Norfolk Boreas Offshore Wind Farm

Chapter 24

Traffic and Transport

Environmental Statement

Volume 1

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Author: Royal HaskoningDHV

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Glossary of Acronyms

AADT	Annual Average Daily Traffic
AADF	Annual Average Daily Flow
AILs	Abnormal Indivisible Loads
AMP	Access Management Plan
ATC	Automatic Traffic Counts
CBS	Cement Bound Sand
CIA	Cumulative Impact Assessment
CoCP	Code of Construction Practice
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
DfT	Department for Transport
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ECR	Export Cable Route
ES	Environmental Statement
ETG	Expert Topic Group
GEART	Guidelines for the Environmental Assessment of Road Traffic
HDD	Horizontal Directional Drilling
HE	Highways England
HGV	Heavy Goods Vehicle
HVDC	High Voltage Direct Current
MA	Mobilisation Area
NATS	Norwich Area Transportation Strategy
NNDR	Norwich Northern Distributor Road
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Projects
OAMP	Outline Access Management Plan
OTMP	Outline Traffic Management Plan
OTP	Outline Travel Plan
PEIR	Preliminary Environmental Information Report
PIC	Personal Injury Collision
PPG	Planning Practice Guidance
RIS	Road Investment Strategy
SoS	Secretary of State
SRN	Strategic Road Network
TA	Transport Assessment
TC	Trenchless Crossing Point
TEMPro	Trip End Model Presentation Programme
TMA	Traffic Management Act

TMP	Traffic Management Plan
VWPL	Vattenfall Wind Power Limited
WCS	Worst Case Scenario

Glossary of Terminology

Cable logistics area	Existing hardstanding area to allow the storage of cable drums and associated materials and to accommodate a site office, welfare facilities and associated temporary infrastructure to support the cable pulling works.
Cable pulling	Installation of cables within pre-installed ducts from jointing pits located along the onshore cable route.
Control Point	A location that provides the checks and controls for the movement of HGVs and employees
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)
Ducts	A duct is a length of underground piping, which is used to house electrical and communications cables.
Highway Link	A road or section of road
Jointing pit	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	Where the offshore cables come ashore at Happisburgh South.
Landfall compound	Compound at landfall within which HDD drilling would take place.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Links	Sections of road with similar characteristics and traffic flows
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
National Grid new / replacement overhead line tower	New overhead line towers to be installed at the National Grid substation.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines.
National Grid substation extension	The permanent footprint of the National Grid substation extension.
National Grid temporary works area	Land adjacent to the Necton National Grid substation which would be temporarily required during construction of the National Grid substation extension.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard.
Onshore 400kV cable route	Buried high-voltage cables linking the onshore project substation to the Necton National Grid substation.
Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.

Onshore cables	The cables which take power and communications from landfall to the onshore project substation.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the project from landfall to grid connection.
Onshore project area	The area of the onshore infrastructure (landfall, onshore cable route, accesses, trenchless crossing zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modifications).
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Running track	The track along the onshore cable route which the construction traffic would use to access workfronts.
The Applicant	Norfolk Boreas Limited
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.
Transition pit	Underground structures that house the joints between the offshore export cables and the onshore cables
Trenchless crossing zone	Areas within the onshore cable route which will house trenchless crossing entry and exit points.
Vehicle (HGV, Traffic) movement	A single trip (i.e. either an arrival to, or departure from site) for the transfer of employees or goods.
Vehicle (HGV, Traffic) flow	Total vehicle movements on a road (highway link).
Workfront	A length of onshore cable route within which duct installation works will occur, approximately 150m.

24 TRAFFIC AND TRANSPORT

24.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the potential traffic and transport impacts of the Norfolk Boreas project (hereafter 'the project') in relation to the onshore project area.

2. This chapter provides an overview of the existing conditions and environment with regard to traffic and transport matters and assesses potential impacts on sensitive receptors during the construction, operation and decommissioning phases of the project. The proposed methodology adhered to for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) is discussed in section 24.4.

3. Vattenfall Wind Power Limited (VWPL) (the parent company of Norfolk Boreas Limited) is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas.

4. In order to minimise impacts associated with onshore construction works for the two projects, Norfolk Vanguard are seeking to obtain consent to undertake enabling works for both projects at the same time. However, Norfolk Boreas needs to consider the possibility that Norfolk Vanguard may not proceed to construction.

5. The EIA has been undertaken using the following two alternative scenarios (further details are presented in Chapter 5 Project Description) and an assessment of potential impacts has been undertaken for each scenario:

   - **Scenario 1** – Norfolk Vanguard proceeds to construction, installs ducts and other shared enabling works for Norfolk Boreas.
   - **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project

6. In accordance with the overarching National Policy Statement (NPS) for Energy EN-1, this chapter contains a 'Transport Assessment' to determine the significance of the project in the context of its traffic and transport effects.

7. It should be noted that the project's traffic and transport effects have the potential to impact on environmental receptors discussed in other chapters within the ES. The relevant chapters to consider are:

   - Chapter 25 Noise and Vibration;
   - Chapter 26 Air Quality;
   - Chapter 27 Human Health; and
   - Chapter 31 Socio-economics.

24.2 Legislation, Guidance and Policy

24.2.1 Legislation and Policy

8. There are a number of pieces of legislation applicable to traffic and transport. The following sections provide detail on key pieces of legislation which are relevant to this chapter.

24.2.2 National Policy Statements

9. The assessment of potential traffic and transport impacts has been made with specific reference to the NPSs. NPSs set out policies or circumstances that the UK Government consider should be taken into account when making decisions on Nationally Significant Infrastructure Projects (NSIP). All six energy NPSs received designation by the Secretary of State (SoS) for Energy and Climate Change on 19th July 2011. Those relevant to the project are:

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

10. For the specific assessment requirements for traffic and transport, only EN-1 is applicable. This is summarised in Table 24.1, together with an indication of where each stipulation is addressed.

Table 24.1 NPS assessment requirements

NPS requirement	NPS reference	ES Response
EN-1 Overarching NPS for Energy		
If a project is likely to have significant transport implications, the applicant's ES should include a Transport Assessment, using the NATA/ WebTAG methodology stipulated in Department for Transport (DfT) guidance, or any successor to such methodology.	Section 5.13.3	The chapter has been produced in accordance with current transport guidance and this is evidenced throughout this document.
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 24.7 outlines the mitigation measures for construction, such as car-share and Heavy Goods Vehicle (HGV) controls. These parameters have also been captured in an Outline Travel Plan (OTP) (Document reference 8.9) and an Outline Traffic Management Plan (OTMP) (Document reference 8.8) which has been submitted as part of the development consent order (DCO) application.

24.2.3 Local Planning Policy

11. 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.

12. The highway study area falls under the jurisdiction of Norfolk County Council and Suffolk County Council and would potentially include the following local authorities:

- North Norfolk District Council;
- South Norfolk District Council;
- Breckland Council;
- Broadlands District Council;
- Waveney District Council; and
- Norwich City Council.

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

14. South Norfolk District Council, Broadland District Council and Norwich City Council each use an individual adopted Local Plan, which includes the Joint Core Strategy (a partnership between Broadland, Norwich and South Norfolk Councils) (Greater Norwich Development Partnership, 2014). All three authorities supplement the Local Plan via individual Development Management Policies Documents.

15. Breckland Council are currently producing an Emerging Single Local Plan 2011-2036 (Breckland Council, 2017). This plan sets out strategic planning policies within Breckland which will replace the Core Strategy and suite of documents that make up the adopted Local Plan (Breckland Council, 2009).

16. Waveney District Council falls within the county of Suffolk and has recently produced the Waveney Local Plan which has been adopted on 20 March 2019 (Waveney District Council, 2019) and covers the period of 2014 to 2036. A number of policies exist within the adopted Development Management Policies Documents (Waveney Disctrict Council, 2011).

17. Table 24.2 provides details of the local planning policy documents and the policies contained within these which are relevant to traffic and transport.

Table 24.2 Relevant local planning policies

Document	Policy/guidance	Policy/guidance purpose
Norfolk County Council		
Local Transport Plan 3 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; • Due regard should be given to ecological networks and European designated sites; and • Impact assessments should be undertaken where necessary.
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; • 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 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 District Council		
Development Management Policies Document. **(South Norfolk District Council, 2015)**	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 • Facilitate the use of the Corridor of Movement for short local journeys.

