1 Traffic Sensitive Roads

158. During consultation with NCC a number of roads were identified as being sensitive to tourism traffic during the summer months (23rd May to 30th September) and high commuter traffic during network peak hours. Therefore, NCC requested that sensitivity be upgraded on these links and construction vehicle caps should be introduced similar to that provided by HP3, NV and NB Offshore Wind Farm Projects.

159. **Table 26-15** details the roads that were identified by NCC as traffic sensitive and their associated links. Assessed peak daily HGV flows and specific HGV caps introduced by HP3, NV and NB have also been presented.

Table 26-15: Traffic Sensitive Links

Roads	Traffic Sensitivity	Associated Links	Daily HGV Construction Flows		
			HP3	NV	NB
A148	Tourist season	4	156	475	379
		5	122	420	138
		6	122	420	138
		13	149	420	138
		14	149	338	287
		100	141	420	138
A149	Tourist season	9	77	n/a	n/a
		11	77	n/a	n/a
Reepham Road	Commuter peaks	71	n/a		
A1067	Commuter peaks	76	n/a		
		77	104	117	117
		79	104	335	117
		80	90	335	167
A1270	Commuter peaks	72	104	335	117
		73	104	335	117
		78	104	335	117
B1436	Tourist season	14	149	338	287
Chapel Street	Local restrictions	101	n/a		
Church Road	Local restrictions	103	n/a		
Fir Covent Road	Commuter peaks	74	n/a		
		75	n/a		

Roads	Traffic Sensitivity	Associated Links	Daily HGV Construction Flows		
			HP3	NV	NB
	HGV caps as a result of respective wind farm projects mitigation measures.				

160. Where it is evidenced that DEP and SEP' construction flows exceed those vehicle caps committed to by HP3 and NV, mitigation would be introduced and detailed in **Section 26.6** and contained within an OTMP provided as part of the DCO application.

161. Further details of construction vehicle flows acting cumulatively between DEP and SEP' and HP3, NV and NB are detailed in **Section 26.7** (Cumulative Impact Assessment).

26.5.4 Road Safety

162. To assess whether the project will have an adverse road safety impact it is necessary to establish a baseline and identify any inherent road safety issues within the TTSA.

163. Recognising the large extent of the TTSA, a proportional approach has been adopted and agreed with the ETG (**Appendix 26.1**) in defining the road safety baseline.

164. The first stage involves a high level search of the TTSA utilising open source data[3] to identify collision clusters[4]. It was agreed this would comprise the latest three years of data for the roads managed by NCC and five years for the Strategic Road Network managed by Highways England.

165. Having identified the potential clusters, a further STATS19[5] data have been obtained for these clusters from NCC and SCC for the five year period, 1st January 2015 to 31st December 2019. These datasets provide further information relevant to the collisions including information to the highway environment allowing more detailed assessment to be undertaken.

166. **Table 26-16** provides a summary of all identified collision clusters within the TTSA; they are also shown graphically in **Figure 26.3.**

[3] http://www.crashmap.co.uk/
[4] Defined within the MS (Ref: PB8164-RHD-ZZ-ON-RP-Z-002)
[5] Accidents on the public highway that are reported to the police and which involve injury or death are recorded by the police on a STATS19 form. The form collects a wide variety of information about the accident (such as time, date, location, road conditions).

Table 26-16: Collision Cluster Information

Link	Collision Cluster Ref.	Description	No. of collisions			
			Total	Fatal	Serious[6]	Slight[7]
23 / 24	1	A140 /Fuller's Hill Roundabout	13	0	1	12
25	2	A47 Breydon Bridge	12	0	3	9
25 / 26	3	A47 / William Adams Way Roundabout	14	0	2	12
26	4	A47 / Lowestoft Road Roundabout	7	0	1	6
26 / 27	5	A47 / B1385 Roundabout	5	0	3	2
29	6	A12 / Carlton Road Junction	11	0	3	8
29	7	A12 / A1145 Roundabout	9	0	1	8
30 / 31 / 129	8	A47 / A146 Junction	29	0	3	26
32 / 33	9	A47 / Cucumber Lane Roundabout	23	0	3	20
33	10	A47, within proximity of the Plantation Road slip road.	9	0	2	7
33	11	A47, within proximity of Main Road	7	0	1	6

[6] An injury for which a person is detained in hospital as an "in-patient", or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushing, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident.

[7] An injury of a minor character such as a sprain (including neck whiplash injury), bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. This definition includes injuries not requiring medical treatment.

Link	Collision Cluster Ref.	Description	No. of collisions			
			Total	Fatal	Serious[6]	Slight[7]
34	12	A47	13	0	3	10
35 / 36 / 40	13	A1270 / A1151 Roundabout	13	0	1	12
36	14	A1042 / A1151 Roundabout	12	0	1	11
42	15	A140 / A1402 Junction	15	0	2	13
76	16	A1067 / Hospital Lane Junction	10	0	2	8
76	17	A140 / A1067 Junction	16	0	3	13
86	18	A47 – Hockering	8	0	2	6
86	19	A47 – Necton	10	0	4	6
89/ 90 / 91 / 94	20	A47 / Bind Lane / Taverham Road Junction	10	0	3	9
93 / 94 / 95	21	A47 / Church Lane Roundabout	12	0	1	11
96	22	A1074 / Longwater Lane Junction	6	0	1	5
96	23	A1074 / Norwich Road Junction	15	0	1	14
96	24	A140 / A1074 Junction	20	0	2	18
105 / 106 / 114 / 121 / 122	25	Thickthorn Interchange	26	0	1	25

Link	Collision Cluster Ref.	Description	No. of collisions			
			Total	Fatal	Serious[6]	Slight[7]
122 / 127 / 129	26	A47 south of Thickthorn Interchange	5	0	1	4
125	27	A47 / A146 Roundabout	8	0	0	8
33	28	A47 / B1140	7	0	2	5
34	29	A47 - Acle Straight	7	1	0	6
34	30	A47 / Branch Road	9	0	0	9
24 / 25 / 34	31	A47 / A149	9	0	0	9
25	32	A47 / Gapton Hall Roundabout	18	0	1	17
87	33	A47 Constitution Hill	6	3	0	3
87	34	A47 - Chalk Farm	6	0	4	2
86	35	A47 / B1146	8	1	4	3
85 / 86 / 89	36	A47 / Berrys Lane / Wood Lane	12	0	2	10
127	37	A140	5	0	3	2

167. **Table 26-16** details that within the study are there are 37 collision clusters.

168. In addition, HE requested that the A11/ Station Lane junction should be assessed in respect to collisions, irrespective of a collision cluster existing at the junction (**Appendix 26.1**). A review of the Junction identified that there were no collisions recorded within the adopted five year study period.

26.5.5 Anticipated Trends in Baseline Conditions – Future Year Traffic Flows

169. It is currently considered that the earliest date that construction could commence would be summer 2024, however the majority of work in 2024 would be enabling works (generating minimal traffic demand) with the main construction works likely to start in 2025 at the earliest.

170. In order to consider a worst case, a reference year for background traffic of 2025 has been derived. The rationale for this is later years would result in higher background traffic flows and therefore a lesser magnitude of change.

171. To take account of sub-regional growth in housing and employment, a proportionate approach to forecasting future traffic growth for the 2025 reference year has been agreed with ETG stakeholders (**Appendix 26.1**). The baseline flows have been factored to the future year baseline traffic demand (year 2025) using the Trip End Model Presentation Programme (known as TEMPro) Version 7.2b with data set 72 for the Norfolk and Suffolk Area and factoring the growth rate using the National Traffic Model Dataset AF15 all areas (a combination of urban and rural area types). Details of the growth factors that have been applied are provided within **Appendix 26.5** of this document.

26.5.6 Climate Change and Natural Trends

172. A number of emerging studies into post Covid19 pandemic traffic conditions have been published, however, due to the pandemic continuing into 2021 nothing conclusive has been identified. Therefore, at this stage it is concluded that for traffic and transport there will be no implications related to climate and natural trends.

26.6 Potential Impacts

26.6.1 Potential Impacts during Construction

26.6.1.1 Introduction

173. This section of the PEIR presents the construction traffic demand, distribution and assignment presented as part of the Evidence Plan Process (as presented in the Traffic and Transport 'Method Statement' (Royal HaskoningDHV, 2020) and agreed with the Expert Topic Group. Further refinements to the agreed methodology have been undertaken as a result of further stakeholder engagement.

174. Three potential construction scenarios for DEP and SEP have been identified:

- Scenario 1 – Construct DEP or SEP in isolation;
- Scenario 2 – Construct DEP and SEP concurrently; and
- Scenario 3 – Construct DEP and SEP sequentially.

175. For the purposes of the PEIR, DEP and SEP concurrent scenario is considered to represent a worst case for traffic and transport impacts as there would be an increased intensity of deliveries of materials and personnel. Noting that an assessment of the single project in isolation will be included as part of the full DCO application.

176. To inform the derivation, distribution and assignment of construction traffic demand, a realistic worst-case traffic demand for DEP and SEP concurrent scenario has been developed by examining:

- The likely minimum construction programme (and therefore maximum activity intensity);
- The earliest commencement date;
- Peak demand for materials and personnel;
- Likely shift patterns;
- Minimum delivery windows;
- Likely mode share; and
- The distribution and assignment of traffic.

177. The assumptions that underpin the calculation of traffic demand and have been developed with the input from the Applicant's engineering team and are augmented with experience gained through the construction of previous projects of a similar scope and scale.

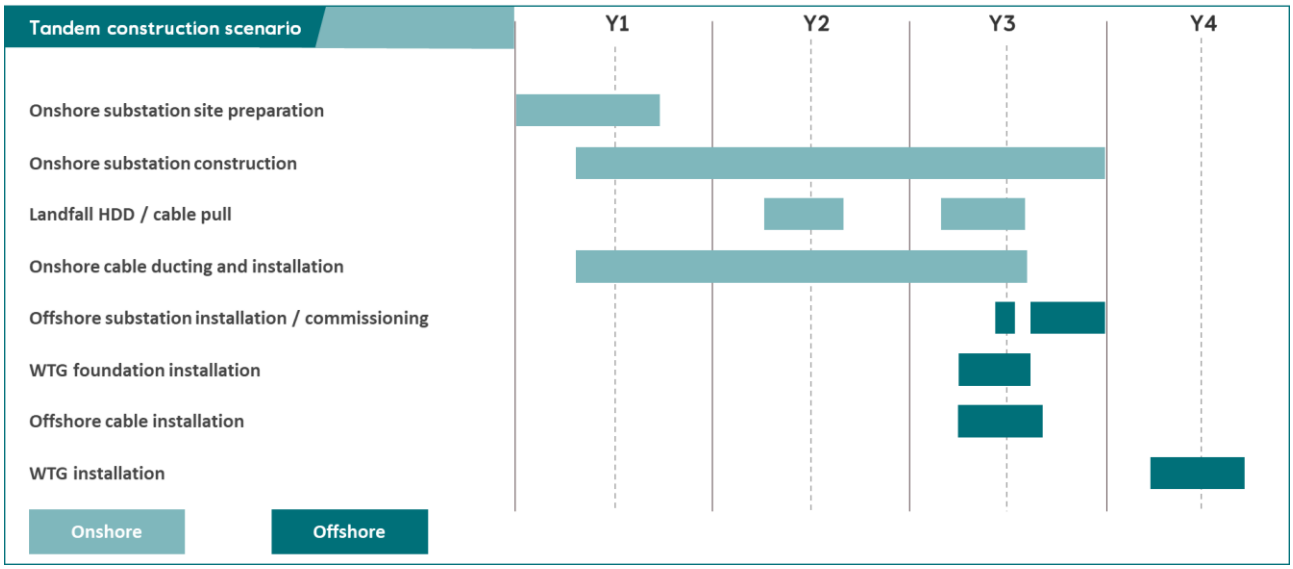
178. The traffic demand and distribution presented within this PEIR is representative of the level of engineering design that has been undertaken to date.

26.6.1.2 Construction Programme

179. Pre-construction works would take place before the 'main installation works' and are scheduled to begin from 2024.

180. DEP and SEP concurrent scenario main installation works are due to begin in 2025 and would consist of the majority of the major works for landfall, onshore cable corridor and the onshore substation. An indicative high-level construction programme is presented in **Plate 26-1.**

Plate 26-1: Indicative Construction Programme - DEP and SEP built alone or DEP and SEP built together concurrently



181. The programme illustrates the likely duration of the main installation works, and how they may relate to one another for DEP or SEP in isolation (to be assessed in the DCO application) and DEP and SEP built concurrently (assessed in PEIR)

182. The construction programme for the two projects concurrent scenario represents a realistic minimum duration for concurrent construction activity and therefore the worst case in terms of traffic intensity. Any lengthening of the construction duration would reduce the intensity of daily traffic and therefore the associated impacts.

183. It is considered that the earliest date that construction could commence for main installation works would be 2025; as such as baseline year for background traffic of 2025 has been derived for the purpose of the assessment.

184. The nature of construction works typically requires that employees work longer hours in the summer and shorter hours in the winter to take advantage of the available daylight. There is a possibility that a proportion of employee arrival / departures may overlap with the network peaks. Accordingly, network peaks will be identified for all the critical junction locations to inform the worst case scenario.

26.6.1.3 Onshore Infrastructure Parameters

185. **Chapter 5 Project Description** provides a full description and methodology of DEP and SEP proposed construction. The following sections provides a summary of DEP and SEP onshore infrastructure components during the main installation stage of works and includes the following elements:

- TCCs;
- Landfall HDD Drilling (including joint transition bays);
- HVAC onshore cable corridor duct installation (including, joint bays, link boxes and trenchless crossings); and
- Onshore substation.

26.6.1.3.1 Temporary Construction Compounds (TCCs)

186. TCCs are required to support the onshore cable installation. This will include several secondary compounds and up to two main compounds. In addition, the landfall and substation works would have their own dedicated construction compounds.

187. The TCCs would operate as support bases for the onshore construction works as the cable workfronts pass through an area. They may house portable offices, welfare facilities, localised stores, as well as acting as staging posts for localised secure storage for equipment and component deliveries.

188. For the purposes of the PEIR, five TCCs have been assessed. These are detailed below and shown graphically on **Figure 26.4**:

- Compound 1, located at the landfall;
- Compound 2, located at Bodum;
- Compound 3, located south of Oulton on the B1149;
- Compound 4, located on Hethersett Road; and
- Compound 5, located at the substation.

189. Additional TCCs are currently being identified and will be included and assessed within the ES.

26.6.1.3.2 Landfall

190. The landfall study area at Weybourne was chosen as the result of a site selection process, considering environmental and technical constraints. The site selection process is described in **Chapter 4 Site Selection and Assessment of Alternatives**.

191. A HDD duct will be required for the installation of each of the DEP and SEP export cables (i.e. two ducts in total for both DEP and SEP). As such, up to two drills will be undertaken for the landfall works. An extra drill per project has been allowed for contingency (i.e. up to four drills in total to install two ducts). Each drill will be launched from a compound inland, drilled under the beach and intertidal area, and will exit out at sea.

26.6.1.3.3 Onshore cable corridor and work fronts

192. From the landfall at Weybourne, the onshore cable corridor travels south, crossing Sheringham Road (A149), and the North Norfolk Railway line between Holt and Sheringham and continuing south to cross Cromer Road (A148) to the east of High Kelling.

193. The route continues south passing the villages of Oulton and Cawston, crossing the River Wensum near Attlebridge and then crossing the A47 between Hockering and Easton. From this point the onshore cable corridor heads south east crossing the A11 at Ketteringham and eventually reaching the two onshore substation options near the existing Norwich Main substation.

194. The onshore cable duct will be installed in sections of up to 1km at a time, with a typical construction presence of up to four weeks along each 1km section. Construction may be carried out by up to ten teams (one per 1km section) along the export cable corridor at the same time.

195. The primary cable installation method would be open cut trenching, with cable ducts installed within the trenches and backfilled with soil. Cables would then be pulled though the pre-laid ducts at a later stage in the construction programme.

196. An approximately 1.2m – 2.0m deep trench would be excavated. Ducts would be buried to a minimum depth of 1.2m (from top of duct to surface) and installed using two methods:

- Hand laying ducts, which is suited to short and/or complicated sections; and
- The use of ducting trailer or ducting machine for longer uninterrupted trenching sections.

197. Once the cable ducts have been installed in each section and the trench reinstated, the workfront would move onto the next section. This would minimise the amount of land being worked on at any one time. However, the haul road (refer to **Section 26.6.1.3.5)** would need to be retained throughout much of the cable route to maintain access to each workfront.

26.6.1.3.4 Onshore cable corridor trenchless crossings

198. Cable route crossings of major roads, main watercourses and rail infrastructure would be undertaken using trenchless crossings techniques such as HDD (refer to **Table 26-3**). Chapter 5 Project Description describes the HDD process in further detail.

26.6.1.3.5 Haul road

199. The haul road would provide safe access for construction vehicles along the onshore cable corridor, between TCCs and the workfronts access locations. This will minimise the amount of vehicles movements between work areas on the local road network. The haul road would be up to 6m wide and 0.4m deep, and as a worst case it is assumed it may be required along the full length of the cable route. Speed limits on the haul road would typically be limited to 20mph.

200. Following an initial topsoil strip, the haul road would be installed in stages as each workfront progresses. It would be formed of protective matting, temporary metal road or permeable gravel aggregate dependant on the ground conditions, vehicle requirements and any necessary protection for underground services.

201. At larger crossings, temporary bridges may be employed to allow continuation of the haul road. At sensitive locations such as some rail and river crossings, the haul road would effectively stop and would re-start on the opposite side.

202. When cable installation is completed the haul road would be removed and the ground reinstated using the stored topsoil.

26.6.1.3.6 Joint bays and link boxes

203. Joint bays would be required along the onshore cable corridor to connect sections of cable. Joint bays would be installed at least 1m below ground and would be formed on completion of the duct installation before the cables are installed.

204. Joint bays will be constructed with a concrete raft floor, battered sides and a containerised enclosure. The joint bays will be completely backfilled with CBS to ensure that the cables are stabilised from future thermo-mechanical movement.

205. Link boxes are required in proximity (within 10m) to the jointing bay locations to allow the cables to be bonded to earth to maximise cable ratings. It is assumed that link boxes could be required up to a frequency of one every 500m. The number and placement of the link boxes would be determined as part of the detailed design.

206. The link boxes would require periodic access by technicians for inspection and testing. Where possible, the link boxes would be located close to field boundaries and in accessible locations.

26.6.1.3.7 Cable pull and jointing

207. Cables would be pulled through the pre-installed ducts later in the construction programme. Trenches would not need to be reopened, and the cable pull would take place from jointing bays located along the onshore cable corridor.

208. Typically, this would be achieved by accessing the onshore cable corridor directly from the existing accesses where possible (existing road network where it crosses the cable route or from other accesses e.g. farm accesses). Sections of the haul would need to be retained following the duct installation works or be reinstated to allow access to more remote joint locations. However, at this stage it is unknown exactly what proportion of the haul road would need to be retained and as a worst case it is assumed that 100% of the haul road would remain in place throughout the cable pulling works.

209. During the cable pull and jointing works, joint bays would need to be temporarily re-excavated. Cable drums would be delivered by HGV low loader to the open joint bay locations and a winch attached to the cable. The cable would then be winched off the drum from one joint pit to another, through the buried ducts. Cable jointing would be conducted once both lengths of cable have been installed within each joint bay.

26.6.1.3.8 Onshore Substation

210. Two onshore substation options have been identified and assessed within this PEIR – each option is of sufficient size to accommodate the maximum footprint required for both DEP and SEP. Only one of these two options will be taken forward for the DCO application. The decision on the preferred option will be informed by stakeholder feedback on the information provided in this PEIR, as well as further technical studies and ongoing environmental survey and assessment work.

211. The two onshore substation options are located in arable land south of the existing Norwich Main substation. Site 1 is located approximately 250m south of Norwich Main, immediately west of the Norwich to Ipswich rail line, and approximately 600m north of the nearest village (Swainsthorpe). Site 2 is located approximately 150m south west of Norwich Main and approximately 1km east of the nearest village (Swardeston).

212. As the final location for the substation has not been confirmed a number of access options have also be proposed (C78A, C78B, C78C and C78D). Options C78A, B and C would be accessed via the A140, whilst option C78D would be accessed via the B1113. The final access strategy will be finalised post-PEIR for inclusion in the DCO application.

213. Further details on the location, construction and operation of the substation is provided in **Chapter 5 Project Description.**

26.6.1.4 HGV and Employee Demand

214. The traffic demand that will inform the assessment of traffic and transport impacts has been derived and undertaken by way of a 'first principles' approach. The first principles approach generates traffic volumes from an understanding of material quantities and personnel numbers required for DEP and SEP and converts these metrics into vehicle movements.

215. **Appendix 26.6** details the derivation of material movements that could be expected for each of the construction activities.

216. **Appendix 26.7** details the expected quantity of materials and personnel movements that could be expected for all construction, and for each of the major construction activities.

26.6.1.4.1 HGV Demand

217. **Table 26-17** provides a sample of the peak daily material per activity respectively. The 12 months sample reflects the peak activity period of the entire construction programme. The full construction programme is presented in Table A26.7.2 within **Appendix 26.7**.