Document	Policy/guidance	Policy/guidance purpose
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 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.
Emerging Single Local Plan Pre-Submission Publication August 2017	Policy TR01: Sustainable Transport Network	Major development proposals should include an assessment of the impacts of new development on the existing transport network. 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.
	Policy TR02: Transport Requirements	Development proposals that are likely to generate a significant number of heavy goods vehicle movements will be required to demonstrate by way of a Routeing Management Plan that no severe impacts will be caused to the efficient and safe operation of the road network and no material harm caused to the living conditions of residents.
Broadland District Council		
Development Management Policies Document. **(Broadland District Council, 2015)**	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.
Waveney District Council		
Waveney Local Plan – adopted March 2019	Policy 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.

Document	Policy/guidance	Policy/guidance purpose
		In consultation with the Highway Authority, the scale, location and nature of development will be considered in determining how the transport impacts of development should be assessed. Non-residential development will be considered on a case by case basis
Development Management Policies Document	Policy DM02 – Design Principles	Ensure access to the site that does not compromise highway safety and the traffic generated by the development is capable of being accommodated on the surrounding transport 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 (Broadland District Council, Norwich City Council and South Norfolk District Council)		
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) including construction of the Northern Distributor road; • Promoting improvements to the A11 and A47; and Continuing to recognise that in the most rural areas the private car will remain an important means of travel.

24.2.4 Further Policy and Guidance

24.2.4.1 Traffic Management Act

18. The Traffic Management Act (TMA) was introduced in 2004 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 authorities.

19. The TMA directs effective communication between highway authorities and parties interested in carrying out street work. The TMA encourages a disciplined approach and advance communication to plan the street works.

24.2.4.2 The Strategic Road Network and the Delivery of Sustainable Development Guidance

20. The Department for Transport (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.

21. Under the heading of 'Environmental Impact' Circular 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".*

22. 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."*

23. Under the heading of '*Access, The Strategic Road Network*' Circular 02/2013 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 movement of goods and people in support of economic growth by compromising traffic movement and flow"*
- *A presumption against new or intensification of access on the motorway network, however, "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 promoter will be expected to secure all necessary consents, and to fund all related design and construction works"*

24.2.4.3 Guidelines for the Environmental Assessment of Road Traffic

24. The Guidelines for the Environmental Assessment of Road Traffic (GEART) (Institute of Environmental Assessment, 1993) relate to the assessment of the environmental impacts of road traffic associated with new developments, irrespective of whether the developments are to be subject to formal EIAs.

25. 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. Further details on the assessment methodology undertaken for the project in relation to traffic and transport can be found in section 24.4 .

24.2.4.4 DfT Transport Assessment Guidance and Successors

26. The DfT Transport Assessment guidance referred to in NPS EN-1, was withdrawn in October 2014 and was replaced with the Department for Communities and Local Government (DCLG) Planning Practice Guidance (PPG). For the purpose of assessing the project's impact the relevant PPG is 'Travel Plans, Transport Assessment and Statements' (henceforth referred to as the Transport PPG).

27. 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 brought forward through collaborative ongoing working between the local 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.

28. The Transport PPG key principles have shaped the development of the ES and can be seen throughout the document.

24.3 Consultation

29. Consultation is a key driver of the EIA and is an ongoing process throughout the lifecycle of the project, from the initial stages through to consent and post-consent. Consultation regarding traffic and transport has been conducted through a Scoping Report (Royal HaskoningDHV, May 2017), a Traffic and Transport Method Statement (Royal HaskoningDHV, 2018, unpublished) and the Expert Topic Group (ETG) Meeting held in May 2018. Consultation has also been undertaken through the publishing of the Preliminary Environmental Information Report (PEIR) (Norfolk Boreas Limited, 2018) and subsequent public Drop In Events in November 2018. Feedback received during the process has been incorporated into this ES.

30. The ETG included transportation professionals from Norfolk County Council, Highways England and Norfolk Boreas Limited. Whilst not a member of the Group; Suffolk County Council were kept informed of developments, noting that the south-east tip of the study area encompassed two roads within their administration area.

31. As the majority of the onshore infrastructure for Norfolk Boreas and Norfolk Vanguard is co-located, the pre-application consultation undertaken for Norfolk Vanguard is relevant to both projects and has been used to inform the approach to this assessment. In addition, where possible any information supplied as part of the Norfolk Vanguard examination process, up to Deadline 5 (20th March 2019) has also be considered.

32. A summary of the consultation responses for Norfolk Boreas and information considered from Norfolk Vanguard are provided in Table 24.3 and Table 24.4 respectively. Further details of the project consultation process are presented within Chapter 7 Technical Consultation and in the Consultation Report (Document reference 5.1) which has been submitted with the development consent order (DCO) application.

Table 24.3 Norfolk Boreas Consultation responses

Consultee	Date received/ Document	Comment	Response / where addressed in the ES
Norfolk County Council and Highways England	21st May 2018 Norfolk Boreas ETG Meeting / Method Statement	The meeting re-capped on all the agreements secured during the development of the Norfolk Vanguard DCO application and agreed the commonality for the Norfolk Boreas assessment as follows: • Approach to deriving Traffic Demand; • Traffic distribution and assignment; and • Sensitive Junctions	Section 24.7
		Norfolk County Council noted that the minor access points for the cable pull stage have not been agreed and requested further details.	Figure 24.2.1 details the minor access routes.
		Norfolk County Council required Section 59 (Highways Act 1980) pre-condition surveys are undertaken prior to commencement of works.	The DCO application contains an OTMP (Document reference 8.8) which commits to pre-condition surveys.
		Norfolk County Council requested that consideration be given to the trenchless crossing of the A1067.	The DCO application contains an outline Code of Construction Practice

Consultee	Date received/ Document	Comment	Response / where addressed in the ES
			(CoCP) (Document reference 8.1) which commits to trenchless crossing locations following a review of traffic conditions.
		Highways England reiterated the need to agree an access strategy for the trenchless crossing of the A47.	The DCO application contains an Outline Access Management Plan (OAMP) (Document reference 8.8) that includes the proposed strategy.
Ingworth Parish Council	12th November 2018 PEIR response	Ingworth Parish Council noted concerns that an increase in traffic, particularly HGVs, through the village of Ingworth could weaken a 25 year old bridge with existing damage, already in need of work.	This is not a HGV haul route for Norfolk Boreas
Norfolk County Council	28th November 2018 PEIR response	Norfolk County Council noted concerns over the delivery of materials and plant to the cable installation locations occurring between 7am and 7pm which goes against avoidance of traffic sensitive times on some key routes.	Traffic sensitive routes with time restrictions have been identified in the OTMP (document reference 8.8), with a commitment to avoid those sensitive periods.
		Norfolk County Council noted that the PEIR indicated that the ES will incorporate a more detailed TA when submitted but in the meantime, the current methodology used to date is acceptable.	The ES contains a level of detail equivalent to a Transport Assessment (TA).
		Norfolk County Council requested that the CTMP contains a specific commitment to managing HGV movements on any specifically identified adverse links. Norfolk County Council noted that since opening of the NDR, traffic flows have increased on the A1067. To inform the DCO submission, a survey of traffic flows has been requested by Norfolk County Council to be undertaken on the A1067 during peak hours and an	The OTMP (document reference 8.8) contains the requisite commitments and sets out the proposed crossing technique for the A1067.