Table 26-17: Peak daily material per activity (extract of Table A26.7.2 within Appendix 26.7)

	Months											
Activity	1	2	3	4	5	6	7	8	9	10	11	12
1A. TCC establishment		10	10	10	10							
2. Landfall HDD TCC establishment		7	7									
3. Haul road		103	103	103	103	103	103					
4. Backfill material - CBS				59	59	59	59	59	59	59	59	
5. Tape/ tile				0	0	0	0	0	0	0		
6. Ducts (trench)				4	4	4	4	4	4	4		
7. Cables										4	4	4
8A. HDD installation (Route)					4	4	4	4	4	4	4	
8B. HDD Installation (Compounds)					20	20	20	20	20	20	20	20
9. Drainage ducts		1	1	1	1	1	1					
10. Joint bays							45	45	45	45	45	89
11. Temporary access roads		31	31	31	31							
12. Onshore substation access road	17	17	17									
13A. Substation site development				33	33	33	33					

	Months											
Activity	1	2	3	4	5	6	7	8	9	10	11	12
13B. Substation site development – Topsoil removal												
14. Onshore substation daily HGV deliveries	12	15	15	15	15	15	75	75	75	75	75	75
Total daily HGV deliveries	**29**	**185**	**185**	**256**	**280**	**238**	**343**	**207**	**207**	**211**	**207**	**189**
Total daily HGV movements (including 30% contingency)	**38**	**240**	**240**	**333**	**364**	**310**	**446**	**269**	**269**	**274**	**269**	**246**
Total daily two-way HGV movements	**75**	**480**	**480**	**666**	**729**	**620**	**892**	**537**	**537**	**549**	**538**	**491**
Key												
Peak traffic flows per activity												

218. It can be noted from **Table 26-17** (and **Appendix 26.7**) that the construction HGV demand fluctuates according to the intensity of the activities that are occurring at any point in the programme. Overall, the most intense period of construction activity would be during month seven.

219. **Table 26-17** highlights that during month seven there could be a combined peak of 343 HGV deliveries per day (686 two-way HGV movements). The worst-case daily HGV movements have been increased further by 30% to account for uncertainties and incidental deliveries (such as plant), resulting in a peak of 892 two way HGV movements per day (i.e. 446 HGVs arrive and 446 HGVs depart).

220. The selection of a peak month however would not include a tolerance for 'real-time' programme changes (e.g. slippage/acceleration) Therefore, in order to account for any tolerance a theoretical worst case month has been derived by examining the potential for individual construction activities to move relative to each other (selecting the orange highlighted cells in **Table 26-17**). The use of a theoretical worst-case month results in a peak of 409 HGV deliveries per day, which when a 30% contingency is applied results in a peak of 532 deliveries, equating to 1,063 two-way HGV movements per day (compared to the peak 892 two-way HGV movements per day in month seven).

221. The peak of 1,063 two-way HGV movements per day is therefore adopted for the purposes of considering a worst case traffic demand.

222. **Table 26-18** details the typical type of HGVs that would be in used during construction of the onshore infrastructure of a project of this nature.

Table 26-18: Typical Construction Vehicles

Vehicle Type	Max Load Weight	Max Gross Vehicle Weight	Max length	Max Width	Notes
Rigid tipper (4 axle)	20t	32t	10m	2.55m	Used to import stone, export excavated materials.
Articulated tipper (6 axle)	29t	44t	14.2m	2.55m	
Rigid mixers (3 axles)	6m^3	26t	8.7m	2.55m	Import of concrete and cement bound sand.
Articulated HGVs	29t	44t	16.5m	2.55m	Import of miscellaneous items such as fencing, ducts, etc.

26.6.1.4.2 Personnel Demand

223. **Table 26-19** provides a sample of the peak daily LCVs per activity respectively. The 12 month sample reflects the peak activity period of the entire construction programme. The full construction programme is presented in Table A26.7.1 within **Appendix 26.7**.

Table 26-19: Peak daily LCVs per activity (extract of Table A26.7.1 within Appendix 26.7)

Activity		Total LCVs	Months											
			1	2	3	4	5	6	7	8	9	17	18	19
Site establishment		6		6	6									
HDD activities		8				8	8	8	8	8	8			
Subsea Cable installation		6											6	6
Cable jointing		4												
Demolition		4												
TCCs		6		6	6	6	6							
Fencing and Topsoil removal		18		18	18	18	18							
Haul roads and access	Establishment	8		8	8	8	8							
	Removal	8												
Land drainage	Pre-Construction	16		16	16	16	16	16	16					
	Post construction	16												
Trenching and ducting		32				32	32	32	32	32	32			
	CBS	6				6	6	6	6	6	6			
HDD		12					12	12	12	12	12			
Joint bays	Preparation	12							12	12	12			
	Reinstatement	12												
Cable installation	Cable pulling	10												
	Jointing	8										8	8	8
	HV Testing	8												
Reinstatement		16												
Site enabling work		25	25	25	25	25	25	25	25	25	25			
Civil and buildings		40							40	40	40	40	40	20
Installation		50										50	50	50
MC/Commissioning		40												40

Activity	Total LCVs	Months											
		1	2	3	4	5	6	7	8	9	17	18	19
Demobilisation	15												
Site Management team/Safety	20	10	10	10	20	20	20	20	20	20	20	20	20
Total monthly Daily LCV movements		**35**	**89**	**89**	**139**	**151**	**119**	**171**	**155**	**155**	**118**	**124**	**144**
Total monthly Daily two-way LCV movements		**70**	**178**	**178**	**278**	**302**	**238**	**342**	**310**	**310**	**236**	**248**	**248**
Key													
	Peak traffic flows per activity												

224. It can be noted from **Table 26-19** (and **Appendix 26.7**) that the construction LCV demand fluctuates according to the intensity of the activities that are occurring at any point in the programme. **Table 26-19** (and **Appendix 26.7**) highlights that during month five there could be a combined peak of 151 employees per day. However, it can be noted from **Table 26-19** (and **Appendix 26.7**) that whilst month five represents the overall worst-case month for the majority of activities, it does not represent the worst case period for the onshore substation activities which occur later in the programme.

225. The worst case month for the onshore substation construction activities occurs between months 19 and 25 when there are up to 144 employees working on the substation.

226. Similar to the approach adopted for HGVs, in order to consider the potential for slippage/ acceleration, a theoretical worst-case demand for employee movements has been selected by considering the worst case demand associated with each of the activities.

227. **Table 26-20** provides a summary of the numbers of employees (split based upon their geographical working locations) that would be required for DEP and SEP when selecting a worst-case month.

Table 26-20: Summary of the numbers of workers for DEP and SEP.

Construction Locations	Peak Month Selected	No. of Employees per location
Landfall	5	8
TCCs	5	6
Onshore cable corridor	5	92
Onshore substation	19	130
Total		236

228. The use of a theoretical worst-case month results in a peak of 236 employees per day compared to the peak 171 employees per day in the programme worst case month seven.

229. It is typical for construction projects that employees will travel to work together and in contractor provided vehicles. However, for the purposes of considering a worst case, no consideration for car -sharing has been applied.

230. This approach also allows a tolerance for additional incidental LCV movements associated with demand such as delivery of parcels or visits by plant fitters, etc.

26.6.1.4.3 Construction Traffic Distribution and Assignment

231. The supply chain for materials cannot be detailed as this will depend on the contractor employed and will therefore not be available until the pre-construction phase. In the absence of this information, the following sections describe the assumptions that have been adopted to inform the distribution of HGVs and construction employee traffic to ensure the assessment 'envelope' encapsulates all foreseen logistic plans.

232. It is envisaged that typical working hours would be 7am to 7pm Monday to Friday, 7am to 1pm on Saturdays, with no work programmed on Sundays or bank holidays.

233. The nature of construction works typically requires that employees work longer hours in the summer and shorter hours in the winter to take advantage of the available daylight. The majority of employee trips would occur outside the peak hours, however, in order to consider a worst case, it would be assumed that all employee trips would overlap with the morning and evening network peaks hours.

26.6.1.4.4 HGV Distribution and Assignment

234. Trips associated with bulk materials such as concrete and stone aggregate would make up the majority of the total HGV movements.

235. A review of the potential supply chain within the TTSA area indicates that while there are a number of local suppliers that may meet some of DEP and SEP demand, they are unlikely to meet the substantive material demands required of DEP and SEP.

236. A viable source for bulk materials would be the ports local to the project. Kings Lynn Port to the west and Lowestoft / Great Yarmouth Ports to the east are considered to be the most likely source for all materials and, as such, it is assumed that all HGV movements would have an origin and destination in these regions (noting that in practice that some of the demand could be met by the local supply chain, taking up existing demand on the network).

237. A single port could have the capacity to provide all required materials for DEP and SEP, however, it is unlikely that HGVs would travel long distances to service the furthest onshore infrastructure site from a single port as the economics would be a 'distance deterrent'.

238. It has been agreed in the traffic and transport ETG (ref: PB8164-RHD-ZZ-ZZ-MI-PM-0008 provided in **Appendix 26.1**) that movements from any local suppliers (such as quarries) within the TTSA would be captured within the existing permissions and therefore do not need to be assessed.

239. It was agreed in the traffic and transport ETG (Ref: PB8164-RHD-ZZ-ZZ-MI-PM-0008) that a gravity model approach would be utilised to assign the traffic to the ports.

240. The gravity model (provided in **Appendix 26.8**) approach uses journey time derived from the Google maps journey planner based on a neutral weekday (Wednesday, during the AM peak period of 7am to 8am). DEP and SEP' various accesses to the port has been calculated based on the percentage of deliveries that could come from the respective ports. For example, from access C01, it is an approximate 75 minutes to Great Yarmouth Port and 65 minutes to Kings Lynn Port. Therefore, applying the gravity model it is calculated that 53.6% would come from the direction of Great Yarmouth Port or Lowestoft and 46.4% would come from the direction of Kings Lynn Port. In contrast, access C71 is approximately 40 minutes from Great Yarmouth Port and 70 minutes to Kings Lynn Port, equivalent to a split of 36.4% and 63.6% respectively.

26.6.1.4.5 Delivery locations

241. **Figure 26.8** details the PEIR boundary. For the purposes of this assessment, the site delivery strategy is as follows.

- Landfall: deliveries would be made directly to the TCC at the landfall site north west of Weybourne utilising existing access (C01) on the A149.

- Onshore cable corridor: The entire onshore cable corridor footprint has been divided in to 45 discrete sections based upon the maximum length of cable route that can be served by each of the points of access.
- TCCs: deliveries associated with welfare and office facilities at the identified TCCs.
- Onshore substation: Deliveries would be made directly to the onshore substation TCC.

242. The assignment for each access is detailed in **Appendix 26.9**.

243. To identify how the peak 1,157 two-way HGV movements would assign to the TTSA, the entire PEIR boundary has been divided in to 45 sections based upon the maximum length of cable route that can be served by each of the points of access, taking into account watercourse/ rail segregation, and the locations of potential trenchless crossings. The proposed access locations are depicted graphically in **Figure 26.4,** whilst the assignment of the HGV movements to these accesses is detailed within **Appendix 26.10**.

244. The assignment of the HGVs from each of these points of access on to the wider highway network is detailed within **Appendix 26.10.**

26.6.1.4.6 Employee Distribution

245. To inform the potential distribution of construction employees, the availability of local labour and rented accommodation has been reviewed.

246. The types of specialist skills required for projects such as DEP and SEP means that construction personnel often have to be drawn from across the country and not necessarily from local labour sources. The socio-economic assessment for DEP and SEP has estimated that 30% of the workforce would be drawn from the local area (known as 'resident' labour). The remaining 70% of the workforce would be sourced from a distance beyond a reasonable daily commute (referred to as 'in-migrant' labour). This is detailed in **Chapter 29 Socioeconomics.**

247. For the purpose of a proportional assessment a single centroid has been assumed in the centre of the onshore cable corridor, which is located approximately 14km northwest of Norwich (close to the village of Swannington).

248. Those personnel who are not local (in-migrant labour) i.e. beyond a reasonable daily commute (up to a 90-minute drive of the centroid) are likely to base themselves within temporary local accommodation.

249. The distribution of local hotel accommodation per post code cluster is outlined within **Appendix 26.11**. The distribution of hotel bed spaces per postcode cluster has been factored using a gravity model approach, whereby the number of bed spaces is divided by the journey time from the centroid (taken from the google maps route planner during a neutral 7am to 8am neutral weekday).

250. **Appendix 26.11** also assigns each postcode cluster a point of entry on to the highway network to inform the distribution of employees.

251. The distribution of residents within the local area with the relevant skill sets has been examined. The number of residents working in the construction sector per postcode within the region has been informed by Table LC6602EW (Industry by economic activity) derived from the 2011 Census (ONS, 2019). The distribution of local employees per postcode cluster is outlined within **Appendix 26.12**. This has been factored using a gravity model approach, whereby the number of employees is divided by the journey time from the centre of the postcode cluster to the centroid.

252. **Appendix 26.12** also assigns each postcode cluster a point of entry on to the TTSA to inform the distribution of local employees. This is shown graphically in **Figure 26.9**.

253. **Section 26.6.1.4.2** identifies that for the onshore cable corridor the number of personnel required would be 92 (184 two-way LCV movements per day).

254. Noting that it is not possible at this stage to confirm how the construction works would be sequenced, to inform a worst-case assessment of impacts on the local highway network, all 92 employees have been assigned to each access at the same time (184 two-way LCV movements per day, per access). However, in order to ensure that the impacts are realistic on the wider highway network (where all the access traffic collects), all LCV movements have been capped at 184 two-way LCV movements per day, i.e. the peak number of daily employee movements for the onshore cable corridor.

255. Having assigned the LCV movements associated with the cable route and capped these at 184 two-way LCV movements per day, the additional employees working at the onshore substation (130), TCCs (6) and landfall (8) have been assigned to the TTSA. The detailed distribution of LCV movements to the TTSA is provided as **Appendix 26.13** of this document.

26.6.1.4.7 Trip Generation and Assignment Summary

256. **Appendix 26.14** provides a summary of the forecast worst case peak daily and peak hour HGV and LCV movements on each of the 156 links within the TTSA.

26.6.1.5 Traffic Impact Screening

257. With reference to the GEART (Rule 1 and Rule 2)[8], a screening process has been undertaken for the TTSA to identify routes that are likely to have sufficient changes in traffic flows and therefore require further impact assessment.

258. **Table 26-21** summarises the assigned daily peak two-way vehicle movements (i.e. arrivals and departures) of all materials, personnel and plant during the peak combined month when distributed across the highway network

259. **Table 26-21** also provides a comparison of the peak daily construction flows with the forecast background daily traffic flows in 2025 and identifies the links exceeding the GEART screening thresholds.

[8] Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and Rule 2: Include any other specifically sensitive areas where traffic flows (or HGV component) are predicted to increase by 10% or more.

Table 26-21: Link Screening

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
1	A1078 Low Road / A148 Grimston Road	Low	17,776	887	825	630	5%	71%
2	A148 from A149 to A1065	Medium	8,658	662	427	231	5%	35%
3	A148 from A1065 to A1067	Low	16,241	978	420	231	3%	24%
4	A148 from A1067 to B1149	Medium	9,530	508	387	176	4%	35%
5	A148 from B1149 to Hempstead Road	Medium	14,272	497	273	76	2%	15%
6	A148 from Hempstead Road to Bridge Road	Medium	14,272	497	251	57	2%	11%
7	Bridge Road	High	827	63	214	30	26%	48%
8	The Street	High	827	63	205	17	25%	27%
9	A149 - The Street	High	3,621	55	245	33	7%	59%
10	Holgate Hill / Holt Road	High	1,273	81	197	13	15%	16%
11	A149 from Weybourne to Weybourne Road	High	5,023	279	236	36	5%	13%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
12	Station Road / Sandy Hill Lane / Gypsies' Lane	Medium	1,008	104	216	32	21%	31%
13	A148 from Gypsie's Lane to B1436	High	15,102	1,271	272	73	2%	6%
14	B1436 - Felbrigg	Medium	7,290	661	214	62	3%	9%
15	A140 - Roughton	Low	5,929	516	259	62	4%	12%
16	A149 - North Walsham	Medium	9,241	378	118	62	1%	16%
17	A149 from B1145 to B1150	Low	12,980	585	118	62	1%	11%
18	A149 from B1150 to Kidas Way	Low	12,980	585	118	62	1%	11%
19	A149 from Kidas Way to Honning Road	Low	7,368	382	118	62	2%	16%
20	A149 from B1159 to Station Road	Low	9,647	543	118	62	1%	11%
21	A149 from Station Road to A1064	Medium	11,556	486	118	62	1%	13%
22	A149 from A1064 to Yarmouth Road	Low	26,297	711	118	62	0%	9%
23	A149 from Yarmouth Road to B1141	High	21,008	619	118	62	1%	10%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
24	A149 from B1141 to A47	Medium	36,217	1,097	508	457	1%	42%
25	A12 from A47 to Williams Adams Way	Low	37,422	1,181	434	236	1%	20%
26	A12 from Williams Adams Way to B1385	Medium	27,224	919	420	239	2%	26%
27	A12 from B1385 to A1117	Low	18,985	505	239	239	1%	47%
28	A12 from A1117 to Mill Road	Medium	10,109	672	239	239	2%	36%
29	A12 from Mill Road to B1384 / A1145 from B1384 to A146	Medium	11,761	446	221	221	2%	50%
30	A146 from A47 to A1145	Medium	19,940	870	469	221	2%	25%
31	A47 from A146 to A1042	Low	55,710	2,520	472	221	1%	9%
32	A47 from A1042 to Cucumber Lane	Low	46,416	2,109	612	395	1%	19%
33	A47 from Cucumber Lane to A1064	Low	46,416	2,109	601	395	1%	19%
34	A47 from A1064 to A12	Low	23,220	1,438	593	395	3%	27%
35	A1270 from A1151 to A47	Low	11,865	760	410	174	3%	23%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
36	A1151 from A1042 to A1270	Medium	17,475	629	0	0	0%	0%
37	A149 from A1151 to B1159	Low	14,702	1,365	85	62	1%	5%
38	A149 from The Street to A1151	Medium	9,137	1,096	85	62	1%	6%
39	A149 from Honing Road to The Street	Low	9,137	1,096	85	62	1%	6%
40	A1270 from B1150 to A1151	Low	23,734	1,519	424	174	2%	11%
41	A1270 from A140 to B1150	Low	23,734	1,519	405	174	2%	11%
42	A140 from B1149 to A1042	Medium	19,522	774	304	0	2%	0%
43	A140 from Cawston Road to A1270	Medium	15,175	632	333	118	2%	19%
44	A140 from B1145 to Cawston Road	Low	16,561	1,485	308	104	2%	7%
45	A140 from B1145 to Aylsham Road	Low	12,240	412	206	0	2%	0%
46	A140 from Thorpe Market Road to Aylsham Road	Low	12,240	412	207	0	2%	0%
47	A1270 from Drayton Lane to A140	Low	11,865	760	388	160	3%	21%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
48	Brewery Lane / B1149 from Brewrey Lane to Shorthorn Road	High	7,047	301	227	0	3%	0%
49	B1149 from Buxton Road to Shorthorn Road	Medium	7,047	301	231	0	3%	0%
50	Buxton Road	Low	750	107	145	14	19%	13%
51	B1149 from B1145 to Buxton Road	Low	8,642	643	249	16	3%	3%
52	B1145 from B1149 to A140	Medium	4,366	357	171	104	4%	29%
53	B1145 from Old Friendship Lane to B1149	Medium	3,569	334	217	20	6%	6%
54	B1149 from Spink's Lane to B1145	Low	5,264	305	396	158	8%	52%
55	Spink's Lane	Low	108	10	184	0	170%	0%
56	B1149 from B1354 to Spink's Lane	Low	5,264	305	368	132	7%	43%
57	B1354 east of B1149	Low	5,526	327	200	16	4%	5%
58	Unnamed Road	Low	1,101	110	252	67	23%	61%
59	B1149 from A148 to B1354	Medium	4,776	363	304	100	6%	28%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
60	Hempstead Road / The Street	High	1,836	180	58	19	3%	11%
61	Church Lane / Unnamed Road	Medium	31	5	201	17	652%	374%
62	Unnamed Road	Low	1,078	88	201	17	19%	19%
63	Unnamed Road	Low	1,078	88	211	27	20%	31%
64	Church Street / Cherry Tree Road	High	252	23	217	33	86%	142%
65	Northfield Lane	Low	221	20	210	26	95%	128%
66	Plumstead Road	Medium	252	23	48	28	19%	124%
67	Shorthorn Road	Low	4,357	491	189	0	4%	0%
68	The Street / Taverham Road	High	4,357	491	189	0	4%	0%
69	Reepham Road	Low	2,436	197	217	33	9%	17%
70	Station Road	Low	842	71	0	0	0%	0%
71	Reepham Road	Low	2,436	197	217	33	9%	17%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
72	A1270 from Reepham Road to Brewrey Lane	Low	11,865	760	248	57	2%	7%
73	A1270 from Fir Covert Road to Reepham Road	Low	11,865	760	239	50	2%	7%
74	Fir Covert Road	Low	4,612	377	188	0	4%	0%
75	Fir Covert Road	Low	8,245	435	187	0	2%	0%
76	A1067 from Beech Avenue to A140	High	13,750	397	209	0	2%	0%
77	A1067 from A1270 to Fir Covert Road	Low	6,318	436	72	0	1%	0%
78	A1270 from A1067 to Fir Covert Road	Low	11,865	760	242	50	2%	7%
79	A1067 from Marl Hill Road to A1270	Low	11,808	755	277	80	2%	11%
80	A1067 from A148 to Marl Hill Road	Low	8,068	479	251	55	3%	12%
81	Marl Hill Road	Low	2,643	252	224	37	8%	15%
82	Ringland Lane / Morton Lane	Low	344	38	208	24	60%	62%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
83	Church Street / Church Farm Close / Woodforde Close / Honingham Road / Paddy's Lane	High	2,643	252	221	32	8%	13%
84	The Broadway / Unnamed Road	High	30	2	205	21	682%	992%
85	Wood Lane	Low	2,643	252	241	45	9%	18%
86	A47 from A1065 to Berrys Lane	Low	16,886	1,659	623	399	4%	24%
87	A47 from A10 to A1065	Low	15,021	1,586	610	399	4%	25%
88	A149 from A148 to A47	Low	26,936	1,948	449	399	2%	20%
89	A47 from Wood Lane to Taverham Road	Low	27,092	2,318	625	387	2%	17%
90	Taverham Road	Low	220	13	202	18	92%	138%
91	Blind Lane	Low	128	35	0	0	0%	0%
92	Unnamed Road	Low	694	136	0	0	0%	0%
93	Unnamed Road / Dereham Road	Low	694	136	215	31	31%	23%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
94	A47 from Blind Lane to Dereham Road	Low	27,092	2,318	620	384	2%	17%
95	A47 from Dereham Road to A1074	Low	54,091	3,253	615	375	1%	12%
96	A1074 from A47 to A140	Medium	15,454	902	188	0	1%	0%
97	A47 from A1074 to B1108	Low	54,091	3,253	618	375	1%	12%
98	B1108 from Landlow Lane to B1108	Low	6,641	720	221	37	3%	5%
99	Bow Hill	Low	796	61	160	12	20%	21%
100	A148 from Bridge Road to Gypsie's Lane	High	14,272	497	242	47	2%	10%
101	Church Road / Bow Hill	Low	796	61	160	12	20%	21%
102	Unnamed Roads	High	219	39	211	27	96%	69%
103	Chapel Street	Low	1,088	104	196	12	18%	12%
104	B1108 west of Bow Hill	Low	5,962	199	209	25	4%	13%
105	A47 from B1108 to A11	Low	54,091	3,253	614	371	1%	11%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
106	B1172 from Ketteringham Lane to A47	Low	16,208	919	236	52	1%	6%
107	B1172 from New Road to Ketteringham Lane	Low	16,208	919	227	52	1%	6%
108	New Road	Medium	3,561	102	25	25	1%	24%
109	Hethersett Road	Low	798	33	25	25	3%	74%
110	Melton Road / High Green	Low	798	33	209	25	26%	74%
111	B1135 from Melton Road to Norwich Common	Low	11,265	964	17	0	0%	0%
112	B1172 from B1135 to New Road	Medium	11,657	744	211	27	2%	4%
113	B1135 from B1172 to A11	Low	20,025	1,270	232	48	1%	4%
114	A11 from B1135 to A47	Low	53,932	3,770	261	48	0%	1%
115	Ketteringham Lane	Low	647	50	88	0	14%	0%
116	High Street	Low	647	50	191	7	30%	14%
117	Low Street	Medium	1,070	73	210	26	20%	36%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
118	Station Lane	Low	1,886	187	244	48	13%	26%
119	Hethersett Road	Low	1,886	187	218	22	12%	12%
120	Cantley Lane / Cantley Lane South	Low	1,205	38	0	0	0%	0%
121	A11 from A47 to A140	Medium	21,775	1,357	192	0	1%	0%
122	A47 from A11 to A140	Low	66,640	3,631	592	336	1%	9%
123	B1113 south of the A47	Medium	9,314	641	825	381	9%	59%
124	B1113 from A47 to A140	Low	8,923	583	825	381	10%	65%
125	A140 from A146 to A47	Low	24,018	1,059	834	381	4%	36%
126	Aylsham Road	Low	5,264	305	332	124	6%	41%
127	A140 south of the A47	Low	23,311	3,026	821	350	4%	12%
128	Mangreen	Low	333	12	818	350	246%	2823%
129	A47 from A140 to A146	Low	10,209	794	514	221	5%	28%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
130	Unnamed road, west of its junction with The Street	Low	166	13	199	15	120%	118%
131	The Street	Low	2,051	58	210	26	10%	45%
132	Buxton Road / Easton Way	Medium	1,020	94	71	30	7%	33%
133	Porter's Lane / Hall Road	Medium	1,145	267	82	13	7%	5%
134	Grove Lane / Unnamed road	Low	173	15	12	0	7%	0%
135	Reepham Road from its junction with Hall Road to junction with unnamed road.	Low	173	15	12	0	7%	0%
136	Reepham Road from its junction with Hall Road to junction with Station Road	Medium	1,145	267	51	13	4%	5%
137	Unnamed Road, east of its junction with Grove Lane	Low	1,020	94	197	13	19%	14%
138	Broad Lane / The Street	High	301	11	206	22	69%	202%
139	Unnamed road	Low	301	11	34	0	11%	0%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
140	Unnamed Road	Low	301	11	201	17	67%	155%
141	A1082 Holway Road	High	9,352	190	41	19	0%	10%
142	Clay Lane	Low	146	15	206	22	141%	150%
143	Old Fakenham Road	Low	1,689	27	37	24	2%	89%
144	Ringland Lane	Low	408	38	196	12	48%	32%
145	Rectory Road	Low	360	34	0	0	0%	0%
146	Breck Road / Unnamed Road	Low	3,991	652	36	0	1%	0%
147	Breck Road / Weston Green Road	Medium	67	5	80	18	120%	348%
148	Weston Road	Low	67	5	202	18	304%	348%
149	Unnamed road	High	67	5	0	0	0%	0%
150	Unnamed Road	Low	360	34	41	0	11%	0%
151	Hall Road	Low	672	34	90	0	13%	0%