Consultee	Date received/ Document	Comment	Response / where addressed in the ES
		appropriate crossing method agreed.	
		Norfolk County Council requested that the developer confirms any cumulative impacts associated with all three wind farm projects utilising the same access route to the compound at Oulton airfield. Norfolk County Council have stated that they are holding an objection until this issue has been suitably addressed.	A Cumulative Impact Assessment contained within section 24.8 details a traffic management plan associated with these projects utilising the same access route to the compound at Oulton Airfield.
		Norfolk County Council advised that Vattenfall liaises with Highways England and Norfolk County to ensure that the planned cable route does not prevent any future major road plans in the area (such as dualling of the A47(T)) and result in additional costs and/or delay to road schemes. Where diversion is required to the cable route as a result of highway works, VWPL will be responsible for upgrades or diversion costs.	Engagement with Highways England has established that Norfolk Boreas does not conflict with any future widening schemes. Section 24.8.1.1 details all future major road plans and how they interact with Norfolk Boreas.
		Norfolk County Council advise that VWPL need to satisfy Highways England with regards to the safety of the proposed access at Necton onto the A47(T) and ensure Highways England assess the impact upon driver delay along the trunk road network.	A Substation Access Clarification Technical Note is contained in Appendix 24.33.
		Norfolk County Council requested that cumulative effects of traffic movements on narrow roads are considered. Specifically, the impact of increased traffic movements on the villages of Cawston, Salle and Heydon should be assessed.	A Cumulative Impact Assessment (CIA) is set out in section 24.8.
The National Trust	6th December 2018 PEIR response	The National Trust advise that the restriction of roads to, and around the Blickling Estate are avoided so to mitigate the potential loss of business for the National Trust.	The OTMP (document reference 8.8) contains measures specific to the Blickling Estate to mitigate

Consultee	Date received/ Document	Comment	Response / where addressed in the ES
		Where this is unavoidable, potential visitor income loss should be underwritten by VWPL. The impact of the proposed development on the local road network should be considered both individually, and in combination with other proposed wind farm developments such as Norfolk Vanguard and Hornsea Three.	the potential loss of business. A full Cumulative Impact Assessment (CIA) is set out in section 24.8.
North Norfolk District Council	6th December 2018 PEIR response	North Norfolk District Council have advised that the timing of construction works will be critical to minimising adverse highway impacts due to peak tourism months and narrow country roads already limiting opportunities for larger vehicles to pass one another.	The OTMP (Document reference 8.8) contains measures to ensure that the project's traffic can be safely accommodated on local roads ensuring minimal delay to road users. Timing restrictions on sensitive routes are also identified.
		North Norfolk District Council have advised that the likely adverse traffic impacts during the construction phase are properly captured and appropriately mitigated through Traffic Management Plans and Codes of Construction Practice. Specific consideration should be given to construction phasing and determining what will happen in the event of significant delay between first and second phases including construction compounds, temporary access routes and mobilisation works within North Norfolk.	The DCO application contains an OTMP (Document reference 8.8) that includes the proposed strategy for both duct installation and cable pulling phases.
Oulton Parish Council	11th December 2018 PEIR response	Oulton Parish Council have questioned whether the pilot scheme for routing traffic to and from the mobilisation and cable route 'The Street' is for all vehicles and how this can be achieved safely as the route is already used by agricultural vehicles.	A full Cumulative Impact Assessment is contained within section 24.8. A number of mitigation measures have been proposed for 'The Street' and agreed with Norfolk County Council. Further details are provided in the OTMP (document reference 8.8).

Consultee	Date received/ Document	Comment	Response / where addressed in the ES
Oulton Parish Council	11th December 2018 PEIR response	Oulton Parish Council questioned what mitigation measures have been considered for addressing the issue of large volumes of traffic passing a residential property; 'The Old Railway Gatehouse' as a result of Norfolk Boreas and Norfolk Vanguard. Specifically, Oulton Parish Council asked whether an alternative route will be considered to avoid passing the property.	A full Cumulative Impact Assessment is contained within section 24.8. A number of mitigation measures have been proposed for 'The Street'. and agreed with Norfolk County Council. Further details are provided in the OTMP (document reference 8.8).
Burgh and Tuttington Parish Council	11th December 2018 PEIR response	Burgh and Tuttington Parish Council have raised concerns on the potential traffic disruption along the local highway network around Colby and Banningham.	The OTMP (document reference 8.8) contains measures to ensure that the Project's traffic can be safely accommodated on local roads ensuring minimal delay to road users. Timing restrictions on sensitive routes are also identified.

Table 24.4 Norfolk Vanguard Consultation

Consultee	Date received / Document	Comment	Response / where addressed in the ES
Norfolk County Council	25th January 2017 Norfolk Vanguard First ETG Meeting	Requirement for an Access Management Plan (AMP) and Traffic Management Plan (TMP) was identified.	An OAMP (document reference 8.10) and Outline TMP (OTMP) (document reference 8.8) have been provided as part of the DCO application.
		Trenchless methods (e.g. HDD) to cross the A47, A140, A149. Open cut to be considered for other routes on a site by site basis and agreed with Norfolk County Council.	Commitment has been made to cross the A47, A140 and A149 via trenchless methods. Other sites under consideration are the B1149, B1145 and A1067 - details of the crossing techniques for these sites will be included in the final submitted Traffic Management Plan (TMP).
		Norfolk County Council advised that extended morning peaks (7:30am – 9am) may require traffic management restrictions.	This has been identified and considered in detailed peak hour capacity assessments as detailed in section 24.7.6.4.
		Norfolk County Council advised of their preference of routes not via local village centres.	Figure 24.11 and 24.14 details the HGV routes within the traffic and transport study area (which is

			identified in section 24.5.1) . The strategy has taken account of local village centres and has routed construction traffic away from these locations where practical.
Highways England	27th February 2017 Norfolk Vanguard ETG meeting	Traffic Distribution – a realistic worst case assessment that assumes that all onshore cable route sections will be active at the same time was outlined.	Stakeholders requested more detail on traffic derivation which informed the second meeting of the ETG. This information formed the basis of agreement of the derivation of project traffic demand by all stakeholders.
		Study Area – The study area was presented with an expected reduction in size once delivery routes had been agreed and traffic screening was finalised.	Agreed traffic and transport study areas contained within Figure 24.2 (Scenario 1) and 24.3 (Scenario 2)
		Access – Proposed existing access to the substation via Necton was presented. It was agreed that a review of the accident record would be undertaken if this facility was to be relied upon. Highways England explained that current policy does not prevent a new access from the A47 from being created, however, preference was for an existing access point to be utilised.	Following consultation with highway stakeholders, a technical note (and a subsequent clarification note) was produced which identified preferred access options based on an evaluation of road safety and environmental impact. The note was circulated to highway stakeholders and is presented in Appendix 24.33.
		Highways England noted that if the base port for [onshore] construction is to be Gt. Yarmouth, then assessments need to take account of Road Investment Strategy (RIS) schemes.	A sensitivity test of RIS schemes was subsequently agreed with Highways England as set out in section 24.7.
		Highways England stated that they do not accept Guidelines for the Environmental Assessment of Road Traffic (GEART) significance thresholds for assessing road safety and capacity.	GEART screening thresholds have not been applied to the effects of road safety and capacity.
Highways England	7th March 2017 Norfolk Vanguard EIA Traffic & Transport Method Statement Response	Impact on A47 at Necton issue raised requiring detailed analysis of traffic generation and a review of historic collisions.	Following consultation with highway stakeholders, a technical note (and a subsequent clarification note) was produced which identified preferred access options based on an evaluation of road safety and

			environmental impact. The note was circulated to highway stakeholders and is presented in Appendix 24.33.
		Impacts of HGVs on wider network (origin and destination) including a number of sensitive junction locations to be assessed.	Section 24.7 provides a full HGV derivation, including demand, distribution and assignment. Table 24.13 details sensitive junctions that have been subject to a detailed capacity assessment.
		Highway authorities to seek a formal commitment to use HDD method under the A47 and a review required for HGV access to the HDD site off the A47.	The DCO application contains an outline Code of Construction Practice (CoCP) (Document reference 8.1) and an OAMP (Document reference 8.10). which will commit to trenchless crossing locations and access arrangement respectively.
Highways England and Norfolk County Council	17th July 2017 Norfolk Vanguard ETG Meeting	Norfolk County Council / Highways England provided details of the sensitive junctions that would require further consideration of Driver Delay impacts.	Table 24.13 details the sensitive junctions that have been subject to a detailed capacity assessment.
		Norfolk County Council / Highways England raised concerns over potential cumulative effects resultant from Norfolk Vanguard construction traffic and proposed A47 Corridor Improvement Programme schemes.	Section 24.8 contains a full Cumulative Impact Assessment.
		Highways England raised concern that HGVs originate from Kings Lynn and Lowestoft. However, the flows would be assigned slightly differently if Great Yarmouth was selected as a source port.	Section 24.7 provides updated HGV derivation data, including that relating to Great Yarmouth assessed as an additional potential source port.
		Highways England requested further clarity on employee distribution for PEIR, specifically for distribution from the south of the study area.	Figures 24.8, 24.9 and 24.10 clarify distribution south of the traffic and transport study area with further points of access.
		Norfolk County Council suggested indicating 'red routes' that would ban HGVs from utilising the route.	The assessment identifies routes that would be unsuitable for project related HGV traffic.