Link ID	Link Description	Link Sensitivity	Background 2025 flows (24hr AADT)		Forecast Construction Vehicle Movements		Percentage Increase	
			All vehicle	HGVs	All vehicles	HGVs	All vehicle	HGVs
152	Burdock Lane / Landlow Lane	Low	5,962	199	207	23	26%	37%
153	Rectory Road / Catbridge Lane	High	1,589	190	118	21	7%	11%
154	Intwood Lane	Low	1,589	190	205	21	32%	43%
155	Unnamed Road	Low	360	34	0	0	0%	0%
156	Imingland Road / Spa Lane	High	30	1	199	14	661%	1330%
*	AADT – Annual Average Daily Traffic							
%	Exceeds GEART screening thresholds							

260. In accordance with GEART only those links that are showing greater than 10% increase in total traffic flows (or HGV component) for sensitive links, or greater than 30% increase in total traffic or HGV component for all other links, are considered when assessing the traffic upon receptors.

261. It is noted from **Table 26-21** that 55 of the 156 links are above the GEART screening thresholds. In addition, Link 52 experiences an increase close to the GEART thresholds. As such, a small change in demand or background traffic flows could result in potentially significant effects, thus the link is screened in for further assessment.

262. **Table 26-22** provides a summary of those links that will be taken forward for further assessment and those that are screened out.

Table 26-22: Link Screening Summary

Further Assessment	No Further Assessment
1, 2, 4, 7-12, 23, 24, 27-29, 54-56, 58, 60, 61, 63-66, 82-84, 90, 93, 100, 102, 109, 110, 116, 117, 123-126, 128, 130-132, 138, 140-144, 147, 148, 152-154 and 156.	3, 5, 6, 13-22, 25, 26, 30-53, 57, 59, 62, 67-81, 85-89, 91, 92, 94-99, 101, 103-108, 111-115, 118-122, 127, 129, 133-137, 139, 145, 146, 149-151 and 155.

26.6.1.6 Impact 1: Severance

263. Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. GEART suggest negative impacts may be experienced when a change in total traffic exceeds 30%.

264. **Table 26-23** presents the impact assessment for each identified link where the percentage increase in total traffic (refer to **Table 26-22**) exceeds 30%.

Table 26-23: Severance Assessment Summary

Link	Link Description	Peak daily change	Link Sensitivity	GEART Magnitude	GEART Impact Significance
55	Spink's Lane	170%	Low	High	**Moderate Adverse**
61	Church Lane / Unnamed Road	652%	Medium		**Major Adverse**
84	The Broadway / Unnamed Road	682%	High		**Major Adverse**
128	Mangreen	246%	Low		

Link	Link Description	Peak daily change	Link Sensitivity	GEART Magnitude	GEART Impact Significance
130	Unnamed road, west of its junction with The Street	120%	Low		**Moderate Adverse**
142	Clay Lane	141%	Low		
147	Breck Road / Weston Green Road	120%	Medium		**Major Adverse**
148	Weston Road	304%	Low		**Moderate Adverse**
156	Imingland Road / Spa Lane	660%	High		**Major Adverse**
64	Church Street / Cherry Tree Road	86%	High	Medium	**Major Adverse**
65	Northfield Lane	95%	Low		**Minor Adverse**
82	Ringland Lane / Morton Lane	60%	Low		
90	Taverham Road	92%	Low		
102	Unnamed Roads	96%	High		**Major Adverse**
138	Broad Lane / The Street	69%	High		
140	Unnamed Road	67%	Low		**Minor Adverse**
145	Rectory Road	76%	Low		
93	Unnamed Road / Dereham Road	31%	Low	Low	**Minor Adverse**

Link	Link Description	Peak daily change	Link Sensitivity	GEART Magnitude	GEART Impact Significance
116	Ketteringham Lane	30%	Low		
144	Ringland Lane	48%	Low		
150	Unnamed Road	37%	Low		

265. As can be seen by **Table 26-23**, five moderate adverse impacts and seven major adverse severance impacts have been identified based on the GEART thresholds.

266. However, it is noted that many of the severance impacts identified are derived from low baseline traffic flows currently experienced on affected links, e.g. link 61 is a medium sensitive link which experiences a 652% increase in traffic over baseline flows, however link 61 has predicted (2025) daily baseline flows of 31 vehicles. Thus, a small change in additional construction traffic would present an exaggerated assessment of magnitude of change on low baseline flows and overestimate the severance impacts likely to occur on such links.

267. To contextualise these impacts, guidance provided in the DMRB Guidance for Population and Human Health (LA112) has been referenced. LA112 states that when considering severance for walkers, cyclists and horse-riders (WCH) roads with daily vehicle flows under 4,000 vehicles per day are considered to be of negligible sensitivity. Using these 4,000 vehicles per day figure as a proxy for all severance impacts, further assessment has been undertaken.

268. The maximum severance effects would occur during peak traffic demand, i.e. during employee arrival/departure from site. Therefore, the 4,000 vehicle per day threshold has been disaggregated to a peak hour demand using a simple factor of 10%. This derives a 400 vehicle per hour threshold over which, severance impact become significant.

269. **Table 26-24** presents daily and peak hourly flows of predicted daily baseline (2025) traffic and baseline traffic with DEP and SEP construction traffic added. As a worst case, a peak hour factor of 20% has been used on the daily baseline traffic flows to determine network peak hour.

Table 26-24: Traffic Flows on Links Showing Moderate and Major Adverse Impacts

Link	24hr AADT (2025)		Peak Hour Flows (2025)			
			Baseline	Construction		Baseline + Construction
	Baseline	Baseline + Construction		LCVs	HGVs	
55	108	292	22	92	0	114
61	31	232	6	92	1.7	100

Link	24hr AADT (2025)		Peak Hour Flows (2025)			
			Baseline	Construction		Baseline + Construction
	Baseline	Baseline + Construction		LCVs	HGVs	
64	252	468	50	92	3.2	146
65	221	431	44	92	2.6	139
84	30	235	6	92	2.1	100
90	220	422	44	92	1.8	138
102	219	430	42	92	2.6	137
128	333	1,151	66	234	35	335
130	166	365	34	92	1.5	128
138	301	507	60	92	2.2	155
142	146	352	30	92	2.2	125
147	67	147	12	31	1.8	45
148	67	269	12	92	1.8	106
155	360	360	72	0	0	72
156	30	229	6	92	1.4	100
*	Baseline peak hour flows estimated at 20% of 24hr AADT.					

270. As identified by **Table 26-24**, all links with combined baseline and construction vehicles within the peak hour experience flows significantly below the 400 peak hour vehicle threshold.

271. The magnitude of effect is therefore assessed as negligible on low to high sensitivity links resulting in a maximum impact of **negligible** to **minor adverse**.

272. Noting that impacts are assessed as no greater than minor adverse for all screened links, no further mitigation beyond that embedded within the design of DEP and SEP is considered necessary.

26.6.1.7 Impact 2: Pedestrian and Cyclist Amenity;

273. The peak daily change in total flows or HGV component for links 61, 64, 65, 66, 84, 90, 128, 130, 138, 140, 142, 147, 148 and 156 are greater than the 100% GEART impact threshold whereby GEART suggest negative impacts may be experienced.

274. The remaining links all experience traffic flows significantly below the 100% threshold and the magnitude of effect is assessed as very low on low to high sensitivity links giving impact significance on all links of **negligible** to **minor adverse**.

275. **Table 26-25** presents the impact assessment for each identified link. To establish the context for the impact assessment reference is made to NCC's Hierarchy Plan (**Appendix 26.2**). Vehicle movement thresholds have also been used to aid the assessment of magnitude; it is considered a daily HGV flow of up to 40 HGVS would constitute a negligible magnitude of impact. Daily HGV movements of 40 results in four movements per hour (40 HGVs profiled over 10 hour delivery window) resulting in a link experiencing one HGV movement every 15 minutes.

276. **Table 26-25** also presents likely pedestrian activity along the links including provision of PROW and any pedestrian infrastructure.

Table 26-25: Pedestrian and Cyclist Amenity Assessment

Link	Link Description	NCC Route Hierarchy	2025 HGV flows		HGV Flow Increase	Assessment	Magnitude of Effect	Link Sensitivity	Impact Significance
			Base	Base +Const'					
61	Church Lane / Unnamed Road	Minor Local – 4A	5	22	374%	Receptors would experience a peak flow of 2.2 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves existing agricultural estates. No footways are provided along the route. Three points of PROW access are located on the link indicating some pedestrian activity is likely. Based on the above, magnitude is considered negligible.	Negligible	Medium	**Minor Adverse**
64	Church Street / Cherry Tree Road	Minor Local – 4A	23	56	142%	Receptors would experience a peak flow of 5.6 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which passes through the village of Plumstead. Frontage development is evident. Two points of PROW access are located on the link indicating some pedestrian activity is likely. Based on the above, magnitude is considered Low.	Low	High	**Moderate Adverse**
65	Northfield Lane	Minor Local – 4A	20	46	128%	Receptors would experience a peak flow of 4.6 HGVs per hour during the defined hours of construction.	Low	Low	**Minor Adverse**

Link	Link Description	NCC Route Hierarchy	2025 HGV flows		HGV Flow Increase	Assessment	Magnitude of Effect	Link Sensitivity	Impact Significance
			Base	Base +Const'					
						The road is classified as a 'Minor Local' route which serves existing farm accesses. No footways are provided along the route. One point of PROW access is located on the eastern extent Based on the above, magnitude is considered Low.			
66	Plumstead Road	Minor Local – 4A	23	51	124%	Receptors would experience a peak flow of 5.1 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves existing farm accesses. Three points of PROW access are located on the link indicating some pedestrian activity is likely. Based on the above, magnitude is considered Low.	Low	Medium	**Minor Adverse**
84	The Broadway / Unnamed Road	Minor Local – 4A	2	23	992%	Receptors would experience a peak flow of 2.3 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves the Merryhill Country Holiday Park, with two points of PROW access located on the link indicating some pedestrian activity is likely. Based on the above, magnitude is considered Low.	Low	High	**Moderate Adverse**

Link	Link Description	NCC Route Hierarchy	2025 HGV flows		HGV Flow Increase	Assessment	Magnitude of Effect	Link Sensitivity	Impact Significance
			Base	Base +Const'					
90	Taverham Road	Minor Local – 4A	13	31	138%	Receptors would experience a peak flow of 3.1 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves existing agricultural estates. No footways are provided along the route indicating minimal pedestrian activity. Based on the above, magnitude is considered negligible.	Negligible	Low	**Negligible**
128	Mangreen	Minor Local – 4A	12	362	2823%	Receptors would experience a peak flow of 36.2 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves the existing Norwich Main Substation Access and Mangreen Quarry crossing points. No community amenities are located along the link and no footways are provided along the route indicating minimal pedestrian activity. Based on the above, magnitude is considered medium.	Medium	Low	**Minor Adverse**
130	Unnamed road, west of its junction		13	28	118%	Receptors would experience a peak flow of 2.8 HGVs per hour during the defined hours of construction.	Negligible	Low	**Negligible**

Link	Link Description	NCC Route Hierarchy	2025 HGV flows		HGV Flow Increase	Assessment	Magnitude of Effect	Link Sensitivity	Impact Significance
			Base	Base +Const'					
	with The Street					The road is classified as a 'Minor Local' route which mainly serves an existing agricultural estate. No footways are provided along the route indicating minimal pedestrian activity. Based on the above, magnitude is considered negligible.			
138	Broad Lane / The Street	Minor Local – 4A	11	33	202%	Receptors would experience a peak flow of 3.3 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which passes through the village of Swannington. Frontage development is evident however the route does not provide for pedestrian access along its length. Three points of PROW access are located on the link indicating some pedestrian activity is likely. Based on the above, magnitude is considered negligible.	Negligible	High	**Minor Adverse**
140	Unnamed Road	Minor Local – 4A	11	28	155%	Receptors would experience a peak flow of 2.8 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves existing farm accesses.	Negligible	Low	**Negligible**

Link	Link Description	NCC Route Hierarchy	2025 HGV flows		HGV Flow Increase	Assessment	Magnitude of Effect	Link Sensitivity	Impact Significance
			Base	Base +Const'					
						Based on the above, magnitude is considered negligible.			
142	Clay Lane	Minor Local – 4A	15	37	150%	Receptors would experience a peak flow of 3.7 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves existing farm accesses and sporadic properties. Based on the above, magnitude is considered negligible.	Negligible	Low	**Negligible**
147	Breck Road / Weston Green Road	Minor Local – 4A	5	23	348%	Receptors would experience a peak flow of 2.4 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves existing farm accesses. Based on the above, magnitude is considered negligible.	Negligible	Medium	**Minor Adverse**
148	Weston Road	Main Distributor – 3A2	5	23	348%	Receptors would experience a peak flow of 2.4 HGVs per hour during the defined hours of construction. The narrow road is classified as a 'Minor Local' route which serves existing farm accesses. Based on the above, magnitude is considered negligible.	Negligible	Low	**Negligible**

Link	Link Description	NCC Route Hierarchy	2025 HGV flows		HGV Flow Increase	Assessment	Magnitude of Effect	Link Sensitivity	Impact Significance
			Base	Base +Const'					
156	Imingland Road / Spa Lane		1	15	1330%	Receptors would experience a peak flow of 1.5 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local' route which serves an access to the repurposed RAF Attlebridge. No footways are provided along the route however, a number of access to PROW are located along the western section of the route indicating some pedestrian activity is likely. Based on the above, magnitude is considered negligible.	Negligible	High	**Minor Adverse**

277. With reference to **Table 26-25** the links initially assessed as having significant adverse pedestrian and cycle amenity impacts (**moderate** and **major adverse)** are considered in more detail below.

26.6.1.7.1 Moderate Adverse Impacts

278. A series of 'enhanced' mitigation measures will be secured in a future OTMP as part of the DCO application as outlined in **Table 26-26**. The measures detailed are additional to those contained in a 'typical' TMP and are included to minimise impacts and enable construction vehicle drivers to understand the policies, procedures and regulations proposed for the safe and efficient movement of plant, materials and employees.

Table 26-26: Enhanced TMP Measures

Enhanced TMP Measures
Driver training and toolbox talks
Driver information packs to include: Delivery timings and constraints (e.g. school arrival/departure times); HGV delivery routes; Diversion routes; and Identify safe areas to pull over to reduce the effect of slow moving platoons of vehicles
Safety Awareness – Educate drivers to report 'near misses'
Pedestrian signing / slow road markings where there is evidence of significant footfall.
Engagement structure – to provide clear governance and reporting (stakeholders) structure
Monitoring and Reporting – To monitor traffic flows at cable route access points, and the onshore project substation
Contact information at all roadwork sites and robust complaint response standards (7 days)

279. The measures are designed to familiarise drivers with the identified sensitivities within the TTSA delivery routes. The 'enhanced' measures help to mitigate the effects of pedestrian severance and amenity (and associated fear and intimidation factors) and are expected to reduce the potential for road safety impacts associated with the increase of HGV movements within the area.

280. It can be noted from **Table 26-26** that link 64 would experience potentially moderate adverse impacts.

281. The adoption of the proposed mitigation measures of an enhanced TMP would serve to address the underlining issues that manifest in adverse pedestrian amenity effects (reducing the magnitude of this potential effect), and therefore, the residual impacts on link 64 and 84 are expected to be no greater than **minor adverse**.

26.6.1.8 Impact 3: Pedestrian and Cycle Delay;

282. The GEART guidance identifies that pedestrians can experience delays and difficulties crossing roads related to changes in traffic, volume, composition and speed.

283. Potential delays for pedestrians and cyclists trying to cross all roads have been calculated (using the formulas prescribed within TRRL 356). As a worst case, it has been assumed that construction employees would overlap during a typical am peak hour of 8am to 9pm. This hour would typically coincide with heavier pedestrian and cyclist trips due to travelling to work or travelling to school.

284. The calculation of delays has been undertaken for the 2025 background reference year and the 2025 background plus DEP and SEP' construction traffic.

285. GEART does not prescribe a threshold for where changes in delay may become significant, and instead advises that assessors should use professional judgement. It is considered that a maximum change in delay of up to five seconds would be indiscernible and therefore the magnitude of effect is assessed as negligible. It is therefore considered that no significant impacts would occur for a change of this order.

286. **Table 26-27** present the assessment summary table for pedestrian and cycle delay and the resultant impact significance. **Appendix 26.15** details the peak hour delay calculations and supporting evidence and **Figure 26.10** presents the information graphically.

Table 26-27: Pedestrian and Cycle Delay Assessment Summary

Links	Link Sensitivity	Magnitude of effect	Impact Significance
1, 3-6, 15, 17-20, 22, 25, 27, 31-35, 37, 39-41, 44-47, 50-58, 62, 63, 65, 67, 69-75, 77-82, 85-95, 97-99, 101, 103-107, 109-111, 113-116, 118-120, 122, 124-131, 134, 135, 137, 139, 140, 142-146, 148, 150-152, 154 and 155.	Low	Negligible	**Negligible**
2, 10-14, 16, 21, 24, 26, 28-30, 36, 38, 42, 43, 49, 59, 61, 66, 96, 100, 108, 112, 117, 121, 123, 132, 133, 136 and 147.	Medium	Negligible	**Minor Adverse**
7-9, 23, 48, 60, 64, 68, 76, 83, 84, 102, 138, 141, 149, 153 and 156.	High	Negligible	**Minor Adverse**

26.6.1.9 Impact 4: Road Safety

287. Highways England do not recognise GEART significance thresholds for assessing road safety. Therefore, as a 'first pass' only those links that exhibit a 'negligible' increase in total traffic of HGV component have been screened out.

288. **Table 26-28** provides a summary of the collision clusters identified in **Table 26-16** and includes details of the peak increase in daily construction flows in comparison to the forecast background daily traffic flows in 2025 to determine the links screened for further assessment.

Table 26-28: Collision Cluster Information

Link	Cluster Ref	Description	% Increase		Summary
			All	HGVs	
23/ 24	C1	A149 roundabout with Fuller's Hill	1%	10% - 42%	It is considered that the change in HGV traffic could lead to potentially significant impacts and is screened in for further assessment.
24/ 25/ 34	C31	A47 roundabout with A149	1% - 3%	27% - 42%	
25	C2	A47 Breydon Bridge	1%	20%	
	C32	A47 roundabout with Pasteur Road			
25/ 26	C3	A47 roundabout with William Adams Way	1% - 2%	20% - 26%	
26	C4	A47 Hopton roundabout	2%	26%	
26/ 27	C5	A47 roundabout with B1385	1% - 2%	26% - 47%	
29	C6	A12 junction with Long Road	2%	50%	
	C7	A12 roundabout with A1117			
30/ 31/ 129	C8	A47 junction with A146	1% - 5%	9% - 28%	
32/ 33	C9	A47 roundabout with Cucumber Lane	1%	19%	
33	C10	A47 Blofield Bypass	1%	19%	
	C11	A47			
	C28	A47 junction with B1140			

Link	Cluster Ref	Description	% Increase		Summary
			All	HGVs	
33/ 34	C29	A47 roundabout with A1064	1% - 3%	19% - 27%	
34	C12	A47 Acle Straight	3%	27%	
	C30	A47 junction with Branch Road			
35/ 36/ 40	C13	A1270 roundabout with A1151	0% - 3%	0% - 23%	
36	C14	A1042 roundabout with A1151	0%	0%	No construction traffic is forecast to pass through the junction therefore the impacts are assessed as **negligible**.
42	C15	A1042 junction with A1402	2%	0%	It is considered that a peak change in total traffic of up to 2% represents a negligible magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse** and further assessment is not required.
76	C16	A1067 junction with Hospital Lane	2%	0%	
	C17	A140 junction with A1067			
85/ 86/ 89	C36	A47 junction with Wood Lane	2% - 9%	17% - 24%	It is considered that the change in HGV traffic could lead to potentially significant impacts and is screened in for further assessment.
86	C18	A47	4%	24%	
	C19	A47			
	C35	A47 junction with B1146			
87	C33	A47	4%	25%	

Link	Cluster Ref	Description	% Increase		Summary
			All	HGVs	
	C34	A47			
89/ 90/ 91/ 94	C20	A47 junction with Taverham Road	0% - 92%	0% - 138%	It is considered that the change in total traffic and HGV traffic could lead to potentially significant impacts and is screened in for further assessment.
93/ 94/ 95	C21	A47 roundabout with Dereham Road	1% - 31%	12% - 23%	It is considered that the change in total traffic could lead to potentially significant impacts and is screened in for further assessment.
96	C22	A1074 junction with Longwater Lane	1%	0%	It is considered that a peak change in total traffic of up to 1% represents a negligible magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse** and further assessment is not required.
	C23	A1074 junction with Norwich Road			
	C24	A140 roundabout with A1074			
105/ 106/ 114/ 121/ 122	C25	A47 roundabout with A11	0% - 1%	0% - 11%	It is considered that the change in HGV traffic could lead to potentially significant impacts and is screened in for further assessment.
122	C26	A47	1%	9%	
122/ 125/ 127/ 129	C27	A47 roundabout with A140	1% - 5%	3% - 36%	

Link	Cluster Ref	Description	% Increase		Summary
			All	HGVs	
127	C37	A140	4%	12%	

289. **Table 26-28** identifies that of the 37 collision cluster sites within the TTSA, four would experience negligible magnitudes of effect and are therefore not assessed further. The remaining 33 collision cluster sites would experience increases in traffic which could potentially result in significant impacts and are therefore considered further.

290. The STATS19 collision data has been examined to identify any emerging patterns or factors that could be exacerbated by DEP and SEP' traffic generation. The review is summarised below with full details included as **Appendix 26.16.**

26.6.1.9.1 Cluster Site 1

291. Cluster site 1 is a four-arm roundabout of the A149 and the B1141 in Great Yarmouth.

292. Within the five-year study period, the roundabout junction has experienced 13 collisions of which 12 resulted in slight injury and one in serious injury. In total of the 13 collisions, five were collisions occurring due to vehicles failing to give way at the roundabout and four were rear end shunt type collisions. The remaining four collisions included two vehicles losing control at the approach to the roundabout, a collision on the roundabout carriageway and a collision involving a motorcycle filtering through traffic.

293. Emerging patterns of collisions occurring due to vehicles failing to give way at the roundabout and rear end shunt type collisions have been identified.

294. Further consideration of these collisions has identified that the collisions were spread across the arms of the roundabout and are not specific to one arm or location on the roundabout. These collisions are therefore considered to be typical of a four-arm roundabout.

295. It is also noteworthy that the roundabout has recently been subject to a junction improvement scheme to increase the capacity of the roundabout and reduce congestion particularly on the North Quay approach where significant queuing was experienced.

296. It is assessed that whilst there is a cluster of collisions at the junction, there is no significant emerging pattern in collision type and location and collision types would be typical for a roundabout junction. It is also noted that the junction has been subject to recent improvements. The junction is therefore assessed as medium sensitivity.

297. Cluster site 1 located on the intersection of link 23 and 24 that are projected to experience an increase in HGV traffic of up to 45%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

298. It is considered that an increase in total traffic of up to 1% represents a negligible magnitude of effect on a medium sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.2 Cluster Site 2

299. Cluster site 2 is located on the A47 Breydon Bridge in Great Yarmouth.

300. Within the five-year study period, there have been 12 collisions of which eight collisions resulted in slight injuries and three in serious injuries. Eleven of the 12 collisions were rear end shunt type collisions and one was due to a motorcyclist losing control.

301. Of the 11 rear end shunt type collisions, one occurred in 2015, three in 2016, one in 2017, four in 2018 and two in 2019, an average of 2.2 rear end shunt type collisions a year.

302. Further consideration of the cluster location has identified that mitigation measures such as “Slow” and “Queues Likely” signage have been introduced to make the drivers aware of the potential for queuing traffic in this location. Cluster site 2 is therefore assessed as of medium sensitivity

303. Traffic flows through the junction are forecast to increase by up to 3% and HGV flows by 45%. Whilst a pattern of rear end shunt collisions is identified, these types of collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

304. It is considered that an increase in total traffic of 1% through the junction represents a negligible magnitude of effect on a medium sensitive receptor. The effect is therefore assessed as a **minor adverse** impact.

26.6.1.9.3 Cluster Site 3

305. Cluster site 3 is a four-arm roundabout of the A47 in Great Yarmouth.

306. Within the five-year study period, there have been 14 collisions of which 12 were slight and two resulted in serious injuries. Of the 14 collisions, eight involved rear end shunt type collisions and three involved vehicles failing to give way at the roundabout. The remaining three collisions involved a motorcycle which was hit whilst filtering through traffic, a vehicle which caught fire due to a mechanical fault and a vehicle which collided with a pedestrian on the carriageway.

307. Emerging patterns of collisions occurring due to vehicles failing to give way at the roundabout and rear end shunt type collisions have been identified.

308. Further consideration of the collision locations identified that the three collisions involving vehicles failing to give way occurred on the eastern approach of William Adams Way. Of the eight rear end shunt type collisions, three occurred on the eastern approach of William Adams Way, three on the northern approach of the A47, one on the southern approach of the A47 and one on the roundabout carriageway.

309. It is assessed that there is no significant emerging pattern in the location of these rear end shunt type collisions and the collisions would be typical for a roundabout junction. It is also noted that the collisions involving vehicles failing to give way occur on the eastern arm of William Adams way, an arm which is not utilised by construction traffic. Cluster site 3 is therefore assessed as of medium sensitivity.

310. Cluster site 3 is located between link 25 and 26 that are projected to experience an increase in HGV traffic of up to 26%. Whilst a pattern of rear end shunt and collisions involving vehicles failing to give way are identified, these types of collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

311. It is considered that an increase in total traffic of up to 2% represents a negligible magnitude of effect on a medium sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.4 Cluster Site 4

312. Cluster site 4 is situated at a three-arm roundabout junction of the A12 and Lowestoft Road to the west of Hopton.

313. Within the five-year period, the roundabout has experienced six slight and one serious collision. Of the seven collisions, three were rear end shunts, of which two occurred on the A12 southern approach and one on the eastern arm of the roundabout. The remaining four collisions involved a single vehicle losing control, a vehicle striking the roundabout, a vehicle failing to give way at the roundabout and a vehicle swerving to avoid a collision with a turning vehicle.

314. It is assessed that there is no significant emerging pattern in collision type and location and collision types would be typical for a roundabout junction. The junction is therefore assessed as medium sensitivity.

315. Cluster site 4 is located on link 26 which is projected to experience an increase in HGV traffic of up to 26%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

316. It is considered that an increase in total traffic of up to 2% represents a negligible magnitude of effect on a medium sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.5 Cluster Site 5

317. Cluster site 5 is situated at a five-arm roundabout junction of the A47 and A1117 in Great Yarmouth.

318. Within the five-year study period, the roundabout has experienced five collisions of which two resulted in slight and three serious injuries. Of the five collisions recorded, two involved vehicles losing control and one was a rear end shunt type collision. The other two collisions involved a vehicle colliding with a cyclist on the roundabout and a vehicle failing to give way at the roundabout.

319. It is assessed that there is no significant emerging pattern in collision type and location and collision types would be typical for a roundabout junction. The junction is therefore assessed as medium sensitivity on the merit that a collision cluster was identified.

320. Cluster site 5 is located between links 26 and 27 which are projected to experience an increase in HGV traffic of up to 47%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

321. It is considered that an increase in total traffic of up to 2% represents a negligible magnitude of effect on a medium sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.6 Cluster Site 6

322. Cluster site 6 is located at a crossroad junction of the A12 in Lowestoft.

323. Within the five-year study period, the junction has experienced 11 collisions, of which eight resulted in slight and three in serious injuries. Of the 11 collisions, four involved vehicles turning at the junction, two involved rear end shunt type collisions and three involved the contravention of traffic signals. The remaining two collisions involved vehicles failing to give way at the junction.

324. Emerging patterns of vehicles colliding whilst turning and contravention of traffic lights at the junction have been identified.

325. Of the four collisions involving vehicles turning, two occurred west of the Blackheath Road arm, one on the junction itself and one east of the Blackheath Road arm. All three collisions involving contravention of traffic signals occurred on the A12 (two in the north and one to the south of the junction).

326. The collisions involving vehicles turning all occur on Blackheath Road arms. The junction is therefore assessed as high sensitivity.

327. Cluster site 6 is located on link 29 which is projected to experience an increase in HGV traffic of up to 50%. It is noted that the HGV traffic would not utilise the Blackheath Road arms (where collisions involving vehicles turning all occur). It is therefore more appropriate to focus upon the total change in traffic rather than changes in HGVs.

328. It is considered that an increase in total traffic of up to 2% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.7 Cluster Site 7

329. Cluster site 7 is a six-arm roundabout of the A12 and A1145 in Pakefield.

330. Within the five-year study period, the roundabout has experienced nine collisions, of which eight resulted in slight and one in serious injury. Of the nine collisions, five involved rear end shunt type collisions, one involved a pedestrian contravening a traffic signal and one involved a vehicle failing to give way at the roundabout. The other two collisions involved vehicles colliding whilst negotiating the roundabout.

331. An emerging pattern of rear end shunt type collisions has been identified at this cluster location.

332. Further consideration of the rear end shunt type collision locations identified that the four collisions occurred on different arms of the roundabout.

333. It is assessed that there is no significant emerging pattern in the location of these rear end shunt type collisions the collisions would be typical for a roundabout junction. It is therefore concluded that cluster site 7 is assessed as medium sensitivity.

334. Cluster site 7 is located on link 29 which is projected to experience an increase in HGV traffic of up to 50%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

335. An increase in total traffic of up to 2% is considered to represent a negligible magnitude of effect on a medium sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.8 Cluster Site 8

336. Cluster site 8 is a grade separated junction at intersection of the A47 and the A146 south of Trowse Newton.

337. Within the five-year study period, the junction as a whole has experienced 29 collisions of which 26 resulted in slight and three in serious injuries. Notably, 12 of the 29 collisions involved rear end shunt type collisions and nine were due to the contravention of traffic signals. Of the 29 collisions, four involved HGVs.

338. Further consideration of the collision locations on the junction identified that:

- eight collisions occurred on the A47's eastern junction with the A146;
- seven on the A47's western junction with the A146;
- seven on the A146 carriageway; and
- eight on the A47 carriageway.

339. Within the other cluster, two secondary cluster locations have been identified at the eastern and western junctions of the A47 with the A146 and are considered further.

340. Of the eight collisions on the eastern junction, five involved the contravention of traffic signals, a driver impaired by alcohol, a rear end shunt type collision and an ambulance on response.

341. Of the seven collisions on the western junction, three were rear end shunt type collisions, two were due to the contravention of traffic signals, one due to a police vehicle on response and one due to the driver suffering a medical episode.

342. Emerging patterns of vehicles contravening traffic signals and rear end shunt type collisions have been identified at this cluster location. The junction would typically be assessed as a high sensitive receptor.

343. A review of the baseline highway environment has identified that there is good forward visibility of the traffic signals on both approaches to the junctions. It is therefore reasoned that as drivers from the A47 would be approaching the junction at relatively high speeds, some drivers could perceive it to be safer to cross the junction rather than stop when faced with an amber traffic light. If they are unable to do so on time, the drivers would be on the carriageway conflicting traffic flow oncoming from A146. There is good forward visibility and as such the pattern of rear end shunt type collisions are likely attributable to driver inattention rather than a deficiency with the existing highway layout.

344. Cluster site 8 is located between links 30, 31 and 129 and are projected to experience an increase in HGV traffic of up to 28%. Noting the proportion of collisions that involved HGVs and that the collisions would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

345. It is therefore considered that an increase in total traffic of up to 5% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.9 Cluster Site 9

346. Cluster site 9 is a four-arm roundabout of the A47 north of Brundall.

347. Within the five-year study period, the roundabout has experienced 23 collisions, of which 20 resulted in slight and three in serious injuries. Of the 23 collisions, seven involved rear end shunt type collisions, six were attributable to drivers colliding with other vehicles whilst negotiating the roundabout and five involved vehicles losing control. Of the remaining five collisions, two involved vehicles colliding as they approached the roundabout, one involved a driver suffering from a medical episode and one occurred due to a driver overshooting the roundabout. Causation details of the last collision was not recorded.

348. Of the 23 collisions, only one collision involved a HGV.

349. Four of the seven rear end shunt type collisions occurred on the A47 arms to the roundabout with three occurring on the western arm and one on the eastern arm. Two occurred on the roundabout carriageway and one occurred on Cucumber Lane.

350. All except one of the collisions resulting from drivers colliding with other vehicles whilst negotiating the roundabout occurred as vehicles travelled across the roundabout on the A47. The loss of control collisions occurred on the A47 approaches to the roundabout, with four of the five collisions due to loss of control occurring whilst the carriageway was wet.

351. Emerging patterns of rear end shunt type collisions, drivers colliding with other vehicles whilst negotiating the roundabout and collisions due to loss of control have been identified. The junction is therefore assessed as a high sensitive receptor.

352. Cluster site 9 is located between link 32 and link 33 and are projected to experience an increase in HGV traffic of up to 19%. Noting the proportion of collisions that involved HGVs and that the collisions would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

353. It is therefore considered that an increase in total traffic of up to 1% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.10 Cluster Site 10

354. Cluster site 10 is located at the on-slip from Plantation Road to the A47. Within the five-year study period, there have been nine collisions of which seven resulted in slight and two in serious injuries. All collisions recorded were rear end shunt type collisions with the exemption of two collisions attributed to loss of control. None of the recorded collisions involved HGVs.

355. Noting the pattern of rear end shunt collisions, the cluster is assessed as a high sensitive receptor.

356. A review of the baseline highway environment has identified that the on-slip to the A47 is of standard-length and advance warning signs are also provided to make drivers aware of the on-slip. It is therefore reasoned that the collisions are likely as a result of driver inattention rather than a deficiency with the existing highway layout.

357. Cluster site 10 is located on link 33 that is projected to experience an increase in HGV traffic of up to 19%. Noting that none of the recorded collisions involved HGVs and that the collisions are of a type that would be attributable to driver inattention rather than vehicle type, the percentage change in HGV traffic alone is not considered to be a material consideration.

358. It is therefore considered that a change in total traffic of 1% through Cluster site 10 represents a negligible magnitude of effect on a high sensitive receptor resulting in a **minor adverse** impact.

26.6.1.9.11 Cluster Site 11

359. Cluster site 11 is located on the A47 south of North Burlingham within proximity of the staggered junction of the B1140 and Acle Road.

360. Cluster site 11 is located along a section of the A47 which would form part of Highways England's Blofield to North Burlingham A47 corridor improvement RIS scheme.

361. Highways England identify that the corridor acts as a bottleneck creating congestion and as a result, a poor safety record. A preferred route announcement (option 4) has been made by Highways England which would involve dualling a new section of the A47 south of the existing Lingwood Lane junctions and constructing a new junction at the B1140.

362. The construction of the proposed improvements is projected to start 2022/2023 and should be complete by the start of DEP and SEP' construction programme in 2024/2025.

363. It is considered that the proposed corridor improvement programme would address the existing road safety issues and therefore the receptor can be reclassified as low sensitivity.

364. It is considered that a change in total traffic of 1% through Cluster site 11 represents a negligible magnitude of effect on a low sensitive receptor resulting in a **negligible** impact.

26.6.1.9.12 Cluster Site 12

365. Cluster site 12 is located on link 34, approximately 2.7km south east of Acle on the A47 New Road.

366. There have been ten slight and three serious collisions within the five-year study period of which approximately eight were rear end shunt type collisions, one was due to a poor overtaking manoeuvre, and one was due to an animal on the carriageway. The remaining three collisions involved a collision with an oncoming vehicle, a loss of control collision and a collision whilst a driver was making a u turn.

367. Of the eight rear end shunt collisions, seven involved eastbound vehicles of which a majority stopped as a result of stationary traffic.

368. It is assessed that there is a pattern of rear end shunt collisions and is therefore assessed as a high sensitive receptor.

369. A review of the highway environment within the vicinity of Cluster site 12 has identified that there is good forward visibility and as such the pattern of rear end shunt type collisions are likely attributable to driver inattention rather than a deficiency with the existing highway layout.

370. Cluster site 12 is located on link 34 that is projected to experience an increase in HGV traffic of up to 27%. Noting that only three of the ten recorded collisions involved HGVs and that the collisions would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

371. It is considered that a change in total traffic of 3% through Cluster site 12 represent a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.13 Cluster Site 13

372. Cluster site 13 is located on a four-arm roundabout of the A1270 northeast of Norwich (known as the Northern Distributor Road).

373. There have been 12 slight and one serious collision within the five-year study period of which all were recorded in the last two years of which four occurred in 2018 and nine in 2019, an average of seven collisions per year.

374. The 12 collisions included five rear end shunt type collisions, six collisions resulting from drivers colliding with other vehicles whilst negotiating the roundabout and one occurred whilst overtaking. Of the 13 collisions recorded, none involved HGVs.

375. Further consideration of the rear end shunt type collisions has identified that the collisions were spread across the arms of the roundabout and are not specific to one arm or location on the roundabout.

376. An emerging pattern involving drivers colliding with other vehicles whilst negotiating the roundabout has been identified.

377. A review of the existing highway environment has identified a number of existing targeted road safety measures are provided including advanced direction signing, street lining, and lane delineators. It is therefore reasoned that the collisions are likely the result of driver negligence rather than a deficiency with the existing highway layout. The road has been open for two years and would therefore still be subject to road safety audit monitoring by NCC in which potential road safety issues identified would be remediated.

378. However, taking into consideration the emerging pattern identified, and the high collision average. The junction is assessed as a high sensitive receptor.

379. Cluster site 13 is located between links 35, 36 and 40 that are projected to experience an increase in total traffic of up to 3% and HGV traffic of up to 23%. Noting that none of collisions involved HGVs and that the collisions would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

380. It is therefore considered that an increase in total traffic of up to 3% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.14 Cluster Site 18

381. Cluster site 18 is located on the A47 south of Hockering.

382. Cluster site 18 is located along a section of the A47 which would form part of Highways England's North Tuddenham to Easton improvement A47 corridor improvement RIS scheme.

383. Highway England identify that the corridor acts as a bottleneck creating congestion and as a result, a poor safety record. The proposals involve the upgrading the A47 between North Tuddenham and Easton in Norfolk to a dual carriageway with two new junctions at Berry's Lane and at Blind Lane. The proposals also result in the removal of the Easton roundabout.

384. The construction of the proposed improvements is projected to start 2022/2023 and should be complete by the start of DEP and SEP' construction programme in 2024/2025.

385. It is considered that the proposed corridor improvement programme would be appropriate to mitigate the existing road safety issues and therefore the discrete cluster location assessed as a low sensitivity receptor.

386. An increase in total traffic of up to 4% is considered to represent a negligible magnitude of effect on a low sensitivity receptor resulting in a **negligible** impact.