		Norfolk County Council / Highways England provided details of sensitive junctions that would require further consideration of Driver Delay impacts.	Table 24.13 details the sensitive junctions that have been subject to a detailed capacity assessment.
		Queries raised relating to the existing National Grid substation extension site access and potential for a new access north of the site.	Following consultation with highway stakeholders, a technical note (and a subsequent clarification note) was produced which identified preferred access options based on an evaluation of road safety and environmental impact. The note was circulated to highway stakeholders and is presented in Appendix 24.33.
		Concerns raised for access off the A47 at the trenchless crossing location.	An OAMP (document reference 8.10) has been submitted with the DCO application which provides details of the proposed access arrangements.
Highways England	4th December 2017 Norfolk Vanguard PEIR Response	Link Sensitivity – concerns raised for the sensitivity of Links 64 and 65 in which it is proposed that they are to be taken forward for further assessment.	Links 64 and 65 have been assessed as 'medium' sensitivity.
		Trip Estimation – Highways England suggested the adoption of the latest version of TEMPro in the estimation of the background flows.	Trip End Model Presentation Programme (TEMpro) (version 7.2) utilised to derive growth factors.
		Road Safety – Highways England recommended a contingency for mitigation at collision cluster site 12 should be considered in the event of the A47 Blofield to North Burlingham RIS scheme being delayed.	Section 24.7 discusses mitigation proposals for cluster 12 in the event that the proposed RIS scheme is delayed.
		Junction Capacity – It is advised that junction capacity assessments may be considered for Junctions 1 (Gapton) and 2 (Vauxhall) in the event of the RIS construction programme being delayed.	Section 24.7 details a proportional approach to assessing capacity on Junction 1 and 2 in the event that the RIS schemes are delayed.
		Concerns raised relating to the substation access and cable crossing on the A47.	An OAMP (document reference 8.8) has been submitted with the DCO

			application which provides details of the proposed access arrangements.
Highways England and Norfolk County Council	25th January 2018 Norfolk Vanguard Traffic and Transport ETG Meeting	Norfolk County Council requested clarification in regard to the DCO transport documents.	An OAMP (document reference 8.10), OTMP (document reference 8.8) and OTP (document reference 8.9). have been provided in support of the DCO application.
		Norfolk County Council identified concerns regarding the A47 highway access.	Following consultation with highway stakeholders, a technical note (and a subsequent clarification note) was produced which identified preferred access options based on an evaluation of road safety and environmental impact. The note was circulated to highway stakeholders and is presented in Appendix 24.33.
		Highways England requested that junction sensitivity tests be undertaken if RIS scheme is not put forward or delayed.	Section 24.7 details a proportional approach to assessing capacity for impacted junctions in the event that the RIS schemes are delayed.
Norfolk County Council	November 2017 Norfolk Vanguard PEIR Response	The formal planning application, when submitted, must be accompanied by a Transport Assessment (TA). The TA will assess the effects of the anticipated traffic upon driver delay; severance; pedestrian delay; pedestrian amenity; accidents; road safety; and impact from abnormal loads. DCO requirements will also have commitments to agree a TMP, which will initially be submitted in outline, then completed and agreed when the contractor is appointed.	A Transport Assessment is contained within this Chapter. An OAMP (document reference 8.10) and OTMP (document reference 8.8) have been provided in support of the DCO application.
		An onshore substation will be required. The intention is to extend the Necton substation in an east-west direction with vehicular access provided from the A47(T). Traffic assessments for the A47(T) are issues for Highways England to comment upon and not Norfolk County	Following consultation with highway stakeholders, a technical note (and a subsequent clarification note) was produced which identified preferred access options based on an evaluation of road safety and

		Council. Nevertheless, Norfolk County Council has expressed concern with regard to the proposed access arrangements and has suggested that as a minimum, a full right turn lane be provided from the A47(T). An alternative access strategy from the A47(T) has also been proposed by the applicant, however Norfolk County Council has again raised safety concerns. Ultimately, access to the A47(T) for the proposed new substation is a matter for Highways England to assess and Norfolk County Council can only inform them of our concerns.	environmental impact. The note was circulated to highway stakeholders and is presented in Appendix 24.33.
		VWPL should work closely with Highways England and Norfolk County Council (Highway Authority) to ensure the proposed cable route does not fetter any future plans for the dualling of the A47(T).	Norfolk Boreas Limited will work with Highways England and Norfolk County Council post consent to ensure that the proposed onshore cable route construction works include suitable provision for existing or approved road developments.
		VWPL should ensure that the proposed underground cable route does not fetter any future highway improvement schemes in Norfolk and that where any reinforcement or diversion is needed to the cable route as a result of such highway works, that VWPL will be responsible for any upgrades or diversion of the cables and will fully meet the costs of these works.	

Table 24.5 Norfolk Vanguard DCO Examination Themes

Themes	Comments	Response / where addressed in the ES
Access arrangements to the onshore substation	Concerns raised by highway stakeholders (Highways England (HE) and NCC) relating to the onshore project substation and National Grid Substation Extension accesses on the A47.	Following consultation with highway stakeholders, a technical note (and a subsequent clarification note) was produced which identified preferred access options based on an evaluation of road safety and environmental impact. The note was circulated to highway stakeholders and is

Themes	Comments	Response / where addressed in the ES
		presented in Appendix 24.33.
A47 crossing arrangements	Concerns raised by highway stakeholders (HE and NCC) relating to the cable crossing on the A47.	An OAMP (document reference 8.10) has been submitted with the DCO application which provides details of the proposed access arrangements.
Additional Trenchless Crossing	Norfolk County Council raised concerns regarding A1067, B1145 and B1149	Commitment has been made to cross the A47, A140 and A149 via trenchless methods. Other sites under consideration are the B1149, B1145 and A1067 - details of the crossing techniques for these sites will be included in the final submitted Traffic Management Plan.
Cumulative Impacts	Norfolk County Council wanted clarification on how each of the project specific traffic demands associated with Hornsea Three, Norfolk Vanguard and Norfolk Boreas interact and result in cumulative impacts on the traffic and transport study area.	A full cumulative impact assessment has been undertaken in section 24.8.
Cawston	Concerns raised by NCC and residents of Cawston regarding the traffic impact through Cawston by Norfolk Vanguard, Norfolk Boreas and cumulatively with Hornsea Three.	A Cumulative Impact Assessment contained within section 24.8 details a traffic management plan associated with these projects utilising the same access route to the compound at Oulton Airfield.
Oulton	Concerns raised by NCC and Oulton Parish Council regarding the traffic impact on The Street at Oulton by Norfolk Vanguard, Norfolk Boreas traffic demand and cumulatively with Hornsea Three traffic demand.	A Cumulative Impact Assessment contained within section 24.8 details a traffic management plan associated with these projects utilising the same access route to the compound at Oulton Airfield.

24.4 Assessment Methodology

33. This section describes the methodology and impact assessment criteria used in the traffic and transport assessment, as consulted on and agreed via ETG meeting, the Scoping Report Opinion (Royal HaskoningDHV, May 2017) the Method Statement (Royal HaskoningDHV, 2018, unpublished) and the Norfolk Boreas Preliminary Environmental Information Report (Norfolk Boreas Limited, October 2018).

34. 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 transport specific methodologies (as prescribed in GEART) to inform a significance evaluation.

24.4.1 Scale of Assessment

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

    a. Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of Heavy Goods Vehicles (HGVs) is predicted to increase by more than 30%); and

    b. Rule 2: Include any other specifically sensitive areas where traffic flows (or HGV component) are predicted to increase by 10% or more.

36. 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."*

37. 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 this study.

38. The exception to the GEART rules is the consideration of the effects of driver delay and road safety. These effects can be potentially significant when high baseline traffic flows are evident, and a lower change in traffic flow can be potentially significant. Full details of the methodology adopted for these effects are set out in section 24.4.1.3 and 24.4.1.4.

39. GEART sets out consideration 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.

40. The following environmental effects have been identified as being susceptible to changes in traffic flow and are appropriate to the local area.

24.4.1.1 Severance

41. 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 both 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.

42. GEART suggests that changes in total traffic flow of 30%, 60% and 90% are considered to be 'slight', 'moderate' and 'substantial' respectively.

24.4.1.2 Pedestrian amenity

43. Pedestrian 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. The definition of amenity also takes into consideration pedestrian fear and intimidation, consideration of the exposure to noise and air pollution, and the overall relationship between pedestrians and traffic.

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

24.4.1.3 Road safety

45. 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 accident 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."*

24.4.1.4 Driver delay

46. GEART recommends the use of proprietary software packages to model junction delay and hence increased 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.

47. The ETG has identified sensitive junctions that require an assessment of potential delays for drivers during peak hours.

48. The assessment therefore seeks to disaggregate the peak hour traffic movements on to these junctions to facilitate a judgement of the potential significance of the driver delay effects.