26.6.1.9.15 Cluster Site 19

387. Cluster site 19 is located on the A47 north of Necton within proximity of its junction with Tuns Road.

388. There have been six slight and four serious injury type collision within the five-year study period of which six involved collisions between vehicles turning, two involved rear end shunt type collisions, and one involved a vehicle drifting into the wrong lane. The last collision involved a vehicle failing to negotiate the gradual bend.

389. An emerging pattern of collisions occurring whilst vehicles turn is identified. Further consideration of the collisions involving vehicles turning identified that five of the six collisions involved vehicles turning from Tuns Road onto the A47. The location is therefore assessed as a high sensitive receptor.

390. A review of the existing highway environment has identified that there is good visibility for drivers on Turns Road at the junction with the A47.

391. Cluster site 19 is located on link 86 and is projected to experience an increase in total traffic of up to 4% and HGV traffic of up to 24%.

392. As no HGV traffic is expected to turn in or out of Tuns Road, the percentage change in HGV traffic alone is not considered to be a material consideration.

393. It is therefore considered that an increase in total traffic of up to 4% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.16 Cluster Site 20

394. Cluster site 20 is located on the A47 crossroad staggered junctions with Taverham Road and Blind Lane.

395. Temporary mitigation measures are proposed for Cluster site 20 by HP3 which include the closure of the A47's junction with Blind Lane and the conversion of the A47 junction with Taverham Road to a left in/left out arrangement.

396. Furthermore, Cluster site 20 is also located along a section of the A47 which would form part of Highways England's North Tuddenham to Easton improvement A47 corridor improvement RIS scheme.

397. Highway England identify that the corridor acts as a bottleneck creating congestion and as a result, a poor safety record. The proposals involve the upgrading the A47 between North Tuddenham and Easton in Norfolk to a dual carriageway with two new junctions at Berry's Lane and at Blind Lane. The proposals also result in the removal of the Easton roundabout.

398. The construction of the proposed RIS improvements is projected to start 2022/2023 and should be complete by the start of DEP and SEP construction programme in 2024/2025. HP3 is currently forecast to commence construction in 2021 and be complete by 2027.

399. It is considered that the proposed temporary improvements to Cluster site 20 by HP3 or the permanent Highways England RIS scheme would be appropriate to mitigate the existing road safety issues and therefore the discrete cluster location is assessed as a low sensitivity receptor.

400. Cluster site 20 is located between link 89 and 94 (A47) and link 90 (Taverham Road).

401. The A47 is projected to experience an increase in total traffic of up to 3% and HGV traffic of up to 17% whilst Taverham Road projected to experience an increase in total traffic of up to 92% and an increase in HGV traffic of up to 138%.

402. Taking into consideration the RIS scheme and HP3's proposed temporary improvements, the A47 is considered in the assessment of this cluster site.

403. An increase in total traffic on the A47 of up to 4% is considered to represent a negligible magnitude of effect on a low sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.17 Cluster Site 21

404. Cluster site 21 is located at the A47 four-arm roundabout with Dereham Road north of Easton.

405. Cluster site 21 is located along a section of the A47 which would form part of Highways England's North Tuddenham to Easton improvement A47 corridor improvement RIS scheme.

406. Highway England identify that the corridor acts as a bottleneck creating congestion and as a result, a poor safety record. The proposals involve the upgrading the A47 between North Tuddenham and Easton in Norfolk to a dual carriageway with two new junctions at Berry's Lane and at Blind Lane. The proposals also result in the removal of the Easton roundabout.

407. The construction of the proposed improvements is projected to start 2022/2023 and should be complete by the start of DEP and SEP construction programme in 2024/2025.

408. The proposed corridor improvement programme would remove the existing roundabout where the cluster is located and therefore there would a **negligible** impact.

26.6.1.9.18 Cluster Site 25

409. Cluster site 25 is located on a six-arm roundabout of the A47 and A11, west of Cringleford.

410. Cluster site 25 is located along a section of the A47 which would form part of Highways England's A47 Thickthorn junction corridor improvement RIS scheme.

411. Highway England identify that the local growth is likely to increase congestion on the junction and the local roads that feed into it and as a result, a poor safety record. The proposals involve the provision of two new free-flowing slip roads that will connect the A47 with the A11.

412. The construction of the proposed improvements is projected to start 2023 and should be complete by the start of DEP and SEP construction programme in 2024/2025.

413. It is assessed that the proposed corridor improvement programme would be appropriate to mitigate the existing road safety issues and therefore the discrete cluster location assessed as a low sensitivity receptor

414. Cluster site 25 is located between links 105, 106, 114, 121 and 122 and are projected to experience an increase in total traffic of up to 1% and HGV traffic of up to 11%.

415. An increase in total traffic of up to 1% is considered to represent a negligible magnitude of effect on a low sensitivity receptor resulting in a **negligible** impact.

26.6.1.9.19 Cluster Site 26

416. Cluster site 26 is located at the A47 south of its roundabout with the A11, west of Cringleford.

417. Within the five-year study period, there have been five collisions of which four resulted in slight and one in a serious injury. Of the five collisions, three were rear ends shunt type collisions, one occurred due to a loss of control and one due to the vehicle existing the hard shoulder into the path of an oncoming vehicle.

418. It is assessed that there is no significant emerging pattern in collision type and location and collision types would be typical for such a road. The location is therefore assessed as medium sensitivity.

419. Cluster site 26 is located on link 122 which is projected to experience an increase in total traffic of up to 1% and an increase in HGV traffic of up to 9%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

420. An increase in total traffic of 1% is considered to represent a negligible magnitude of effect on a medium sensitive receptor resulting in a **minor adverse** impact.

26.6.1.9.20 Cluster Site 27

421. Cluster site 27 is located at the A47 roundabout with A140, south of Norwich. The roundabout is a six-arm grade separated roundabout.

422. Within the five-year study period, there have been eight slight collisions of which seven were rear end shunt type collisions and one was due to a vehicle losing control on the roundabout. Of the seven rear end shunt type collisions, four occurred on the eastern approach of the A47, two on the A47 through road and one on the northern approach of the A140.

423. It is assessed that there is a pattern of rear end shunt collisions on the eastern approach to the roundabout, and as such the site is assessed as a high sensitive receptor.

424. Cluster site 27 is located between links 122, 125, 127 and 129 that are projected to experience an increase in HGV traffic of up to 36%. Whilst a pattern of rear end shunt type collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

425. An increase in total traffic of up to 5% is considered to represent a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.21 Cluster Site 28

426. Cluster site 28 is located at the A47 junction with B1140 south of North Burlingham.

427. Cluster site 28 is located along a section of the A47 which would form part of Highways England's Blofield to North Burlingham A47 corridor improvement RIS scheme.

428. Highway England identify that the corridor acts as a bottleneck creating congestion and as a result, a poor safety record. A preferred route announcement (option 4) has been made by Highways England which would involve dualling a new section of the A47 south of the existing Lingwood Lane junctions and constructing a new junction at the B1140.

429. The construction of the proposed improvements is projected to start 2022/2023 and should be complete by the start of DEP and SEP construction programme in 2024/2025.

430. It is considered that the proposed corridor improvement programme would be appropriate to mitigate the existing road safety issues and therefore the discrete cluster location assessed as a low sensitivity receptor

431. Cluster site 28 is located along link 33 and is projected to experience an increase in total traffic of up to 1% and HGV traffic of up to 19%.

432. An increase in total traffic of up to 1% is considered to represent a negligible magnitude of effect on a low sensitivity receptor resulting in a **negligible** impact.

26.6.1.9.22 Cluster Site 29

433. Cluster site 29 is located on the A47 south of its roundabout with A1064, east of Acle.

434. Within the five-year period, there have been seven collisions of which six resulted in slight and one in a fatal injury. The slight injury collisions involved five rear end shunt type collisions and a collision due to skidding. The fatal collision involved an inexperienced driver who lost control and went over the central island and roundabout and collided with a recovery vehicle.

435. The five rear end shunt type collisions involved drivers approaching the roundabout from the east. A review of the existing highway environment for vehicles approaching from the east has identified that the junction already benefits from targeted road safety measures including advanced warning signs and high friction surfacing on the approach to the junction.

436. However, a review of forward visibility to the give-way line (using online mapping) shows overgrown vegetation. Drivers approaching from the east could therefore fail to see a vehicle stopped at the give-way line, potentially contributing to the pattern of rear end shunts. It is therefore concluded that Cluster site 29 is of high sensitivity.

437. Cluster site 29 is located at the intersection of links 33 and 34 that are projected to experience an increase in HGV traffic of up to 27%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

438. An increase in total traffic of 3% is considered to represent a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.23 Cluster Site 30

439. Cluster site 30 is located at the priority junction of the A47 with Branch Road.

440. During the five-year study period there have been nine rear end shunt type collisions which all resulted in slight injuries.

441. An emerging pattern of rear end shut collisions has been identified. Further consideration of the collisions has identified that only one of the nine collisions involved a HGV. The cluster site is therefore assessed as a high sensitive receptor.

442. A review of the existing highway environment has identified a number of existing targeted road safety measures are provided including advanced direction signing, street lighting, and high friction surfacing. In addition, there is also good forward visibility for drivers on the A47 of right turning traffic. It is therefore reasoned that the rear end shunt collisions are likely the result of driver inattention rather than a deficiency with the existing highway layout.

443. Cluster site 30 is located on link 34 that is projected to experience an increase in total traffic of up to 3% and HGV traffic of up to 27%. Noting the proportion of collisions that involved HGVs, and that the collisions would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

444. It is therefore considered that an increase in total traffic of up to 3% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.24 Cluster Site 31

445. Cluster site 31 is situated at a four-arm roundabout junction of the A149, A12 and A47 to the north of Great Yarmouth. The junction forms part of Highways England's Great Yarmouth Junction Improvements as part of the A47 corridor improvement RIS scheme.

446. Highways England identified that the junction experiences heavy congestion during peak hours. A preferred route announcement has been made by Highways England which would involve the following;

447. A larger roundabout with traffic lights and a widened bridge over the railway line to accommodate widening of the A47 southern exit and approach

448. Realignment to current highway standards to improve driver experience and safety.

449. The construction of the proposed improvements is projected to start by 2023/2024 and should be complete by 2025 prior to the commencement of DEP and SEP' construction. However, Highways England noted that the scheme has been paused pending a review.

450. This assessment therefore assumes that the improvements may not be delivered prior to the commencement of construction of DEP and SEP.

451. During the five-year study period there have been nine collisions which all resulted in slight injuries. Eight of the nine collisions involved rear end shunt type collisions. The final collision was due to the driver failing to give way at the roundabout.

452. It is noted that whilst there is a pattern of rear end shunt collision types at Cluster site 31, the collisions are not concentrated at any particular arm and are of a type that would be typical for this form of junction. The junction is therefore assessed as a medium sensitive receptor.

453. Cluster site 31 is located at the intersection of link 24, 25 and 34, that are projected to experience an increase in total traffic of up to 3% and HGV traffic of up to 42%. Noting that the existing collision types would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

454. An increase in total traffic of up to 3% is therefore considered to represent a negligible magnitude of effect on a medium sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.25 Cluster Site 32

455. Cluster site 32 is situated at a partially traffic signal controlled four-arm roundabout junction of the A12 and A1243 to the west of Great Yarmouth. The junction also forms part of Highways England's Great Yarmouth Junction Improvements as part of the A47 corridor improvement RIS scheme.

456. Highways England identified that the junction experiences heavy congestion during peak hours. A preferred route announcement has been made by Highways England which would involve installing traffic signals on the existing roundabout.

457. The construction of the proposed improvements is projected to start by 2023/2024 and should be complete by 2024/2025 prior to the commencement of DEP and SEP' construction. However, Highways England noted that the scheme has been paused pending a review.

458. This assessment therefore assumes that the improvements may not be delivered prior to the commencement of construction of DEP and SEP.

459. During the five-year study period there have been 18 collisions which 17 resulted in slight and one in a serious injury. The 18 collisions included seven rear end shunt type collisions and four collisions due to poor manoeuvring at the roundabout. Two of the 18 collisions involved HGVs.

460. Four of the seven rear end shunt type collisions occurred on the northern arm of the A12, all three collisions involving VRUs also occurred at the northern arm of the A12.The roundabout is therefore assessed as a high sensitive receptor.

461. A review of the existing highway environment for vehicles approaching from the north on the A12 has identified a number of existing targeted road safety measures are provided including advanced warning signs, street lighting, and high friction surfacing. It is therefore reasoned that the collisions are likely the result of driver inattention rather than a deficiency with the existing highway layout.

462. Cluster site 32 is located on link 25 that is projected to experience an increase in HGV traffic of up to 20%. Noting that the majority of the existing collision types would not be disproportionately impacted by vehicle composition, the percentage change in HGV traffic alone is not considered to be a material consideration.

463. It is considered that an increase in total traffic of up to 1% represents a negligible magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

26.6.1.9.26 Cluster Site 33

464. Cluster site 33 is located on the A47, south east of King's Lynn.

465. During the five-year study period, six collisions were recorded in which three resulted in slight and three in fatal type injuries. The three slight collisions were rear end shunt type collisions. The three fatal collisions included two collisions involving vehicles drifting into the opposite lane and a rear end shunt type collision. Two of the three fatal collisions involved HGVs.

466. An emerging pattern of rear end shunt type collisions and collisions involving HGV traffic is identified at this location. The location is therefore assessed as a high sensitive receptor.

467. A review of the existing highway environment has identified that there is limited forward visibility at the location with no warning signs of the layby (predominantly used by HGVs). This suggests that drivers are having to slow down relatively late which could be attributed to the collisions.

468. Cluster site 33 is located on link 87 that is projected to experience an increase total traffic of up to 4% and in HGV traffic of up to 25%. The magnitude of effect is therefore considered to be low on a high sensitivity receptor resulting in a **moderate adverse** impact.

469. To mitigate the potential for construction traffic to exacerbate the identified pattern of rear end shunt collisions it is proposed to introduce 'Slow Down", "Layby Ahead" and "Vehicles Turning" signage to make drivers aware of the potential for queuing and turning traffic in this location.

470. With the implementation of the additional mitigation measures the sensitivity of the Cluster site 33 would be expected to reduce to low sensitivity. The magnitude of effect remains medium upon a low sensitive receptor resulting in a **minor adverse** residual impact.

26.6.1.9.27 Cluster Site 34

471. Cluster site 34 is located on the A47, within proximity of the Chalk Farm Clay Ground access, south east of Narborough.

472. During the five-year study period, six collisions were recorded of which two resulted in slight and four in serious type injuries. Of the six collisions, four were rear end shunt type collisions, one was due to overtaking and one was due to a vehicle turning left at the junction. The two of slight collisions involved HGVs.

473. An emerging pattern of rear end shunt type collisions is identified at this location. The location is therefore assessed as a high sensitive receptor.

474. Cluster site 34 is located on link 87 that is projected to experience an increase in HGV traffic of up to 25%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

475. It is considered that an increase in total traffic of 4% represents a negligible magnitude of effect on a high sensitive receptor. The effect is therefore assessed as a **minor adverse** impact.

26.6.1.9.28 Cluster Site 35

476. Cluster site 35 is located at the A47 junction with the B1146, south west of Dereham.

477. During the five-year study period, eight collisions were recorded of which three resulted in slight, four in serious and one in a fatal injury. Three collisions including the fatal collision involved vehicles failing to give way whilst driving down Drayton Hall Lane onto the A47. The other collisions included four rear end shunt type collisions and one collision as a result of a car swerving into the opposite lane.

478. It is noted that whilst there is an emerging pattern of rear end shunt collisions at Cluster site 35, the collisions are not concentrated at any particular arm and are of a type that would be typical for this form of junction.

479. It is also noted that there is a pattern of collisions involving vehicles turning from the B1146 into the path of oncoming vehicles on the A47. A review of forward visibility to the east has identified that existing vegetation is overgrown. Drivers approaching from the north could therefore fail to see oncoming vehicles, potentially contributing to the pattern of collisions involving vehicles turning into the path of oncoming vehicles. It is therefore concluded that Cluster site 35 is of high sensitivity.

480. Cluster site 35 is located on link 86 that is projected to experience an increase in HGV traffic of up to 24%. Whilst a pattern of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

481. It is considered that an increase in total traffic of 4% represents a negligible magnitude of effect on a high sensitive receptor. The effect is therefore assessed as a **minor adverse** impact.

26.6.1.9.29 Cluster Site 36

482. Cluster site 36 is located at the A47 junction with Berry's Lane and Wood Lane, north east of Honingham.

483. Cluster site 36 is located along a section of the A47 which would form part of Highways England's North Tuddenham to Easton improvement A47 corridor improvement RIS scheme.

484. Highways England identify that the corridor acts as a bottleneck creating congestion and as a result, a poor safety record. The proposals involve the upgrading the A47 between North Tuddenham and Easton in Norfolk to a dual carriageway with two new junctions at Berry's Lane and at Blind Lane. The proposals also result in the removal of the Easton roundabout.

485. The construction of the proposed improvements is projected to start 2022/2023 and should be complete by the start of DEP and SEP' construction programme in 2024/2025.

486. It is considered that the proposed corridor improvement programme would be appropriate to mitigate the existing road safety issues and therefore the discrete cluster location assessed as a low sensitivity receptor

487. Cluster 36 is located at the intersection of link 85, 86 and 89, that are projected to experience an increase in HGV traffic of up to 24%.

488. An increase in total traffic of up to 9% is considered to represent a negligible magnitude of effect on a low sensitivity receptor resulting in a **negligible** impact.

26.6.1.9.30 Cluster Site 37

489. Cluster site 37 is located at the A140, south of Dunston.

490. Five collisions have been recorded during the five-year study period of which two resulted in slight and three in serious injuries. Of the five collisions, four collisions involved vehicles turning at the junction, and one involved a driver that suffered a medical episode.

491. A review of the existing highway environment at the location has identified a number of existing targeted road safety measures are provided including advanced warning signing, dedicated right turn lanes, "Slow" road markings and street lighting. It is therefore reasoned that the collisions are likely the result of driver inattention rather than a deficiency with the existing highway layout.

492. An emerging pattern of vehicles turning into the path of oncoming vehicles has been identified however no issues have been identified with the existing highway layout. The cluster is therefore assessed as of medium sensitivity.

493. Cluster 37 is located on link 127, that are projected to experience an increase total traffic of up to 4% and HGV traffic of up to 12%. Whilst a cluster of collisions is identified, the collisions would not be disproportionately impacted by vehicle composition and therefore it is more appropriate to focus upon the total change in traffic rather than changes in HGVs.

494. It is considered that an increase in total traffic of 4% and 12% in HGV traffic represents a low magnitude of effect on a medium sensitive receptor. The effect is therefore assessed as a **minor adverse** impact.

26.6.1.10 Impact 5: Driver Delay (Capacity)

495. The GEART screening thresholds do not apply to this effect as the potential impact is defined as significant when the highway network surrounding the Development under consideration is at or close to capacity.

496. The most sensitive time for Driver Delay could be if the construction shift starts or finishes at the same time as the morning or evening network peak hours.

497. To assess if this has the potential for significant impacts, the traffic generation associated with all the construction employees arriving/ departing work and peak hourly HGV demand (daily HGV demand profiled across 10 hours) has been considered.

498. During ETG consultation (Ref: PB8164-RHD-ZZ-ZZ-MI-PM-0008) with NCC and HE it was agreed that where DEP and SEP traffic flows through a junction are forecast to be less than 30 two-way vehicle movements per hour, no further assessment would be required.

499. An initial proportional review of peak hour construction flows has been undertaken on all links in the study area. The review has identified links, where the junctions located along or at the terminals of each link would experience peak hour flows of more than 30 two-way movements.

500. **Appendix 26.17** identifies those links where peak hour traffic flows would be greater than 30 two-way vehicles movements. **Table 26-29** and **Figure 26.11** categorises the links into four magnitude of change thresholds for comparison purposes. Noting, that high magnitude of changes may not result in driver delay issues on junctions with spare capacity. **Figure 26.11** depicts links magnitude of changes graphically.

501. The review is to aid and inform further discussions with NCC and HE Post PEIR on sensitive junction locations that would be further assessed (and potentially modelled) within the ES DCO application.

Table 26-29: Peak Hour Traffic Flows Through Links Summary

Links	Construction Peak Hour Two-Way Flows	Magnitude
27-29, 36-39, 60, 66, 70, 91, 92, 108, 109, 111, 120, 132, 134-136, 139, 141, 143, 145, 146, 149, 150 and 155.	0 – 30	Negligible
16-23, 52, 77, 115, 133, 147, 151 and 153	30 - 60	Low
7, 8, 10, 12, 14, 24, 50, 53, 55, 57, 58, 61-65, 67-69, 71, 73-75, 81-84, 90, 93, 96, 98, 99, 101-104, 106, 107, 110, 112, 113, 116, 117, 119, 121, 130, 131, 137, 138, 140, 142, 144, 148, 152, 154 and 156	60 - 100	Medium

Links	Construction Peak Hour Two-Way Flows	Magnitude
1-6, 9, 11, 13, 15, 25, 26, 30-35, 40-49, 51, 53, 54, 56, 59, 72, 76, 78-80, 85-87, 89, 94, 95, 97, 100, 105, 114, 118, 119, 122-129.	100 +	High

502. All junctions that are located on links that would experience a negligible magnitude of change (less than 30 two-way movements) as detailed within **Table 26-29** are not be assessed further. The demand on the remaining links will enable the critical junctions to be determined and assessed for driver delay in consultations with NCC and HE.

503. In addition (in response to the Method Statement (Ref: PB8164-RHD-ZZ-ON-RP-Z-002)) HE identified the following junctions that warranted further investigation;

- A47 / B1535 staggered junction (west of Honingham);
- A47 / Taverham staggered junction (east of Honingham);
- A47 / Dereham Road 'Easton' Roundabout;
- A11 / Station Lane junction;
- A11 / A47 'Thickthorn' grade separated roundabout; and
- A47 / A140 'Harford' grade separated roundabout.

504. **Table 26-30** details DEP and SEP' peak hour construction traffic demand during the am and pm peak hours arriving at each junction arm.

Table 26-30: Identified Sensitive Junctions

Junction	Arm (Link)	Arrivals per arm (AM)		Arrivals per arm (PM)	
		Light Vehicles	HGVs	Light Vehicles	HGVs
Junction 1: A47 Junction with B1535 west of Honingham					
A47 west (86)		25.6	19.9	0	19.9
B1535 – Wood Lane (85)		0	1.8	47	1.8
A47 east (89)		37.2	18.9	16	18.9
Berry's Lane		0	0	0	0
Total arrivals		**103.4**		**103.4**	
Junction 2: A47 Junction with Taverham Road east of Honingham					
A47 west (89)		15	15.7	0	15.7
Taverham Road (90)		0	1.1	92	1.1

Junction	Arm (Link)	Arrivals per arm (AM)		Arrivals per arm (PM)	
		Light Vehicles	HGVs	Light Vehicles	HGVs
A47 east (94)		103	15.7	39	15.7
Total Arrivals		**150.5**		**150.5**	
Junction 3: A47 Easton Roundabout					
A47 east (95)		35.1	19.7	4.1	19.7
Dereham Road (93)		0	15.5	92	15.5
A47 west (94)		95	19.7	36	19.7
Church Lane		0	0	0	0
Total Arrivals		**185**		**185**	
Junction 4: A11 / Station Lane					
A11 east (114)		92	2.4	10	2.4
Station Lane (118)		0	2.4	92	2.4
Total Arrivals		**96.8**		**106.8**	
Junction 5: A11 / A47 Thickthorn Junction					
A47 North (105)		18	3.5	3.9	3.5
A11 east (121)		48	0	0	0
A47 south (122)		29	2.6	7.1	1.6
A11 west (114)		9.9	1.9	97.8	1.9
B1172 (106)		0	3.7	0	3.7
Total Arrivals		**116**		**120.5**	
Junction 6: A47 / A140 Harford junction (Substation Access on A140)					
A140 north (125)		88.5	0	0	0
A47 east (129)		84.3	6.7	0	6.7
A140 south (127)		0	17.5	226.6	17.5
A47 west (122)		53.8	12.4	0	12.4

Junction	Arm (Link)	Arrivals per arm (AM)		Arrivals per arm (PM)	
		Light Vehicles	HGVs	Light Vehicles	HGVs
Total Arrivals		**263.2**		**263.2**	
Junction 6: A47 / A140 Harford junction (Substation Access on B1113)					
A140 north (125)		0	19.1	136.1	19.1
A47 east (129)		75.3	6.7	0	6.7
A140 south (127)		7	0	0	0
A47 west (122)		53.8	12.4	0	12.4
Total Arrivals		**174.3**		**174.3**	

505. It is considered that the increases in traffic flows through junctions 1 to 6 may require further assessments in the form of junction modelling to determine driver delay impacts.

506. Junctions 1, 2 and 3 are part of the proposed A47 North Tuddenham to Easton Road Investment Strategy (RIS) due to commence construction in early 2022/23 with a likely completion by 2024/2025, (potentially the same year when DEP and SEP' peak construction is due to start).

507. The A47 North Tuddenham to Easton RIS scheme has submitted a PEIR, however, no traffic generation during construction or traffic redistribution during operation of the new highway layout is included. The full DCO application is due to be submitted in early 2021 which should provide the necessary traffic details ahead of submission of DEP and SEP' DCO application.

508. Junction 5 will be superseded by another A47 Corridor Improvement RIS (A11/A47 Thickthorn junction RIS scheme). The scheme is due to commence construction in early 2022/23 with a likely completion by 2024/2025, (potentially the same year when DEP and SEP' peak construction is due to start).

509. A refined scheme layout has been produced however no detailed designs of the junction improvements can be found. The full DCO application is due to be submitted in early 2021 which should provide the necessary traffic details ahead of submission of DEP and SEP' DCO application.

510. The Applicant is committed to engaging with both HE and NCC to establish the appropriate bounds for the driver delay assessment to be completed prior to DCO application submission.

26.6.1.11 Impact 6: Driver Delay (Highway constraints)

511. For this effect, an evaluation has been undertaken of where the highway network within the TTSA is of substandard width to prevent two HGVs from passing (therefore leading to delays associated within waiting and manoeuvring). A review of all links has been undertaken to identify these links, defined as roads less than 5.5m wide.

512. **Table 26-31** provides a summary of the magnitude of effect and impact significance for each of the 57 links identified as of substandard width. The impact upon the remaining 156 links where the road is greater than 5.5m in width is assessed as negligible.

Table 26-31: Highway Constraints Assessment

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
7	Narrow two lane road ~ 1.6km long, 4.5 to 5 m wide.	92	3	The existing road allows passing of LCVs. One formal and two informal passing places are provided, however these do not allow two HGVs to pass. An increase of up to three HGVs per hour could occasionally lead to conflict when attempting to pass each other.	Low	High	**Moderate Adverse**
8	Narrow two lane road ~ 2.1km long, 5 to 5.5 m wide.	94	2	The existing road allows passing of LCVs. Approximately 15% of the route allows two-way HGV movement. An increase of up to two HGVs per hour could occasionally lead to conflict when attempting to pass each other.	Low		**Moderate Adverse**
10	Narrow two lane road ~ 5.3km long, 4 to 5 m wide.	92	1	The existing road allows passing of LCVs. One formal and one informal passing place are provided, however these do not allow two HGVs to pass. An increase of one HGV per hour would unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**
12	Narrow two lane road ~	92	3	The existing road allows passing of LCVs. One formal and eight informal passing	Low	High	**Moderate Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
	3.3km long, 4 to 5 m wide.			places are provided, however these do not allow two HGVs to pass. Approximately 20% of the route allows two-way HGV movement. An increase of up to three HGVs per hour could occasionally lead to conflict when attempting to pass each other.			
50	Narrow two lane road ~ 4.4km long, 4.4m wide.	65	1	The existing road allows passing of LCVs. Approximately 15% of the route allows two-way HGV movement. In addition, 14 formal and five informal passing places are provided which mostly allow two HGVs to pass. An increase of one HGV per hour would unlikely lead to conflict with other HGVs.	Negligible	High	**Minor Adverse**
55	One lane road ~ 2.6km long, 2.6 - 3m wide.	92	0	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs per hour could lead to conflict when attempting to pass each other.	High		**Major Adverse**
58	Narrow two lane road ~	92	7	The existing road allows passing of LCVs. Approximately 10% of the route allows two-way HGV movement. In addition,	Medium	High	**Major Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
	5.2km long, 4 to 5 m wide.			seven formal and five informal passing places are provided which mostly allow two HGVs to pass. An increase of seven HGVs per hour could lead to conflict when attempting to pass each other.			
60	Narrow two lane road ~ 5.2km long, 3.7 to 4.5m wide.	20	2	The existing road allows passing of LCVs. One formal and eight informal passing places are provided, however these do not allow two HGVs to pass. Approximately 10% of the route allows two-way HGV movement. An increase of up to two HGVs per hour would be unlikely lead to conflict with other HGVs.	Negligible	High	**Minor Adverse**
62	Narrow two lane road ~ 0.9km long, 4.5 to 5m wide.	92	2	The existing road allows passing of LCVs. One informal passing place is provided, however this does not allow two HGVs to pass. Approximately 10% of the route allows two-way HGV movement. An increase of up to two HGVs per hour would be unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
63	Narrow two lane road ~ 0.7km long, 5m wide.	92	3	The existing road allows passing of LCVs. No passing places are provided. An increase of up to three HGVs per hour could occasionally lead to conflict when attempting to pass each other.	Low		**Moderate Adverse**
64	Narrow two lane road ~ 1.9km long, 4m wide.	92	3	The existing road does not allow the passing of two LCVs. Two informal and three formal passing places are provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and three HGVs per hour could lead to conflict when attempting to pass each other.	High	High	**Major Adverse**
65	One lane road ~ 1.1km long, 3.5 – 3.8m wide.	92	3	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs and three HGVs per hour could lead to conflict when attempting to pass each other.	High		**Major Adverse**
66	One lane road ~ 1.5km long, 3.5 – 4m wide.	10	3	The existing road does not allow the passing of two LCVs. One informal passing place is provided, however this does not allow two HGVs to pass. An	Medium		**Major Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
				increase of up to 10 LCVs and three HGVs per hour could lead to conflict when attempting to pass each other.			
68	Narrow two lane road ~ 2.7km long, 5 – 5.3m wide.	94	0	The existing road allows passing of LCVs and no HGV movements are proposed.	Negligible	High	**Minor Adverse**
81	Narrow two lane road ~ 1.1km long, 5 – 5.3m wide.	94	4	The existing road allows passing of LCVs. Approximately 10% of the route allows two-way HGV movement. In addition, three informal passing places are provided which allow two HGVs to pass.	Negligible		**Minor Adverse**
82	One lane road ~ 2.6km long, 3.5 – 4m wide.	92	2	The existing road does not allow the passing of two LCVs. There are three formal and five informal passing places provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict when attempting to pass each other.	Medium		**Major Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
83	Narrow two lane road ~ 2.8km long, 4.3 – 5m wide.	95	3	The existing road allows passing of LCVs. Three formal and two informal passing places are provided, however only one allows two HGVs to pass. An increase of three HGVs per hour could occasionally lead to conflict with other HGVs.	Low		**Moderate Adverse**
84	One lane road ~ 2.5km long, 3m wide.	92	2	The existing road does not allow the passing of two LCVs. There are five informal passing places provided, however these do not allow two HGVs to pass. An increase of up to 72 LCVs and two HGVs per hour could lead to conflict when attempting to pass each other.	High	High	**Major Adverse**
90	One lane road ~ 1.64m long, 2.5 -3m wide.	92	2	The existing road does not allow the passing of two LCVs. There are eight formal and six informal passing places provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict when attempting to pass each other.	High		**Major Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
93	One lane road ~ 3.3km long, 3.2 -3.4m wide.	92	3	The existing road does not allow the passing of two LCVs. Approximately 10% of the route allows two-way HGV movement. In addition, there are 10 formal and nine informal passing places provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and three HGVs per hour could lead to conflict when attempting to pass each other.	Medium		**Major Adverse**
99	Narrow two lane road ~ 0.5km long, 4.6m wide.	74	1	The existing road allows passing of LCVs and one formal and one informal passing place is provided, however these do not allow two HGVs to pass. An increase of one HGV per hour would unlikely lead to conflict with other HGVs.	Negligible	High	**Minor Adverse**
101	Narrow two lane road ~ 1.1km long, 4.3m wide.	74	1	The existing road allows passing of LCVs and one formal passing place is provided, however these do not allow two HGVs to pass. An increase of one HGV per hour would unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
102	One lane road ~ 3.5km long , 3.5 – 4m wide.	92	3	The existing road does not allow the passing of two LCVs. There are two informal passing places provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and three HGVs per hour could lead to conflict when attempting to pass each other.	Low		**Moderate Adverse**
103	Narrow two lane road ~ 1km long, 4.3 – 4.7m wide.	92	1	The existing road allows passing of LCVs. An increase of one HGV per hour would unlikely lead to conflict with other HGVs.	Negligible	High	**Minor Adverse**
108	Narrow two lane road ~ 1.4km long, 4.9 – 5.3m wide.	0	2	The existing road would allow an LCV to pass a HGV. An increase of up to two HGVs per hour would be unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**
109	Narrow two lane road ~ 1.1km long, 4.8m wide.	0	2	The existing road would allow an LCV to pass a HGV. An increase of up to two HGVs per hour would be unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**
110	Narrow two lane road ~	92	2	The existing road allows passing of LCVs and one formal and three informal	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
	3.9km long, 4.9 – 5m wide.			passing places are provided, however only one allows two HGVs to pass. The road width would also allow a LCV to pass a HGV. An increase of up to two HGVs per hour would be unlikely lead to conflict with other HGVs.			
116	One lane road ~ 0.4km long, 3.4m wide.	92	1	The existing road does not allow the passing of two LCVs. There is an informal passing place provided, however this does not allow two HGVs to pass. An increase of up to 92 LCVs and one HGV per hour could lead to conflict when attempting to pass each other.	Medium	High	**Major Adverse**
117	Narrow two lane road ~ 1.7km long, 4.7m wide.	92	3	The existing road allows passing of LCVs and an LCV to pass a HGV. Three formal and two informal passing places are provided, however these are not large enough for HGVs. An increase of three HGVs per hour would be unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**
118	Two lane road ~ 0.9km long,	98	5	Approximately 50% of the route is wide enough for two HGVs to pass and the	Negligible	High	**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
	4.5 – 5.0m wide.			remainder is wide enough for a HGV to pass a LCV. An increase of up to 98 LCVs and five HGV per hour would be unlikely lead to conflict with other HGVs.			
119	Narrow two lane road ~ 1.4km long, 4.5m wide.	98	2	The existing road allows passing of LCVs and a HGV to pass a LCV. One formal and two informal passing places are provided, which allow two HGVs to pass. An increase of two HGVs per hour would unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**
130	One lane road ~ 1.1km long, 3m wide.	92	1	The existing road does not allow the passing of two LCVs. There are no passing places provided. An increase of up to 92 LCVs and one HGV per hour could lead to conflict when attempting to pass each other.	High		**Major Adverse**
131	Narrow two lane road ~ 1km long, 4.5 – 4.8m wide.	92	3	The existing road allows passing of LCVs and an HGV to pass an LCV. Three formal passing places are provided, however only one allows two HGVs to pass. An increase of three HGVs per hour	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
				would be unlikely lead to conflict with other HGVs.			
132	Narrow two lane road ~ 1.8km long, 4.6 – 5.3m wide.	23	3	The existing road allows passing of LCVs and a HGV to pass an LCV. Two formal and seven informal passing places are provided, however only the two formal passing places allow two HGVs to pass. An increase of three HGVs per hour would be unlikely lead to conflict with other HGVs.	Negligible	High	**Minor Adverse**
133	Narrow two lane road ~ 2.7km long, 4.2 – 5m wide.	36	1	Whilst there are no passing places present, the existing road allows the passing of two LCVs and a HGV to pass an LCV. An increase of up to 36 LCVs and one HGV per hour would be unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**
134	One lane road ~ 1.7km long, 2.6 – 2.9m wide.	6	0	The existing road does not allow the passing of two LCVs. An increase of up to six LCVs per hour would be unlikely lead to conflict with other LCVs.	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
135	Narrow two lane road ~ 2.9km long, 4.8 – 5.2m wide.	6	0	The existing road allows the passing of two LCVs and no HGVs are proposed.	Negligible		**Minor Adverse**
136	Two Lane Road ~ 0.9km long, 5.5m	19	1	The majority of the link allows the passing of two HGVs. An increase of up to one HGV per hour would be unlikely lead to conflict with other vehicles.	Negligible		**Minor Adverse**
137	Narrow two lane road ~ 1.8km long, 4.3 – 4.8m wide.	92	1	The existing road allows passing of LCVs and a LCV to pass a HGV. Whilst two informal passing places are provided, these do not allow two HGVs to pass. An increase of one HGVs per hour would unlikely lead to conflict with other HGVs.	Negligible	High	**Minor Adverse**
138	Narrow road ~ 1.4km long, 2.9 – 4.2m wide.	92	2	A majority of the existing road does not allow the passing of two LCVs. Whilst four informal passing places are provided, these do not allow two HGVs to pass. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict when attempting to pass each other.	Medium		**Major Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
139	Narrow road ~ 3.1km long, 3 – 4.3m wide.	17	0	A proportion of the existing road does not allow the passing of two LCVs. Three formal and 12 informal passing places are provided. An increase of up to 17 LCVs would be unlikely to lead to conflict.	Negligible		**Minor Adverse**
140	One lane road ~ 0.3km long, 2.7 – 2.9m wide.	92	2	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict with other LCVs.	High		**Major Adverse**
142	One lane road ~ 0.5km long, 3.9m wide.	92	2	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict with other LCVs.	Medium	High	**Major Adverse**
143	Narrow two lane road ~ 0.3km long, 4.9 – 5.3m wide.	7	2	The existing road allows passing of LCVs and a HGV to pass an LCV. Approximately 40% of the route allows two-way HGV movement. In addition, a formal passing place that allows two HGVs to pass is provided. An increase of two HGVs per hour would unlikely lead to conflict with other HGVs.	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
144	Narrow one lane road ~ 0.3km long, 2.4m wide.	92	1	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs and one HGV per hour could lead to conflict with other LCVs.	Medium		**Major Adverse**
145	Narrow one lane road ~ 1.6km long, 2.6m wide.	0	0	The road would not be used by construction traffic.	Negligible		**Minor Adverse**
146	Two lane road ~ 2.2km long, 4.6 – 6m wide.	18	0	The existing road allows passing of LCVs and no HGV movements are proposed.	Negligible		**Minor Adverse**
147	One lane road ~ 0.9km long, 3.2m wide.	31	2	The existing road does not allow the passing of two LCVs. An increase of up to 31 LCVs and two HGVs per hour could lead to conflict with other LCVs.	Low	High	**Moderate Adverse**
148	One lane road ~ 0.9km long, 3.5 – 3.6m wide.	92	2	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict with other LCVs.	Medium		**Major Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
149	One lane road ~ 0.8km long, 3m wide.	0	0	The road would not be used by construction traffic.	Negligible		**Minor Adverse**
151	Narrow road ~ 2.3km long, 3.8 – 4.9m wide.	45	0	A proportion of the existing road does not allow the passing of two LCVs. Seven formal and three informal passing places are provided. An increase of up to 45 LCVs per hour would be unlikely to lead to conflict.	Negligible		**Minor Adverse**
152	Narrow road ~ 2.7km long, 3.6 – 4.5m wide.	92	2	A proportion of the existing road does not allow the passing of two LCVs. Three formal and 10 informal passing places are provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and two HGVs per hour would be unlikely to lead to conflict.	Negligible		**Minor Adverse**
153	Narrow road ~ 1.9km long, 3.6 – 5.5m wide.	48	2	A proportion of the existing road does not allow the passing of two LCVs. Approximately 50% of the route allows two-way HGV movement. In addition, five formal and three informal passing places are provided, however these do not allow	Negligible		**Minor Adverse**

Link	Description of existing situation	Peak hourly construction flows		Rationale for Magnitude	Magnitude of effect	Sensitivity	Impact Significance
		LCVs	HGVs				
				two HGVs to pass. An increase of up to 48 LCVs and two HGVs per hour would be unlikely to lead to conflict.			
154	One lane road ~ 1.3km long, 3.7m wide.	92	2	The existing road does not allow the passing of two LCVs. Six informal passing places are provided, however these do not allow two HGVs to pass. An increase of up to 92 LCVs and two HGVs per hour could lead to conflict with other LCVs.	Medium	High	**Major Adverse**
155	Narrow road ~ 1.4km long, 3.8 – 4.9m wide.	0	0	The road would not be used by construction traffic.	Negligible		**Minor Adverse**
156	One lane road ~ 2.8km long, 3m wide.	92	1	The existing road does not allow the passing of two LCVs. An increase of up to 92 LCVs and one HGVs per hour could lead to conflict with other LCVs.	Medium		**Major Adverse**

513. **Table 26-31** identifies that DEP and SEP' construction traffic could result in potentially significant impacts upon 25 of the 56 links identified to be of substandard width.

514. **Table 26-32** details mitigation measures that would be applied to reduce the potentially significant adverse driver delay (highway constraints) impacts. The measures outlined in **Table 26-32** are intended to provide an indicative and proportionate means of mitigating the potential impacts, the final measures will be agreed with the NCC through the development of the OTMP.

Table 26-32: Potential Mitigation Measures for Driver Delay (Highway Constraints)

Links	Potential Mitigation Measures
7, 12, 58, 66, 83	The links are identified as wide enough to accommodate DEP and SEP increase in LCV traffic but would not accommodate two-way HGV traffic. To accommodate the additional HGV traffic, it would be proposed to either widen the existing passing places to allow two HGVs to pass or use an escort vehicle to guide HGVs along the link.
63	The links are identified as wide enough to accommodate DEP and SEP increase in LCV traffic but would not accommodate two-way HGV traffic. To accommodate the additional HGV traffic, it would be proposed to either provide new passing places to allow two HGVs to pass or use an escort vehicle to guide HGVs along the link.
64, 82, 84, 90, 93, 102, 116, 138, 154	The links are identified as not being wide enough to allow two vehicles to pass. It would be proposed to either widen the existing passing places to allow two HGVs to pass or use an escort vehicle to guide HGVs along the link. LCV movements would also be reduced through either the scheduling of works to reduce peak employee demand or through the use of travel planning measures such as car-sharing and/or minibuses.
65, 130, 140, 142, 144, 147, 148, 156	The links are identified as not being wide enough to allow two vehicles to pass. It would be proposed to either provide new passing places to allow two HGVs to pass or use an escort vehicle to guide HGVs along the link. LCV movements would also be reduced through either the scheduling of works to reduce peak employee demand or through the use of travel planning measures such as car-sharing and/or minibuses.
55	The links are identified as not being wide enough to allow two vehicles to pass, however no HGV traffic is proposed to use these links. LCV movements would be reduced through either the scheduling of works to reduce peak employee demand or through the use of travel planning measures such as car-sharing and/or minibuses.

515. Following the implementation of the proposed mitigation measures outlined in **Table 26-32**, the magnitude of effect is assessed as negligible on high sensitivity receptors resulting in a minor adverse residual impact.

26.6.1.12 Impact 7: Driver Delay (Road Closures);

516. During the main cable installation works, the onshore cable corridor would need to be installed, using open cut trenching techniques, across a number of minor public roads. Where appropriate, signal controlled single lane traffic management would be utilised during duct installation where the width of the road (less than 7.2m for cable route crossings) does not permit single lane traffic management.