24.4.1.5 Abnormal indivisible loads

49. The importing of large Abnormal Indivisible Loads (AILs) may lead to delays on the highway network. The construction of the onshore project substation is likely to require the delivery of up to eight supergrid transformers to the onshore project substation. An AIL access study has been undertaken for Norfolk Vanguard by Collet and Sons Ltd (Collet and Sons Ltd, 2018) and was submitted with the Norfolk Vanguard DCO application. It is considered that the findings for informing the management measures required to deliver AILs to the onshore project substation which will be accessed off the A47 for Norfolk Vanguard would be equally applicable for Norfolk Boreas. The AIL study has also been appended to the Outline Traffic Management Plan (OTMP) (document reference 8.8) submitted as part of the DCO application.

24.4.1.6 Other Impacts

50. Traffic-borne noise and vibration effects and air quality effects will be informed by the traffic data outlined in this chapter. These impacts are assessed in Chapter 25 Noise and Vibration and Chapter 26 Air Quality, respectively.

24.4.2 Magnitude

51. Table 24.6 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 of the impact magnitude.

Table 24.6 Traffic and Transport assessment framework

Effect	Magnitude of effect			
	Very low	**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 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		
Highway safety	Informed by a review of existing collisions patterns and trends based upon the existing personal injury collision records and the forecast increase in traffic			
Driver delay	Informed by projected traffic increases through sensitive junctions within the study area			

24.4.3 Highway Traffic Sensitive Receptors

52. The sensitivity of a road (link) can be defined by the type of user groups who may use it. A sensitive area may for example be a village environment or where pedestrian or cyclist activity may be high, for example in the vicinity of a school. Table 24.7 provides broad definitions of the different sensitivity levels which have been applied to the assessment.

Table 24.7 Link sensitivity

Sensitivity	Definition
Negligible	Routes of no importance to the assessment not included in study area.
Low	Few sensitive receptors and / or highway environment can accommodate changes in volumes of traffic
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines, etc.) and limited separation from traffic provided by the highway environment
High*	High concentrations of sensitive receptors (e.g. hospitals, schools, areas with high tourist footfall etc.) and limited separation provided by the highway environment

*High sensitivity links are considered to be 'specifically sensitive areas' for the purposes of GEART Rule 2

24.4.4 Other Receptors

53. To consider the effects on road safety and driver delay, areas with evidenced road safety patterns and congested junctions have been assigned an appropriate level of sensitivity informed by a detailed review of the baseline characteristics.

54. With respect to driver delay, the ETG has identified four junctions within the traffic and transport study area which are considered to be highly sensitive to changes in traffic.

- A12 Gapton Roundabout;
- A47 Vauxhall Roundabout;
- A149 Fuller's Hill Roundabout; and
- Junction of the A47 and the A1064.

55. The location of these junctions is shown in Figure 24.1 and the assessment discussed further in section 24.7.

24.4.5 Impact significance

56. Table 24.8 sets out the significance matrix which combines the initial impact assessment derived from the assessment framework presented in Table 24.6 with the sensitive receptor value for the purpose of determining the 'magnitude of impact'.

Table 24.8 Impact Significance Matrix*

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Very Low	Very Low	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*
	Very Low	*Minor*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*

*Beneficial magnitude matrix has been included for completeness, although it is not anticipated for traffic and transport impacts.

57. Note that for the purposes of this ES, 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 other non-significant impacts as they may contribute to significant impacts cumulatively or through interactions.

58. Embedded mitigation and existing commitments to good practice are included in the initial assessment of impact and are detailed in section 24.7. If the impact does not require mitigation (or none is possible) the residual impact remains the same. If additional mitigation is required there will be an assessment of the post-mitigation residual impact.

59. As with the definitions of magnitude and sensitivity, the matrix used for a topic is clearly defined by the assessor within the context of that assessment. The impact significance categories are divided as shown in Table 24.8.

24.4.6 Cumulative Impact Assessment

60. Chapter 6 EIA Methodology provides a general methodology with regards to the CIA.

61. The potential for cumulative effects has been considered for the construction, operation and decommissioning of the project cumulatively with other relevant projects.

62. Cumulative impacts are discussed where the onshore project area has the potential to 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.

63. The CIA involves consideration of whether impacts on a receptor can occur on a cumulative basis between the project and other activities, projects and plans for which sufficient information regarding location and scale exist.

64. For further details of the methods used for the CIA for traffic and transport, see section 24.8.

24.4.7 Transboundary Impact Assessment

65. There are no transboundary impacts with regard to traffic and transport as the onshore project 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.

24.5 Scope

24.5.1 Study Area

66. The project traffic and transport study area has been established through stakeholder engagement by determining the most probable routes for traffic for the movement of materials and employees.

67. Specifically, the traffic and transport study area has been established by assigning trip origins on the 'A' class road network and 'trip ends' at the onshore project area.

68. Two discrete assessment scenarios have been developed in context with the Scenario 1 and Scenario 2 project parameters and associated trip ends (as set out in Chapter 5).

69. The Scenario 1 assessment assigns the following trip ends:

- Landfall;
- Onshore project substation (including National Grid Extension works); and
- Jointing pit access points.

70. The Scenario 2 assessment assigns the following trip ends:

- Landfall;
- Onshore project substation;
- National Grid Extension works (including National Grid overhead line modification works; and
- Onshore cable route running track; mobilisation areas; trenchless crossing sites.

71. Whilst the traffic and transport study area is identical for both assessment scenarios, the differing trips ends necessitate two discrete access strategies as outlined below.

24.5.1.1 Scenario 1

72. The access strategy for the Scenario 1 assessment is illustrated in Figure 24.2 and is divided into a total of 108 discrete highway sections known as links. Links are sections of road with similar characteristics and traffic flows. For the purpose of the assessment the 108 links are split into two distinct categories based on their function within the project:

- Links 1a-79 represent the 'core' highway and serve to assign the project's traffic demand.
- Links A to V are minor links and serve to assign limited project traffic demand during the cable pulling and jointing stage. The minor links are connected via links 1a – 79.

24.5.1.2 Scenario 2

73. The access strategy for the Scenario 2 assessment is illustrated in Figure 24.3 and consists of only highway links 1a-79.

74. Note; routes that extend outside of the traffic and transport study area have been deemed to not be subject to significant adverse impacts and are therefore scoped out of the assessment.

24.5.1.3 Operation

75. During the operational phase of the project, traffic movements would be limited to those generated by the daily operation and periodic maintenance at the onshore project substation and at link boxes along the onshore cable route. No significant traffic impacts are anticipated during the operational phase therefore an operational traffic and transport assessment is scoped out. This approach was agreed with stakeholders during the ETG meetings.

24.5.2 Data Sources

24.5.2.1 Traffic flow Data

76. Traffic flow data has been captured for links 1a-65. The datasets that are to be used in the assessment are summarised in Table 24.9 and are presented graphically in Figure 24.4.

Table 24.9 Data Sources

Data	Year	Coverage	Confidence	Notes
Classified Annual Average Daily Traffic (AADT) counts	2015	1a, 1b, 2-4, 6-9, 11, 12, 13a, 13b, 14, 18, 19, 24, 26, 27, 29, 30, 40a, 40b, 44a, 44b, 45, 50, 53, 56, 57, 64 and 65.	High	Data sourced from the DfT which provides classified AADT traffic count data.
Classified Automatic Traffic Counts (ATC)	2017	15-17, 20-23, 25, 32-37, 41-43, 46-49, 52 and 61.	High	Traffic counts commissioned by Norfolk Vanguard Ltd which provide classified hourly and daily traffic count data.
AADT Traffic Flows	2012, 2017 and 2032	5, 28, 31, 38, 39, 51, 58-60, 62 and 63.	High	Data sourced and interpolated from the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) DCO Application*
Classified ATC	2016	10, 54 and 55	High	Traffic counts sourced from Norfolk County Council.
Classified ATC	2018	68	High	Traffic count sourced from Hornsea Project Three (Ørsted Hornsea Project Three, 2019)
Estimated Traffic Flow	2017	66, 67, 69 - 79, A-V	Medium	For links with limited project traffic demand, flows have been estimated based on data sources for similar links within the study area.

* Document 5.6 NNDR Traffic Forecasting Report: Volume 3 – Appendices H to K

77. A DCO application for the Norwich Northern Distributor Road (NNDR) was submitted on 7th January 2014. The SoS granted development consent on 2nd June 2015.