517. **Table 26-33** details of all minor road onshore cable corridor crossings required during the main installation stage and the chosen crossing method including proposed traffic management measures. It is worth noting that a number of major roads are proposed to be crossed by trenchless crossing methods as detailed in **Table 26-3.**

518. In reviewing the potential impacts of a road closure, consideration has been given to the following questions in relation to certain receptor groups

- Would closing the road have a significant impact upon a driver's journey time? This includes consideration of daily traffic flows and if a suitable alternative diversion route exists;
- Would closing the road sever a route currently used by pedestrians / cyclists;
- Would closing the road lead to a significant detour for scheduled bus services.

519. When considering the potential for alternative routes, diversions should ensure that vehicles are diverted to a road of the same or higher classification, i.e. a B road could only be diverted to a B road, A road or motorway.

520. **Table 26-33** provides a summary of the likely impacts of closing the road for each onshore crossing location.

Table 26-33: Main Installation Stage - Road Closures and Diversion Summary

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
Holt Road	10	CX002	No	No	DR 001	Medium	Negligible	A suitable alternative route exists which would add a 1 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Station Road	12	CX004	No	No	DR 002	Medium	Negligible	A suitable alternative route exists which would add a 3 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Sandy Hill Lane	12	CX007	No	No	DR 002	Medium	Negligible	A suitable alternative route exists which would add a 3 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
The Street (Bodham)	n/a	CX009	No	Yes	DR 003	High	Low	A suitable alternative route exists which would add a 1 min delay to travel times. However, the route is used by buses. Therefore, a full closure could have a **Moderate Adverse** impact.

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
Osier Lane	102	CX010	Yes	No	DR 004	High	Negligible	Regional Cycle Route (RCR) runs along Osier Lane. However, a suitable alternative route exists which would add 3 minute delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
New Road	n/a	CX012	No	No	DR 005	Medium	Low	A suitable alternative route exists which would add a 6 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
New Road	n/a	CX013	No	No	DR 006	Low	Negligible	A suitable alternative route exists which would add a 1 min delay to travel times. Therefore, a closure could have a **Negligible Adverse** impact.
Gresham Road	n/a	CX014	No	No	DR 007	Low	Negligible	A suitable alternative route exists which would add a 2 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Church Lane	61	CX015	No	No	DR 008	Medium	Negligible	A suitable alternative route exists which would add a 1 min delay to

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								travel times. Therefore, a closure could have a **Minor Adverse** impact.
Northfield Lane	65	CX018	No	No	DR 009	Low	Negligible	A suitable alternative route exists which would add a 3 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Church Street	64	CX020	No	Yes	DR 010	High	Low	A suitable alternative route exists which would add a 3 min delay to travel times. However, the route is used by buses. Therefore, a full closure could have a **Moderate Adverse** impact.
Unnamed Road	58	CX021	No	No	DR 011	Low	Negligible	A suitable alternative route exists which would add less than a 1 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
The Street	130	CX023	No	No	DR 012	Low	Negligible	A suitable alternative route exists which would add a 2 min delay to travel times. Therefore, a closure could have a **Negligible** impact.

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
Unnamed Road	58	CX024	No	No	DR 013	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Maltslaske Road (Crossing 1)	58	CX027	No	No	DR 014	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Maltslaske Road (Crossing 2)	58	CX029	No	No	DR 015	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Spa Lane	156	CX034	No	No	DR 016	High	Negligible	A suitable alternative route exists which would reduce travel by 1 min. Therefore, a closure could have a **Minor Adverse** impact.
Spink's Lane	55	CX040	No	No	DR 017	Low	Negligible	A suitable alternative route exists which would add a 2 min delay to

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								travel times. Therefore, a closure could have a **Negligible** impact.
Heydon Road	n/a	CX042	No	No	n/a	Low	Negligible	A suitable alternative route exists which would add a 2 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
The Street (Oulton)	131	CX044	No	No	DR 018	Low	Low	A suitable alternative route exists which would add a 4 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Unnamed Road	n/a	CX048	No	No	DR 019	Low	Negligible	A suitable alternative route exists which would add a 1 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Old Friendship Lane	n/a	CX052	No	No	DR 020	Medium	Negligible	A suitable alternative route exists which would add a 2 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Norwich Road	n/a	CX054	No	No	DR 021	Medium	Negligible	A suitable alternative route exists which would add a 2 min delay to

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								travel times. Therefore, a closure could have a **Minor Adverse** impact.
Easton Way	137	CX055	No	No	DR 022	Low	Low	A suitable alternative route exists which would not increase delay to travel times. However, the diversion route would divert traffic through Cawston. Therefore, a closure could have a **Minor Adverse** impact.
Church Lane	140	CX056	No	No	DR 023	Low	Negligible	A suitable alternative route exists which would add a 3 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Clay Lane	142	CX060	No	No	DR 024	Low	Negligible	A suitable alternative route exists which would add a 3 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Church Road	n/a	CX064	No	No	n/a	Medium	High	No suitable alternative route exists as the road leads to a single farm only. Therefore, a closure could have a **Major**

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								Adverse impact on the residents and agricultural workers.
School Road	n/a	CX069	No	No	DR 025	Low	Negligible	A suitable alternative route exists which would reduce travel by 1 min. Therefore, a closure could have a **Negligible** impact.
Reepham Road	69	CX071	No	No	n/a	Low	High	No suitable alternative route exists which could cater for the 2,436 AADT vehicle flows increasing the sensitivity of the link to high. Therefore, a closure could have a **Major Adverse** impact.
Felthorpe Road	n/a	CX074	No	No	DR 026	Low	Negligible	A suitable alternative route exists which would add a 1 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Ringland Lane	82	CX085	No	No	DR 027	Low	Low	A suitable alternative route exists which would add a 4 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
Weston Road	148	CX089	No	No	DR 028	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
The Broadway	84	CX091	No	No	DR 029	High	Low	A suitable alternative route exists which would add a 4 min delay to travel times. Therefore, a closure could have a **Moderate Adverse** impact.
Taverham Road	90	CX097	No	No	DR 030	Low	Negligible	A suitable alternative route exists which would add a 2 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Unnamed Road	93	CX102	No	No	DR 031	Low	Negligible	A suitable alternative route exists which would not increase delay to travel times. Therefore, a closure could have a **Negligible** impact.
Broom Lane	n/a	CX103	No	No	DR 032	Low	Negligible	A suitable alternative route exists which would reduce travel by 1

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								min. Therefore, a closure could have a **Negligible** impact.
Colton Road	93	CX106	No	No	DR 032	Low	Negligible	A suitable alternative route exists which would not increase delay to travel times. Therefore, a closure could have a **Negligible** impact.
Chapel Street	103	CX111	No	Yes	DR 033	Low	High	A suitable alternative route exists which would add 11 min delay to travel times. The route is also used by buses. Therefore, a full closure could have a **Moderate Adverse** impact.
B1108 – Watton Road	104	CX113	No	Yes	No	Low	High	The B1108 is a bus route and no suitable alternative route exists for diversion. Therefore, a closure could have a **Moderate Adverse** impact.
Burdock Lane	152	CX115	No	Yes	DR 034	Low	Negligible	A suitable alternative route exists which would reduce travel by 1 min. Therefore, a closure could have a **Negligible** impact.

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
Skoyes Lane	n/a	CX118	No	No	DR 035	Low	Negligible	A suitable alternative route exists which would add a 3 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Melton Road	110	CX121	No	No	DR 036	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
B1172 Ketts Oak	112	CX127	No	Yes	DR 037	Medium	Medium	A suitable alternative route exists which would add a 6 min delay to travel times. However, the route is used by buses. Therefore, a full closure could have a **Moderate Adverse** impact.
High Street	116	CX131	No	No	DR 038	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Negligible** impact.
Hethersett Road	119	CX140	No	No	DR 039	Low	High	A suitable alternative route exists which would add a 10 min delay to travel times. Therefore, a

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								closure could have a **Moderate Adverse** impact.
Intwood Lane	154	CX147	No	No	DR 040	Low	Low	A suitable alternative route exists which would add a 5 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
B1113 Norwich Road	123	CX153	No	Yes	DR 041	Medium	High	A suitable alternative route exists which would add 26 min delay to travel times. The route is also used by buses. Therefore, a full closure could have a **Major Adverse** impact.
Gowthorpe Lane	n/a	CX156	No	No	DR 042	Low	Low	A suitable alternative route exists which would add a 6 min delay to travel times. Therefore, a closure could have a **Minor Adverse** impact.
Hickling Lane	n/a	CX158	No	No	DR 043	Low	Negligible	A suitable alternative route exists, however, negligible traffic movements associated with Hickling Lane. Therefore, a

Crossing Location	Link ID	Crossing ID	Footway/ Cycleway	Bus Route	Alternative Diversion Route ID	Link Sensitivity	Magnitude	Summary
								closure could have a **Negligible** impact.

521. **Table 26-33** identifies seven moderate adverse and three major adverse impacts as a result of temporary road closures. The remaining road closures would experience negligible or minor adverse impacts and are not assessed further.

522. A total of 43 alternative diversion routes have been graphically presented in Figure 26.6 to inform further discussions with NCC / HE.

523. The following mitigation measures could be provided to ensure smooth operation of the potential road closures showing:

1. Implementation of advanced signing to assist drivers in finding alternative routes.
2. Ensuring all road closure works are staggered to minimise any cumulative impacts within close geographical areas.
3. Liaising with bus operators to coordinate and facilitate bus routing amendments.
4. Working with NCC and local stakeholders to agree an appropriate time to undertake the works (e.g. night time working)
5. Hard Engineering
    - Temporarily widen the existing road to 6m.
    - Undertake the road crossing in two stages maintaining one traffic lane in each direction.
    - Controlling traffic through temporary traffic signals.
6. Investigate potential for further trenchless crossing methods.

524. **Table 26-34** details the identified moderate and major adverse impacts and the potential mitigation measures that could be employed to reduce the impacts to **minor adverse**. Further discussions with NCC post-PEIR will be undertaken to agree the final form of traffic management (including agreed diversion routes).

Table 26-34: Road Closure Mitigation Measures Summary

Road Name	Link ID	Crossing ID	Impact Significance	2025 Baseline AADT	Proposed Mitigation Measures	Notes	Residual Impacts
The Street (Bodham)	n/a	OC 03	**Moderate Adverse**	< 200	1,2,3 & 4	Low daily vehicle flows.	**Minor Adverse**
Church Street	64	OC 10	**Moderate Adverse**	252	1,2,3 & 4	Low daily vehicle flows.	**Minor Adverse**
Church Road	n/a	OC 25	**Major Adverse**	< 20	2 & 4	Impacts will affect a single farm property only. To liaises with farm to agree suitable method of traffic management and timing of works.	**Minor Adverse**
Reepham Road	69	OC 27	**Major Adverse**	2,436	1 & 5	Potential to widen 5.5m road width allowing for single lane traffic management. 2025 peak hour flows of 222 vehicles.	**Minor Adverse**
The Broadway	84	CX091	**Moderate Adverse**	30	1,2 & 4	Low daily vehicle flows.	**Minor Adverse**
Chapel Street	103	CX111	**Moderate Adverse**	1,088	1,2,3 & 4	Low daily vehicle flows.	**Minor Adverse**
B1108 – Watton Road	104	CX115	**Moderate Adverse**	5,962	1,2,4 & 5	Potential to widen 5.8m road width allowing for single lane	**Minor Adverse**

Road Name	Link ID	Crossing ID	Impact Significance	2025 Baseline AADT	Proposed Mitigation Measures	Notes	Residual Impacts
						traffic management. 2025 peak hour flows of 597* vehicles.	
B1172 – Ketts Oak	112	CX127	**Moderate Adverse**	11,657	5 & 6	Potential to widen 5.6m road width allowing for single lane traffic management. 2025 peak hour flows of 968* vehicles.	**Minor Adverse**
Hethersett Lane	119	CX140	**Moderate Adverse**	1,886	5 & 6	Potential to widen 5.5m road width allowing for single lane traffic management. 2025 peak hour flows of 190* vehicles.	**Minor Adverse**
B1113 – Norwich Road	123	CX153	**Major Adverse**	9,314	1,2,3,4,5 & 6	Potential to widen 5.4m road width allowing for single lane traffic management. 2025 peak hour flows of 930* vehicles.	**Minor Adverse**
*	Where classified ATC data does not exist, 10% of the Annual Average Daily Traffic has been used to derive approximate peak hour flows.						

525. Following the implementation of the proposed mitigation measures in relation to road closures and traffic management, the magnitude of effect is assessed as low on low sensitivity receptors resulting in a **minor adverse** residual impact.

526. Once the appropriate mitigation measures have been agreed with highway stakeholders, they would be captured in a future OTMP to be submitted with the DCO application.

26.6.2 Potential Impacts during Operation

527. There is no ongoing requirement for regular maintenance of the onshore cables following installation, however access to the onshore cable corridor would be required to conduct emergency repairs, if necessary. Access to each field parcel along the cable route is available from the identified operational side accesses using existing field entry points where possible or accessing the cable route from road crossings.

528. The onshore substation would not be manned, however access would be required periodically for routine maintenance activities, estimated at an average of one visit per week.

529. Considering the activities above, no significant traffic impacts are anticipated during the operational phase.

26.6.3 Potential Impacts during Decommissioning

530. No decision has been made regarding the final decommissioning policy for the onshore infrastructure, as it is recognised that industry best practice, rules and legislation change over time.

531. A full EIA will be carried out ahead of any decommissioning works being undertaken. The programme for decommissioning is expected to be similar in duration to the onshore construction phase of up to 36 months. The detailed activities and methodology for decommissioning will be determined later within the project lifetime, in line with relevant policies at that time, but would be expected to include:

- Dismantling and removal of electrical equipment;
- Removal of cabling from site;
- Removal of any building services equipment;
- Demolition of the buildings and removal of fences; and
- Landscaping and reinstatement of the site.

532. The decommissioning methodology cannot be finalised until immediately prior to decommissioning, but would be in line with relevant policy at that time.

533. Whilst details regarding the decommissioning of the onshore infrastructure are currently unknown, considering the worst case which would be the removal and reinstatement of the current land use at the site, it is anticipated that the impacts would be no worse than those assessed during construction.

26.7 Cumulative Impacts

26.7.1 Identification of Potential Cumulative Impacts

534. The first step in the cumulative assessment is the identification of which residual impacts assessed for DEP and/or SEP on their own have the potential for a cumulative impact with other plans, projects and activities (described as 'impact screening'). This information is set out in **Table 26-35** below, together with a consideration of the confidence in the data that is available to inform a detailed assessment and the associated rationale. Only potential impacts assessed in **Section 26.6** as minor or above are included in the CIA (i.e. those assessed as 'no impact' or 'negligible' in terms of transport impacts are not taken forward as there is no potential for them to contribute to a cumulative impact).

535. **Table 26-35** concludes that in relation to traffic and transport all identified environmental effects have the potential for cumulative impacts during construction.

Table 26-35: Potential Cumulative Impacts (impact screening)

Effects	Potential for Cumulative Impact	Rationale
Construction		
Severance	Yes	Cumulative impacts arising from the sequential, concurrent and single DEP and SEP projects are possible with other projects that generate traffic in the TTSA where temporal overlap exists.
Pedestrian and cyclist amenity	Yes	
Pedestrian and cyclist delay	Yes	
Road safety	Yes	
Driver delay (capacity)	Yes	
Driver delay (highway constraints)	Yes	
Driver delay (road closures)	Yes	
Operation		
Operational impacts were scoped out of the assessment in **Section 26.3.2.3**, therefore there would be no cumulative operational impacts.		
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

26.7.2 Other Plans, Projects and Activities

536. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative impacts for inclusion in the CIA (described as 'project screening'). This information is set out in **Table 26-36** below, together with a consideration of the relevant details of each, including current status (e.g. under construction), planned construction period, closest distance to DEP & SEP, status of available data and rationale for including or excluding from the assessment.

537. The project screening has been informed by the development of a CIA project list which forms an exhaustive list of plans, projects and activities in a very large TTSA relevant to DEP and SEP. The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

Table 26-36: Summary of projects considered for the CIA in relation to traffic and transport (project screening)

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
Norfolk Vanguard Offshore Wind Farm	DCO consented[9]	Expected construction 2021 to 2025	0 – cable intersects DEP and SEP	Y	There is potential for the construction traffic to interact with DEP and SEP. The projects have therefore been assessed in the traffic and transport CIA.
Hornsea Project Three Offshore Wind Farm	DCO consented	Expected construction 2021 to 2027	0 – cable intersects DEP and SEP 0.8 between onshore substations	Y	
Norfolk Boreas Offshore Wind Farm	DCO examination	Expected construction 2026 to 2027 (if Norfolk Vanguard lay ducts as part of project)	0 – cable intersects DEP and SEP	Y	

[9] Following completion of this CIA, the ruling of a Judicial Review brought against the Secretary of State for Business Energy and Industrial Strategy's (BEIS) decision to award a DCO for NV has been handed down. The decision to grant the order has been submitted to the Secretary of State for redetermination. BEIS will be considering its options, namely appeal or redetermination. Until such time as this process reached a conclusion it has been decided to maintain the NV/ NB cumulative assessment for stakeholder review.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
Great Yarmouth Third River Crossing	DCO consented	Expected construction 2020 to 2022	31.1	N	It is anticipated that the construction works associated with the proposed project will be completed prior to commencement of the Project's construction phase. A review of the project will be undertaken prior to submission of the DCO application.
A47 North Tuddenham to Easton RIS	Pre-application (application due Q1 2021)	Expected construction 2023 to 2024/5	0 – A47 intersects PEIR boundary	Y	There is potential for the construction traffic and that of DEP and SEP to interact. The project has therefore been considered in the traffic and transport CIA.
A47/A11 Thickthorn Junction RIS	Pre-application (application due Q1 2021)	Expected construction 2023 to 2024/5	2.2 (PEIR boundary)	Y	
A47 Blofield to North Burlington RIS	Application submitted	Expected construction 2023 to 2024/5	15.9 (onshore substation)	Y	
A47 Great Yarmouth Junction	Pre-application	Expected construction 2023/4 to 2024/5	36.1	N	The construction of the proposed improvements is projected to start by 2023/2024 and should be complete by

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
Improvements Including Reconstruction of the Vauxhall Roundabout RIS			(onshore substation)		2024/2025 prior to the commencement of the Projects' construction. However, HE noted that the scheme has been paused pending a review. A review of the project will be undertaken prior to submission of the DCO application.
East Anglia TWO Offshore Wind Farm	DCO examination	Earliest start of construction is mid-2023	44.4 (onshore substation)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
East Anglia THREE Offshore Wind Farm	DCO Consented	Expected construction 2020-2025	52.5 (onshore substation)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
Expansion of London Luton Airport	Pre-application	Expected construction 2023-2036	134.9	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
Sunnica Energy Farm	Pre-application	Expected construction 2022-2025	59 (onshore substation)	N	As the project is at the pre-application stage, there is insufficient information within the public domain to enable a traffic and transport CIA. A review of the project will be

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
					undertaken prior to submission of the DCO application.
Sizewell C Project	Pre-examination	Expected construction 2022-2034	43.5 (onshore substation)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
Medworth Energy from Waste Combined Heat and Power Facility	Pre-application	Earliest start of construction is mid-2022	66.2 (PEIR boundary)	N	As the project is at the pre-application stage, there is insufficient information within the public domain to enable a traffic and transport CIA. A review of the project will be undertaken prior to submission of the DCO application.
A428 Black Cat to Caxton Gibbet Road Improvement scheme	Pre-application	Expected construction 2021-2025	100 (PEIR boundary)	N	The project was accepted for DCO examination 23 March 2021, as such there has been insufficient time to review the application to enable a traffic and transport CIA. A review of the project will be undertaken prior to submission of the DCO application.
Lake Lothing Third Crossing	DCO consented	Construction is expected to be completed by 2022	33.3 (onshore substation)	N	It is anticipated that the construction works associated with the proposed project will be completed prior to commencement of the

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
					Project's construction phase. A review of the project will be undertaken prior to submission of the DCO application.
Bradwell B new nuclear power station	Pre-application	N/A	94 (onshore substation)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
Oikos Marine & South Side Development	Pre-application	N/A	125 (onshore substation)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
Progress Power Station	DCO Consented	N/A	27.5 (onshore cable corridor)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
Nautilus Interconnector	Pre-application	Expected construction 2024-2028	45.6 (onshore substation)	N	As the project is at the pre-application stage, there is insufficient information within the public domain to enable a traffic and transport CIA. A review of the project will be undertaken prior to submission of the DCO application.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
TIGRE Project 1 (TP1)	Pre-application	N/A	N/A	N	As the project is at the pre-application stage, there is insufficient information within the public domain to enable a traffic and transport CIA. A review of the project will be undertaken prior to submission of the DCO application.
Rookery South Energy from Waste Generating Station	DCO Consented	Undergoing construction	130 (onshore cable corridor)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
A14 Cambridge to Huntingdon Improvement Scheme	DCO Consented	2016 to 2020	88 (onshore cable corridor)	N	The study areas of the projects do not overlap. Therefore, there is no potential for the construction traffic and that of DEP and SEP to interact.
A47 Wansford to Sutton	Pre-application	N/A	102 (onshore cable corridor)	N	As the project is at the pre-application stage, there is insufficient information within the public domain to enable a traffic and transport CIA. A review of the project will be undertaken prior to submission of the DCO application.
Norfolk County Council					

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
C/5/2017/5007 Change of use from B8 Warehouse: to a Sui Generis use for waste processing and the production of refuse derived fuel (RDF)	Approved	N/A	1.47 (onshore cable corridor)	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.
Norwich Western Link	Pre-application	Expected construction 2023-2025	0 – A47 intersects PEIR boundary	Y	There is potential for the construction traffic to interact with DEP and SEP. In addition, the new road layout would provide alternative routes for the Projects construction traffic. The project has therefore been considered in the traffic and transport CIA.
North Norfolk District Council					
PF/19/1584 Demolition of garage and outbuildings,	Approved	N/A	Within the current PEIR onshore	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
erection of detached garage, single story side extension…			boundary at Bodham		
IS2/18/1802 Proposed erection of detached double garage and erection of a detached outbuilding to provide two self-contained holiday lets	Advice given	N/A	Within the current PEIR onshore boundary at Bodham	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.
IS2/19/0413 Proposal to demolish garages replacing with construction of wheelchair adaptable	Advice given	N/A	Within the current PEIR onshore boundary at Bodham	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
bungalow (affordable unit)					
IS2/17/1671 Demolition of former school and erection of four dwelling houses	Advice given	N/A	Within the current PEIR onshore boundary (at Bodham)	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.
IB/18/0570 Affordable housing development (for up to 10 dwellings)	Advice given	N/A	Within the current PEIR onshore boundary (at Bodham)	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.
NP/17/1405 Agricultural storage building	Permission not required	N/A	Within the current PEIR onshore boundary (off Weybourne Road)	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.
South Norfolk Council					

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
2017/2794 2020/0903 Reserved Matters Outline Application for Proposed employment development Land West of Ipswich Road Keswick Norfolk 'Harford Triangle'	Approval with conditions	N/A	Within the current PEIR onshore boundary at Norwich	Y	There is potential for the construction traffic to interact with DEP and SEP. The project has therefore been assessed in the traffic and transport CIA.
Broadland District Council					
20181024 Nationally Significant Infrastructure Proposal - underground cable route associated with offshore wind farm.	Registered	N/A	0.2 (onshore cable corridor)	N	There is insufficient information within the public domain to enable a traffic and transport CIA to be carried out. A review of the project will be undertaken prior to submission of the DCO application.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
20181400 Demolition of 4 existing units and development of 10 residential units (Reserved Matters Application Following Outline Approval 20151644)	Final decision	N/A	0.05 (onshore cable corridor)	N	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2025. Therefore, the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.
20201012 Screening Opinion (Environmental Impact Assessment) Regulations 2017 - Proposed Development of a Ground Mounted Solar Farm & Associated Infrastructure	Final Decision - EIA Not Required	N/A	Within onshore PEIR boundary	N	There is no information on traffic and transport within the public domain to enable a traffic and transport CIA to be carried out. A review of the project will be undertaken prior to submission of the DCO application.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
20181336 1. Infiltration Lagoon to serve Food Enterprise Park 2. Submission of details under condition 2.25 of the Local Development Order REF. 20170052	Full approval	N/A	Within onshore PEIR boundary	N	The project would not result in an increase in traffic movements, therefore not taken forward into CIA.
20181294 Milling Tower Building and 6 No Storage Silos for Food Processing and Production	Approved	N/A	0.02 (onshore cable corridor)	N	Within the submitted documents, traffic and transport impacts were scoped out of the EIA for proposed project as traffic and transport impacts were considered to be insignificant. On this basis, it is unlikely that there would be potential for significant cumulative impacts.
20180077 Change of Use from Potato Store to Agricultural	Approved	N/A	Within onshore PEIR boundary	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.