78. The NNDR completed construction and fully opened to traffic in May 2018. As such, the NNDR (recently renamed to the A1270 - Broadland Northway) has been included as part of the Norfolk Boreas traffic and transport study area.

79. As part of the NNDR DCO application, Document 5.6 - Traffic Forecasting Report was produced. The report describes the changes in traffic and network performance that are expected to occur with the implementation of the NNDR and the proposed transport interventions in the area. The data has been utilised to derive baseflows for 11 links within the traffic and transport study area.

80. Table 24.9 demonstrates that baseline traffic flow for 66 links within the study area have been captured. The remaining 35 links are based on estimated data as detailed within paragraph 86.

24.5.2.2 Personal Injury Collisions

81. In addition to the data sources listed in Table 24.9, a desktop assessment was undertaken which included consideration of Personal Injury Collision (PIC) data utilising street view and mapping data.

82. High level open source PIC data for the most recent three year period (1st January 2016 to 31st December 2018) was obtained for the study area from the website Crashmap (Crashmap, 2019).

83. Full PIC data has been obtained from Norfolk County Council for collision clusters identified by the high level Crashmap search.

24.5.3 Assumptions and Limitations

84. The traffic data has been collected from a combination of sources which include the DfT Traffic counts. However, DfT's traffic counts for individual road links are estimates, as they are not always based on up-to-date counts made at these locations. Where other more up-to-date sources of traffic data have been available, such as the commissioned classified automatic traffic counts (ATC), these have been used instead.

85. The DfT data utilised for the baseflows were taken from the 2017 counts which at the time of the production of this chapter was the latest available data. The traffic counts have been through a series of consultations, review and extensively agreed through the ETG.

86. The baseflows for 35 links have been estimated based on their location, characteristics and a comparison with adjacent link base flows which are of similar nature. There are a number of limitations when using estimated data such as over/under estimating the baseflows. Notwithstanding, it should be noted that the links that have estimated flows are of a minor status and thus have been predicted with low baseflows.

    The Crashmap website utilises data approved by the National Statistics Authority and reported on by the DfT each year. Incidents are plotted to within ten metres of their location and as such, can sometimes appear to be off the carriageway when interrogated in detail.

24.6 Existing Environment

87. Characterisation of the existing environment has been informed through a number of sources, including:

- Traffic count data from the DfT;
- Desktop studies and site visits;
- Personal injury collision data sourced utilising open source data;
- Traffic surveys commissioned by Norfolk Vanguard Limited; and
- Traffic count data from the Norfolk County Council, NNDR DCO application.

88. Within the traffic and transport study area, the principal highway network (managed by Norfolk County Council Highways) includes the A149, A140, and the A1067 whilst the A47 and A12 form part of the Strategic Road (Trunk Road) Network managed by Highways England. Management and maintenance of the road network within Norwich is undertaken by Norwich City Council.

89. A route hierarchy for the whole of Norfolk has been developed by Norfolk County Council (Norfolk County Council, 2017) 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 24.1.

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

24.6.1.1 A-roads (Trunk Roads and Principal Routes)

90. The A47 trunk route is identified in the Norfolk County Council Local Transport Plan (Norfolk County Council, 2011) as one of Norfolk's key strategic connections, forming part of the Trans-European Transport Network. The A47 provides the main east-west road connection and routes from Great Yarmouth to the Midlands and the north of England. Local to the study area, the A47 provides a key link between King's Lynn, Norwich and Lowestoft. The A47 is predominately a single carriageway road, widening to dual carriageway around the major urban areas (Norwich, Dereham, Swaffham and King's Lynn).

91. As part of Highways England's road investment strategy (RIS) six improvement schemes are proposed along the A47 corridor with an expected start date of 2019/2020. 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.

92. The influence of these schemes on the project is considered later in section 24.8 Cumulative Impacts.

93. 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.

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

95. The A12 trunk road 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.

96. 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 to Stalham, connecting to the A1151 and B1159.

97. The A1151 is a major road within the traffic and transport study area, providing links between Norwich, Hoveton and Stalham, as well as the A149.

98. 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.

99. The A1065 is a single carriageway road which connects the A47 at Swaffham to the A148 at Fakenham to the north.

100. Bounding the northern extent of the study area is the A148, a rural single carriageway that extends from Fakenham, through Holt and connects to Cromer. Links to the A1065, A1067, B1149 and A140 are all present along this route.

101. Heading north out of Norwich is the A140, a single carriageway A class road that by-passes Aylsham and connects to Roughton. Links to the A148 and A149 are present along this route allowing connection to the wider study area.

24.6.1.2 B-roads

102. A number of strategically important B class roads are located within, or offer access to, the wider study area. These main roads offer access to minor roads and lanes located along the onshore cable route.

103. 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.

104. Within the study area, 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.

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

106. Deviating off the A149 into Broomholm is the B1159, a single carriageway B class road located within the study area.

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

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

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

24.6.1.3 Other roads

110. Cromer Road, located off the A140 is a rural single carriageway that passes through Ingworth, a village north of Aylsham.

111. Located adjacent to the B1159 is Mill Common Road, a minor rural road located within the study area.

112. There are a total of 36 unclassified links which serve the final part of the journey to the onshore cable route (Local Access routes). These links typically have narrow carriageways and are subject to very low baseline traffic flows.

24.6.2 Traffic Flow Data

113. The baseline traffic flow data are summarised in Table 24.10 which includes the date and type of survey from which the data has been derived and detailed within Table 24.9.

Table 24.10 Existing daily traffic flows and associated data sources

Link ID	Link description	Total vehicles (24Hr AADT*)	Total HGVs (24Hr AADT*)	Data source, type and date
1a	A47	17,225	1,691	2017 DfT Annual Average Daily Flow (AADF)
1b	A47	17,225	1,691	2017 DfT AADF
2	A47	23,875	2,035	2017 DfT AADF
3	A47	47,728	2,855	2017 DfT AADF
4	A47	49,150	2,212	2017 DfT AADF
5	A47	43,300	1,959	NNDR Data
6	A47	20,524	1,269	2017 DfT AADF
7	A47	13,220	1,388	2017 DfT AADF
8	A146	12,313	670	2017 DfT AADF
9	A47	33,293	1,045	2017 DfT AADF
10	A47	26,533	599	November 2016 ATC
11	A1065	7,373	493	2017 DfT AADF
12	A1065	5,831	443	2017 DfT AADF
13a	A148	14,351	512	2017 DfT AADF
13b	A148	10,729	512	2017 DfT AADF
14	A148	11,222	515	2017 DfT AADF
15	B1145 – Litcham	1,725	35	April 2017 ATC
16	B1110/B1146 - Holt Road	7,344	83	April 2017 ATC
17	B1145 - Billingford Road	2,803	46	April 2017 ATC
18	A1067	8,021	572	2017 DfT AADF
19	A148	11,782	1,015	2017 DfT AADF
20	Mill Common Road	271	6	April 2017 ATC
21	B1147 - Etling Green	1,391	15	April 2017 ATC
22	B1147 - Dereham Road	2,137	20	April 2017 ATC
23	Northgate - from junction with B1146	1,725	35	April 2017 ATC
24	A1067	9,531	486	2017 DfT AADF
25	Elsing Lane	495	5	April 2017 ATC
26	A1074	22,302	996	2017 DfT AADF
27	A140	30,198	1,976	2017 DfT AADF
28	A140	21,400	1,217	NNDR Data

Link ID	Link description	Total vehicles (24Hr AADT*)	Total HGVs (24Hr AADT*)	Data source, type and date
29	A1067	11,973	830	2017 DfT AADF
30	A1067	10,469	669	2017 DfT AADF
31	A1067	18,200	537	NNDR Data
32	B1149 – Norwich road	4,043	75	April 2017 ATC
33	B1149 - Holt Road	5,274	162	April 2017 ATC
34	B1145 - west of Cawston	2,648	26	April 2017 ATC
35a	B1159 - Coast Road	3,236	29	April 2017 ATC
35b	B1159 - Coast Road	3,236	29	April 2017 ATC
36	B1149 - Holt Road	7,553	145	April 2017 ATC
37	B1145 - Cawston road	3,816	49	April 2017 ATC
38	A140 - Cromer Road	18,900	704	NNDR Data
39	A140 – Hevingham	14,400	597	NNDR Data
40a	A140 – Roughton	9,020	276	2017 DfT AADF
40b	A140 – Roughton	12,159	547	2017 DfT AADF
41	B1436 – Felbrigg	6,372	144	April 2017 ATC
42	B1145 - Reepham Road	2,265	18	April 2017 ATC
43	Cromer Road - Ingworth	983	3	April 2017 ATC
44a	A149	8,166	331	2017 DfT AADF
44b	A149	8,166	331	2017 DfT AADF
45	A149	6,495	337	2017 DfT AADF
46	B1145 - Lyngate Road	5,530	90	April 2017 ATC
47a	Bacton Road – North Walsham	1,949	16	April 2017 ATC
47b	North Walsham Road - Edingthorpe Green	1,949	16	April 2017 ATC
47c	North Walsham Road – Broomholm	1,949	16	April 2017 ATC
48	B1159 - Bacton Road	2,394	45	April 2017 ATC
49	B1159	3,469	64	April 2017 ATC
50	A1151	10,012	351	2017 DfT AADF
51	A1151	18,800	680	NNDR Data
52	A149 - Wayford Road	12,850	175	April 2017 ATC
53	A149	32,034	966	2017 DfT AADF
54	A149	25,239	551	November 2016 ATC

Link ID	Link description	Total vehicles (24Hr AADT*)	Total HGVs (24Hr AADT*)	Data source, type and date
55	A149	11,904	162	November 2016 ATC
56	A149	8,367	333	2017 DfT AADF
57	A149	8,517	476	2017 DfT AADF
58	NNDR - Link a	33,175	1,299	NNDR Data
59	NNDR - Link b	22,033	863	NNDR Data
60	NNDR - Link c	16,950	664	NNDR Data
61	B1436 - Roughton Road	4,451	103	April 2017 ATC
62	A1042	23,600	685	NNDR Data
63	A1151	13,900	525	NNDR Data
64	A12	9,712	542	2017 DfT AADF
65	A47	14,661	295	2017 DfT AADF
66	Wendling – Dereham Road	1,300	50	Estimated
67	North Walsham Road / Happisburgh Road	1,000	40	Estimated
68	The Street / Heydon Road	727	40	2018 HP3 ATC
69	Little London Road	500	20	Estimated
70	Plantation Road	1,000	40	Estimated
71	Vicarage Road / Whimpwell Street	2,000	70	Estimated
72	Dereham Road / Longham Road – Dillington	1,000	40	Estimated
73	Hoe Road South	800	30	Estimated
74	Mill Street, Elsing Road – Swanton Morley	800	30	Estimated
75	B1354 – Blickling	2,000	70	Estimated
76	High Noon Road / Church Road	500	20	Estimated
77	Hall Lane – North Walsham	500	20	Estimated
78	Bylaugh	500	20	Estimated
79	B1145 / Suffield Road	2,000	70	Estimated
A-V	No data has been captured for these minor links recognising the very low baseline flows.			
***Annual Average Daily Traffic**				

114. A proportional approach has been adopted for baseline data for links 66 – 79 (excluding link 68) and links A - V. It is forecast that the links will have low baseline traffic demand, therefore, it is reasoned that the effects relating to the volume of

traffic (i.e. Severance, Pedestrian Amenity, Noise and Air Quality) would be better informed by assessing total project quantum rather than magnitude of change. Adopting this approach, baseline traffic flow data would be superfluous.

24.6.3 Link Based Sensitive Receptors

115. All 108 highway links contained within the traffic and transport study area have been assessed and assigned sensitivity. Table 24.11 summarises the links and the rationale for the applied link sensitivity whilst Appendix 24.2 provides a full detailed breakdown per link. Figure 24.5 illustrates these routes graphically.

Table 24.11 Link based sensitive receptors

Link sensitivity	Link ID	Rational
Low	1a, 1b, 2-7, 9, 11, 13a, 16, 20-25, 30, 33, 35a, 35b, 37, 40a, 40b, 41, 43, 46, 47b, 52, 55, 57-60, 67, 68, 70, 73, 76, 77, 78, A, C, D, E, I, J, K, L, N, O, P, Q, S, T, U and V.	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	8, 10, 12,14, 17, 19, 26-29, 32, 34, 36, 38, 39, 42, 44a-b, 45, 50, 51, 53, 56, 61-66, 72, 74, 75, 79, B, F and R.	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	13b, 15, 18, 31, 47a, 47c, 48, 49, 54, 69, 71, G, H and M.	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.

24.6.4 Road Safety

116. 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 traffic and transport study area.

117. Recognising the sizeable extent of the traffic and transport study area, a proportional approach has been adopted in defining the road safety baseline involving the following stages:

- Stage 1: A high-level search of the traffic and transport study area utilising open source data[1] covering the most recent three year period of 2016 – 2018 to identify collision clusters. The collision cluster criteria has been based on Norfolk County Council's definition of *"five personal injury collisions occurring within a three year period in a 50 metre radius for built up areas and a 100 metre radius in non-built up areas"*[2]; and

[1] http://www.crashmap.co.uk/
[2] Community and Environmental Services, Norfolk County Council

- Stage 2: Further detailed STATS19[3] data have been obtained from Norfolk County Council for the five year period, 1st December 2013 to 30th November 2018. These datasets provide further information relevant to the collisions including information relating to the highway environment allowing more detailed assessment to be undertaken.

118. Table 24.12 provides a summary of all identified collision clusters within the traffic and transport study area for both scenarios; these are also shown graphically in Figure 24.6.

Table 24.12 Crashmap collisions cluster information

Link	Collision ref no.	Description	No. of collisions			
			Total	Fatal	Serious	Slight
2	1	A47 at the junction of Woodlane and Berrys Lane	**6**	**0**	**1**	**5**
2	7	A47 junction with Taverham Road and Blind Lane	**6**	**0**	**1**	**6**
2	8	A47 roundabout with Dereham Road	**5**	**0**	**1**	**4**
3	9	A47 roundabout with A11 Newmarket Road	**14**	**0**	**0**	**14**
3/4/8	6	A146 (Loddon Road) junction with slip road onto A47	**8**	**0**	**0**	**8**
5	10	A47 Cucumber Lane Roundabout	**11**	**0**	**2**	**9**
5	11	A47 Yarmouth Road	**5**	**0**	**1**	**4**
5	12	A47 North Bulringham	**11**	**0**	**2**	**9**
5/6	13	A47 New Road roundabout with A1064	**5**	**1**	**0**	**4**
6	14	A47 New Road	**9**	**0**	**2**	**7**
6	15	A47 junction with Branch Road	**5**	**0**	**0**	**5**
6/9/53	16	A47 / Acle New Road / Runham Road Roundabout	**5**	**0**	**0**	**5**
7	18	A47 Swaffham	**5**	**0**	**1**	**5**
9	17	A47 River Yare Bridge	**5**	**0**	**0**	**5**
9	19	A12 roundabout with Gapton Hall Road and Pasteur Road	**5**	**0**	**0**	**5**
10	20	A12 roundabout with Lowestoft Road	**6**	**0**	**0**	**6**
26	3	Dereham Road (A1074) at the junction of Larkman Lane and Marl Pit Lane	**5**	**0**	**0**	**5**
26	21	Dereham Road (A1074) roundabout with Breckland Road	**5**	**0**	**1**	**4**
26/27	2	A140, A1074 and Dereham Road (A1074) roundabout	**7**	**0**	**2**	**5**
27	4	A140 at the junction of Hellesdon Hall Road	**6**	**0**	**2**	**4**
39	22	A140 (Hevingham) junction with Church Street	**6**	**0**	**1**	**5**

[3] 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).

Link	Collision ref no.	Description	No. of collisions			
			Total	Fatal	Serious	Slight
53/54	23	A149 Acle New Road roundabout with Fuller's Hill	**6**	**0**	**1**	**5**
62/63	5	A1052 (Chartwell Road) Roundabout with the A1151 (Wroxham Road and Sprowston Road) and Mousehold Lane	**5**	**0**	**0**	**5**

119. Table 24.12 details that almost 90% of all collisions within the identified collision clusters resulted in slight injuries with no fatalities recorded.

24.6.5 Sensitive Junctions

120. During extensive consultation with Norfolk County Council and Highways England (section 24.3) the junctions that are potentially sensitive to the changes in traffic have been identified as those junctions presented within Table 24.13 and as detailed on Figure 24.1.