Project	Status	Construction Period	Closest Distance from the Project (km)	Included in the CIA (Y/N)	Rationale
Chemical Storage					
2019/0740 Erection of agricultural building and shed. (Resubmission of planning consent 2013/1403).	Approval with conditions	N/A	Within onshore PEIR boundary (at Colton)	N	Given the small scale of the proposed project, it is unlikely there would be potential for significant cumulative impacts or that the construction timeframes would overlap.

538. **Table 26-36** identified the following projects which have been scoped in for further CIA.

- Norfolk Vanguard (an offshore windfarm);
- Hornsea Project Three (an offshore windfarm);
- Norfolk Boreas (an offshore windfarm);
- A47 North Tuddenham to Easton RIS (a highway improvement scheme);
- A47 Blofield to North Burlingham RIS (a highway improvement scheme);
- A47/A11 Thickthorn junction improvement RIS (a highway improvement scheme).
- Land West of Ipswich Road ('Harford Triangle'); and
- Norwich Western Link (a highway improvement scheme).

539. The following sections set out a framework for a detailed CIA that will be submitted with the DCO application.

26.7.3 DEP / SEP and A47 Corridor Improvement Programme

540. HE has proposed six improvement schemes for the A47 as part of the Road Investment Strategy (RIS) announced in 2014. The schemes have been identified at congestion hotspots and significant growth has been predicted in the areas which the proposed improvements will help support.

541. The schemes identified (**Table 26-36)** that could potentially impact on the TTSA are;

- A47 North Tuddenham to Easton RIS (a highway improvement scheme);
- A47 Blofield to North Burlingham RIS (a highway improvement scheme); and
- A47/A11 Thickthorn junction improvement RIS (a highway improvement scheme).

542. DCO applications for both the North Tuddenham to Easton and A47/A11 Thickthorn junction are due to be submitted in Q1 2021. The A47 Blofield to North Burlington RIS DCO application was submitted in December 2020.

543. The programme of constructions works for the three identified RIS schemes is due to start in 2023/24 and finishing in 2024/25. All works are programmed to finish before the commencement of construction works for DEP and SEP. However, noting that any slippage in the programmes could potentially lead to cumulative impacts with DEP and SEP.

544. The Applicant will continue to engage HE, to establish a suitable 'reference case' for the highway capacity assessments.

26.7.4 Norwich Western Link (a high improvement scheme)

545. The development of the Norwich Western Link (NWL) has been proposed to connect the Broadland Northway formerly known as the Northern Distributor Road (NDR) from the A1067 to the A47 west of Norwich. The NWL would be of a high standard route significantly improving traffic congestion and journey times on the local minor roads to the west of Norwich.

546. A preferred 3.8km route for the NWL was outlined in July 2019, and development funding from the DfT has been awarded. The current timeline, estimates construction to begin in 2023 at the earliest, with the road completed and open to traffic late 2025.

547. The Applicant will continue to engage NCC to establish a suitable 'reference case' for the highway capacity assessments.

26.7.5 Land West of Ipswich Road ('Harford Triangle')

548. The Land West of Ipswich Road (also known locally as the 'Harford Triangle' is an allocated site in the triangular piece of land between the B113 and the A140. Planning consent was granted in May 2018 for an employment development consisting of B1, B2 and B8 uses, associated access and landscaping and a link road between the A140 and the B113. Further reserved matters for discharge were submitted in 2020 for phase 1 of the development, including the link road. The application is currently pending approval.

549. A TA was submitted with part of the application assessing the performance of a proposed link road and a consented junction. The new link road will join with the A140 at the existing Tesco junction, which will be converted into a four arm signalised junction. The TA predicted the signalised junction (including traffic generated by the proposed development) would operate within capacity in the future year 2026 am peak but over capacity in the pm peak.

550. DEP and SEP TTSA utilises the B1113 (link 124) and the A140 (link 125) for routing of construction traffic. The volume of DEP and SEP traffic passing through the junction would be dependent upon whether the final substation access is taken from the A140 or B1113.

551. It is proposed therefore, that once the substation access strategy has been finalised (post-PEIR), further discussions will be held with highway stakeholders to agree the extent of any cumulative assessment required at this location.

26.7.6 DEP / SEP and Other Wind Farm Projects.

26.7.6.1 Norfolk Vanguard (NV) and Norfolk Boreas (NB)

552. Vattenfall Wind Power Limited (VWPL) are developing two offshore wind farm projects 47km and 72km off the Norfolk coast, NV and NB respectively.

553. NV and NB will have a total combined capacity of 3.6GW and will share the onshore infrastructure locations for both projects with landfall at Happisburgh and onshore project substations at Necton.

554. The NV application included for the installation of shared activities for both projects including trenching and installation of ducts and other shared enabling works for NB. NV was granted consent in July 2020, which was later quashed by the High Court and will now be re-determined by the Secretary of State. For the purpose of this assessment it has been assumed that NV is re-consented and keeps to the same timeline as indicated in its application documents. Clarification of this situation should be available at the time of the SEP and DEP application.

555. The construction timelines for NV currently show construction activity will occur between 2022 and 2024 with peak activity during the main duct installation phase in 2023.

556. The application for NB considered two alternative scenarios:

- Scenario 1 (2026–2027): NV proceeds to construction and installs ducts and other shared enabling works for NB. NB would undertake the pulling of cables through the pre-installed ducts and construction of the substation and landfall sites.
- Scenario 2 (2025-2026): NV does not proceed to construction and NB proceeds alone. NB undertakes all works required as an independent project.

557. The programmes for both NV and NB indicate that NV would be completing its cable pulling phase at the same time that NB Scenario 1 commences construction at the onshore project substation and landfall.

558. Noting that NB Scenario 2 would only occur if NV does not proceed to construction, there would be no cumulative impacts between NV and NB under Scenario 2.

559. The construction timeline for NB Scenario 1 currently shows construction activity between 2024 and 2027 with peak activity during the cable pulling phase due to occur in 2026. Noting that NV has been granted consent[10], this is the most likely scenario for the CIA.

560. NB is currently awaiting a consent decision following completion of the DCO examination.

26.7.6.2 DEP / SEP and Hornsea Project Three

561. Orsted is proposing to develop an offshore windfarm located in the southern North Sea with a total generating capacity of up to 2.4GW (Hornsea Project Three (HP3)). The project was granted Consent on 31 December 2020.

562. HP3 will make landfall at a location between Sheringham and Cley next to the Sea. From the landfall location, the onshore cable corridor heads approximately 55km south to connect to and new onshore substation to the south of Norwich, from here it then connects to the existing Norwich Main National Grid Substation.

563. (HP3 construction timeline indicates potential construction between 2021 and 2027 with peak activity occurring during 2023.

26.7.6.3 Proposed Windfarm Cumulative Assessment

564. **Table 26-12 (Section 26.4.4)** presents details of the currently anticipated construction programme for each of the identified wind farm projects when the peak period for deliveries are expected to occur and how this could overlap with DEP and SEP.

565. Both NV and HP3 peak periods of construction are programmed to be complete by the end of 2023 (two years before DEP and SEP begin their peak construction). However, due to the nature of large infrastructure projects, slippage in the timeline is possible.

[10] Following completion of this CIA, the ruling of a Judicial Review brought against the Secretary of State for Business Energy and Industrial Strategy's (BEIS) decision to award a DCO for NV has been handed down. The decision to grant the order has been submitted to the Secretary of State for redetermination. BEIS will be considering its options, namely appeal or redetermination. Until such time as this process reached a conclusion it has been decided to maintain the NV/ NB cumulative assessment for stakeholder review.

566. It is assumed for the purposes of this CIA that NB Scenario 1 would proceed to construction, as NV has been granted consent for shared works for NB. Thus, NB Scenario 1 is predicted to occur between 2025 to 2027 with peak construction activity in 2026.

567. Based on the review of NV, NB and HP3 application documents the realistic temporal cumulative scenario would be DEP/SEP built concurrently in combination with NB Scenario 1 and HP3. For this scenario HP3 would have passed construction peak so it is proposed to apply a reduction factor to peak flows derived from the DCO application materials, or new information that may become available prior to finalising DEP and SEP DCO application submission.

26.7.6.4 Summary of CIA framework is provided in **Table 26-37.**

Table 26-37: Shortlisted Cumulative Projects Summary

Cumulative Project	CIA Status
Norfolk Vanguard (an offshore windfarm)	Not selected
Hornsea Project Three (an offshore windfarm)	Selected
Norfolk Boreas (an offshore windfarm)	Selected
A47 North Tuddenham to Easton RIS (a highway improvement scheme)	Under review
A47 Blofield to North Burlingham RIS (a highway improvement scheme)	Under review
A47/A11 Thickthorn junction improvement RIS (a highway improvement scheme)	Under review
Land West of Ipswich Road (‘Harford Triangle’)	Under review
Norwich Western Link (a highway improvement scheme)	Under review

26.8 Transboundary Impacts

568. There are no transboundary impacts with regard to traffic and transport as the onshore infrastructure is within the UK and is not located near to any international boundaries. Transboundary impacts are therefore scoped out of the assessment and are not considered further.

26.9 Inter-relationships

569. In order to address the environmental impact of the project as a whole, this section establishes the inter-relationships between traffic and transport and other physical, environmental and human receptors. The objective is to identify where the accumulation of impacts on a single receptor, and the relationship between those impacts, may give rise to a need for additional mitigation. **Table 26-38** summarises the inter-relationships that are considered of relevance to traffic and transport and identifies where they have been considered within this PEIR.

Table 26-38: Traffic and Transport inter-relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Construction			
The relationship between traffic delay and traffic related air quality upon local residents.	Chapter 24: Air Quality	Traffic data included in the assessment is presented in Chapter 24: Air Quality.	Traffic has the potential to temporarily affect air quality.
The relationship between traffic delay and traffic noise upon local residents.	Chapter 25: Noise and Vibration	Traffic data included in the assessment is presented in Chapter 25: Noise and Vibration.	Increased traffic has the potential to increase noise disturbance temporarily.
The relationship between an increase in traffic on the local demography	Chapter 29: Socioeconomics	Traffic data included in the assessment is presented in Chapter 29: Socioeconomics.	Traffic movements associated with construction may impact the local demography.
The relationship between traffic delay and traffic related emissions upon the health of local residents.	Chapter 30: Health	Traffic data included in the assessment is presented in Chapter 24: Air Quality and Chapter 30 Heath.	Traffic movements associated with construction may generate localised dust emissions leading to potential complaints.

570. The potential for inter-related human health impacts is assessed further in **Chapter 30 Health**.

26.10 Interactions

571. The impacts identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between impacts are presented in **Table 26-39**. This provides a screening tool for which impacts have the potential to interact. **Table 26-41** provides an assessment for each receptor (or receptor group) as related to these impacts.

572. Within **Table 26-41** the impacts are assessed relative to each development phase (phase assessment, i.e. construction, operation or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the level of impact upon that receptor. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across all development phases.

573. The significance of each individual impact is determined by the sensitivity of the receptor and the magnitude of effect; the sensitivity is constant whereas the magnitude may differ. Therefore, when considering the potential for impacts to be additive it is the magnitude of effect which is important – the magnitudes of the different effects are combined upon the same sensitivity receptor.

Table 26-39: Interaction between impacts - screening [does impact 1 affect the same receptor as impact 2, impact 3 etc y/n]

Potential Interaction between Impacts								
Construction								
	Severance	Pedestrian and Cyclist Amenity	Pedestrian and Cyclist Delay	Road Safety	Driver Delay (Capacity)	Driver Delay (Highway Constraints)	Driver Delay (Road Closures)	Abnormal Loads
Severance	-	Yes	Yes	Yes	Yes	Yes	No	No
Pedestrian and Cyclist Amenity	Yes	-	Yes	No	Yes	Yes	No	No
Pedestrian and Cyclist Delay	Yes	Yes	-	Yes	Yes	Yes	No	No
Road Safety	Yes	Yes	Yes	-	Yes	Yes	No	No
Driver Delay (Capacity)	Yes	Yes	Yes	Yes	-	Yes	No	No
Driver Delay (Highway Constraints)	Yes	Yes	Yes	Yes	Yes	-	No	No
Driver Delay	No	No	No	No	No	No	-	No

Potential Interaction between Impacts								
(Road Closures)								
Abnormal Loads	No	No	No	No	No	No	No	-
Operation								
No potential interaction between impacts are anticipated as there are no impacts associated with DEP and/or SEP								
Decommissioning								
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, potential interaction between impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.								

Table 26-40: Interactions between impacts - Phase and Lifetime Assessment

	Highest significance level				
Receptor	**Construction**	**Operation**	**Decommissioning**	**Phase assessment**	**Lifetime assessment**
All TTSA links	Minor adverse	No operational impacts	It is anticipated that the decommissioning impacts will be similar or less in nature to those of construction.	**No greater than individually assessed impact** The effects of Severance, Pedestrian and Cyclist Amenity, Pedestrian and Cycle Delay, Road Safety, Driver Delay (Capacity) and Driver Delay (Highway Constraints) have the potential to interact. However, the individual effects, are influenced by the same worst case traffic metrics ensuring a consistent evaluation of magnitude of effect and interrelationships are inherent in the impact assessments. Driver Delay (Road Closures) and Abnormal Loads do not have any interrelationships.	Following the construction phase there will be no impacts relating to Traffic and Transport effects

26.11 Potential Monitoring Requirements

574. Monitoring and enforcement requirements will be described in the OTMP and OTP submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction and taking account of the final detailed design.

26.12 Assessment Summary

575. This chapter has provided a characterisation of the existing environment for traffic and transport based on both existing and site specific survey data which has established that there will be some Minor Adverse residual impacts on all assessed environmental effects during construction.

Table 26-41: Summary of potential impacts on Traffic and Transport

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
Construction						
Impact 1: Severance	All links in the TTSA	Low – High	Negligible - Low	Negligible – Minor Adverse	N/A	N/A
Impact 2: Pedestrian and Cyclist Amenity:	Links 90, 130, 140, 142 and 148	Low	Negligible	Negligible	N/A	N/A
	Links 61 and 147	Medium	Negligible	Minor Adverse	N/A	N/A
	Link 66	Medium	Low	Minor Adverse	N/A	N/A
	Links 84, 138 and 156	High	Negligible	Minor Adverse	N/A	N/A
	Link 64	High	Low	Moderate Adverse	Introduction of enhanced mitigation measures (to be outlined in the OTMP)	Minor Adverse
	All other links in the TTSA	Low – High	Negligible	Negligible – Minor Adverse	N/A	N/A
Impact 3: Pedestrian and Cycle Delay	Links 1, 3-6, 15, 17-20, 22, 25, 27, 31-35, 37, 39-41, 44-47, 50-58, 62, 63, 65, 67, 69-75, 77-82, 85-95, 97-99, 101, 103-107, 109-111, 113-116, 118-	Low	Negligible	Negligible	Negligible	N/A

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	120, 122, 124-131, 134, 135, 137, 139, 140, 142-146, 148, 150-152, 154 and 155					
	Links 2, 10-14, 16, 21, 24, 26, 28-30, 36, 38, 42, 43, 49, 59, 61, 66, 96, 100, 108, 112, 117, 121, 123, 132, 133, 136 and 147.	Medium	Negligible	Minor Adverse	N/A	N/A
	Links 7-9, 23, 48, 60, 64, 68, 76, 83, 84, 102, 138, 141, 149, 153 and 156.	High	Negligible	Minor Adverse	N/A	N/A
Impact 4: Road Safety	Cluster sites 14 – 17, 21 and 22 – 24	Negligible	Negligible	Negligible	N/A	N/A
	Cluster sites 11, 18, 20, 25, 28 and 36	Low	Negligible	Minor Adverse	N/A	N/A
	Cluster sites 1 – 3, 4, 5, 7, 26, and 31	Medium	Negligible	Minor Adverse	N/A	N/A
	Cluster site 37	Medium	Low	Minor Adverse	N/A	N/A

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	Cluster sites 2, 6, 7, 9, 10, 12, 13, 19, 27, 29, 30, 32, 34 and 35	High	Negligible	Minor Adverse	N/A	N/A
	Cluster site 33	High	Low	Moderate Adverse	Specific targeted OTMP measures.	Minor Adverse
Impact 5: Driver Delay (Capacity)	Links 27-29, 36-39, 60, 66, 70, 91, 92, 108, 109, 111, 120, 132, 134-136, 139, 141, 143, 145, 146, 149, 150 and 155.	Low - High	Negligible	Negligible – Minor Adverse	N/A	N/A
	Links 16-23, 52, 77, 115, 133, 147, 151 and 153.	Low - High	Low	Further discussion with highway authorities to determine the scale of the driver delay capacity assessment to be incorporated in the DCO application.		
	Links 7, 8, 10, 12, 14, 24, 50, 53, 55, 57, 58, 61-65, 67-69, 71, 73-75, 81-84, 90, 93, 96, 98, 99, 101-104, 106, 107, 110, 112, 113, 116, 117, 119, 121, 130, 131, 137, 138, 140, 142, 144, 148, 152, 154 and 156.	Low - High	Medium			

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	Links 1-6, 9, 11, 13, 15, 25, 26, 30-35, 40-49, 51, 53, 54, 56, 59, 72, 76, 78-80, 85-87, 89, 94, 95, 97, 100, 105, 114, 118, 119 and 122-129.	Low - High	High			
	Sensitive junctions: • A47 / B1535 staggered junction (west of Honingham); • A47 / Taverham staggered junction (east of Honingham); • A47 / Dereham Road 'Easton' Roundabout • A11 / Station Lane junction;	High	Further discussion with highway authorities to determine the scale of the driver delay capacity assessment to be incorporated in the DCO application.			

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	• A11 / A47 'Thickthorn' grade separated roundabout; and • A47 / A140 'Harford' grade separated roundabout.					
Impact 6: Driver Delay (Highway Constraints)	Links 10, 50, 60, 62, 68, 81, 99, 101, 103, 108 – 110, 117 – 119, 131 – 137, 139, 143, 145, 146, 149, 151 – 153 and 155.	High	Negligible	Minor Adverse	N/A	N/A
	Links 7, 8, 12, 63, 83, 102 and 147.	High	Low	Moderate Adverse	Potential mitigation measures could include: • The widening of existing passing places, • The use of escort vehicles for HGVs, • Scheduling of works, • Travel Plan, and • Car sharing	Minor Adverse
	Links 58, 66, 82, 93, 116, 138, 142, 144, 148, 154 and 156	High	Medium	Major Adverse		
	Links 55, 64, 65, 84, 90, 128, 130, 140 and 155	High	High	Major Adverse		

Potential impact	Receptor	Sensitivity	Magnitude	Pre-mitigation impact	Mitigation measures proposed	Residual impact
	All other links in the TTSA	Low – Medium	Negligible	Negligible – Minor Adverse	N/A	N/A
Impact 7: Driver Delay (Road Closures)	Links with identified road crossings	Low to High	Negligible – High	Negligible – Major Adverse	Proposed mitigation: Diversion routes, Temporary widening, Controlling traffic through temporary traffic signals	Minor Adverse
Operation						
No operational impacts associated with DEP and/or SEP						
Decommissioning						
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided.						

26.13References

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