Table 24.13 Junctions identified as sensitive to changes in traffic

Junction notation	Location	Junction description	Junction type
Junction 1	Great Yarmouth	Junction of the A47 and Gapton Hall 'Gapton Roundabout'	Four arm roundabout with partial signal control
Junction 2	Great Yarmouth	Junction of the A47 and the A149 'Vauxhall Roundabout'	Four arm roundabout
Junction 3	Great Yarmouth	Junction of the B1141 and the A149 'Fuller's Hill Roundabout'	Four arm roundabout
Junction 4	Acle	Junction of the A47 and A1064	Four arm roundabout

121. Junctions 1, 2, and 4 form part of the Strategic Road Network (SRN) and are managed by Highways England. Junction 3 falls under Norfolk County Council's jurisdiction.

122. Junctions 1 and 2 are currently included within the A47 corridor improvement programme as part of the RIS schemes announced in 2014. Further discussion on the RIS schemes is contained in section 24.7.6.4.1.

123. The A47 corridor improvement programmes are classified as NSIP which would require DCO. Current timescales estimate that the DCO applications for these schemes will be submitted in 2019 or 2020 (depending on the scheme), with construction starting from April 2021 (see Table 24.45 for details).

24.6.6 Anticipated Trends in Baseline Conditions - Future Year Traffic Flows

124. To take account of sub-regional growth in housing and employment, vehicle flows have been factored into the future year baseline traffic demand using the DfT Trip

End Model Presentation Programme (TEMPro) Version 7.2 with data set 7.2 for Norfolk geographical areas. Background traffic flows for 2026 (Scenario 1) are presented in Appendix 24.3. Background traffic flows for 2023 (Scenario 2) are presented in Appendix 24.18.

24.7 Potential Impacts

125. The EIA has been undertaken for the following two alternative scenarios, therefore an assessment of potential impacts has been undertaken for each scenario:

- **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
- **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project

126. The assessment for traffic and transport identifies the period when the maximum traffic will be generated for each scenario, notated as Scenario 1 - Worst Case Scenario (S1-WCS) and the Scenario 2 – Worst Case Scenario (S2-WCS).

127. The S1 and S2 WCS traffic demand have been developed by examining:

- The likely minimum construction programme;
- The earliest commencement date;
- Demand for materials and personnel;
- Likely shift patterns;
- Likely delivery windows; and
- The distribution of traffic.

128. Section 24.7.2 sets out the parameters and assumptions that together inform the S1-WCS, with section 24.7.3 informing the S2-WCS.

24.7.1 Embedded Mitigation

129. Norfolk Boreas Limited has committed to a number of techniques and engineering designs/modifications inherent as part of the project, during the pre-application phase, in order to avoid a number of impacts or reduce impacts as far as possible. Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process.

130. A range of different information sources have been considered as part of embedding mitigation into the design of the project including engineering requirements, feedback from communities and landowners, ongoing discussions with stakeholders and regulators, commercial considerations and environmental best practice.

131. With specific regard to traffic and transport, the assessment has been a culmination of an interactive process with the project engineering consultants. This involved developing construction methodologies, undertaking a preliminary impact assessment and revising as necessary to minimise the potential impacts. This has led to a comprehensive suite of 'designed in' mitigation measures to addresses potential significant traffic and transport impact before it can manifest.

132. The following sections outline the key embedded mitigation measures relevant for this assessment. These measures are presented in Table 24.14. Where embedded mitigation measures have been developed into the design of the project with specific regard to traffic and transport, these are described in Table 24.15.

Table 24.14 Embedded mitigation

Parameter	Mitigation measures embedded into the project design	Notes
Project Wide		
Commitment to High Voltage Direct Current (HVDC) technology	Commitment to HVDC technology minimises environmental impacts through the following design considerations; • HVDC requires fewer cables than the HVAC solution. During the duct installation phase in Scenario 2 this reduces the cable route working width to 35m from the previously identified worst case of 50m. As a result, the overall footprint of the onshore cable route required for the duct installation phase is reduced from approx. 300ha to 210ha; • The width of permanent cable easement is also reduced from 25m to 13m; • Removes the requirement for a cable relay station; • Reduces the maximum duration of the cable pulling phase from three years down to two years; • Reduces the total number of jointing bays for Norfolk Boreas from 450 to 150; and • Reduces the number of drills needed at trenchless crossings (including landfall).	Norfolk Boreas Limited has reviewed consultation received and in light of the feedback, has made a number of decisions in relation to the project design. One of these decisions is to deploy HVDC technology as the export system.
Site Selection	The project 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 the onshore project substation and National Grid infrastructure, a preference for the shortest route length (where practical) and developing construction methodologies to minimise potential impacts.	Constraints mapping and sensitive site selection to avoid a number of impacts, or to reduce impacts as far as possible, is a type of primary mitigation and is an inherent aspect of the EIA process. Norfolk Boreas Limited has reviewed consultation received to inform the site selection

Parameter	Mitigation measures embedded into the project design	Notes
	Key design principles from the outset were followed (wherever practical) and further refined during the EIA process, including; • Avoiding proximity to residential dwellings; • Avoiding proximity to historic buildings; • Avoiding designated sites; • Minimising impacts to local residents in relation to access to services and road usage, including footpath closures; • Utilising open agricultural land, therefore reducing road carriageway works; • Minimising requirement for complex crossing arrangements, e.g. road, river and rail crossings; • Avoiding areas of important habitat, trees, ponds and agricultural ditches; • Installing cables in flat terrain maintaining a straight route where possible for ease of pulling cables through ducts; • Avoiding other services (e.g. gas pipelines) but aiming to cross at close to right angles where crossings are required; • Minimising the number of hedgerow crossings, utilising existing gaps in field boundaries; • Avoiding rendering parcels of agricultural land inaccessible; and • Utilising and upgrading existing accesses where possible to avoid impacting undisturbed ground.	process (including local communities, landowners and regulators) and in response to feedback, has made a number of decisions in relation to the siting of project infrastructure. The site selection process is set out in Chapter 4 Site Selection and Assessment of Alternatives.
Long HDD at landfall	Use of long HDD at landfall to avoid restrictions or closures to Happisburgh beach and retain open access to the beach during construction. Norfolk Boreas Limited have also agreed to not use the beach car park at Happisburgh South.	Norfolk Boreas Limited has reviewed consultation received and in response to feedback, has made a number of decisions in relation to the project design. One of those decisions is to use long HDD at landfall.
Scenario 1		
Strategic approach to delivering Norfolk Vanguard and Norfolk Boreas	Subject to both Norfolk Vanguard and Norfolk Boreas receiving development consent and progressing to construction, onshore ducts will be installed for both projects at the same time, as part of the Norfolk Vanguard construction works. This would allow the main civil works for the cable route to be completed in one construction period and in advance of cable delivery, preventing the requirement to reopen the land in order to minimise disruption. Onshore cables would then be pulled through the pre-installed ducts in a phased approach at later stages.	The strategic approach to delivering Norfolk Vanguard and Norfolk Boreas has been a consideration from the outset of the project.

Parameter	Mitigation measures embedded into the project design	Notes
	In accordance with the Horlock Rules, the co-location of Norfolk Vanguard and Norfolk Boreas onshore project substations will keep these developments contained within a localised area and, in so doing, will contain the extent of potential impacts.	
Scenario 2		
Duct Installation Strategy	Under Scenario 2 the onshore cable duct installation strategy is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on a short length (approximately 150m section) 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 disruption.	This has been a very early commitment. Chapter 5 Project Description provides a detailed description of the process.
Trenchless Crossings	Under Scenario 2 a commitment to trenchless crossing techniques to minimise impacts to the following specific features; • Wendling Carr County Wildlife Site; • Little Wood County Wildlife Site; • Land South of Dillington Carr County Wildlife Site; • Kerdiston proposed County Wildlife Site; • Marriott's Way County Wildlife Site / Public Right of Way (PRoW); • Paston Way and Knapton Cutting County Wildlife Site; • Norfolk Coast Path; • Witton Hall Plantation along Old Hall Road; • King's Beck; • River Wensum; • River Bure; • Wendling Beck; • Wendling Carr; • North Walsham and Dilham Canal; • Network Rail line at North Walsham that runs from Norwich to Cromer; • Mid-Norfolk Railway line at Dereham that runs from Wymondham to North Elmham; and • Trunk/Principal Roads including A47, A140, A149.	A commitment to a number of trenchless crossings at certain sensitive locations was identified at the outset of the Project. However, Norfolk Boreas Limited has committed to certain additional trenchless crossings as a direct response to stakeholder requests.

Table 24.15 Embedded mitigation for traffic and transport

Parameter	Embedded mitigation for traffic and transport	Applicable to Scenario 1	Applicable to Scenario 2
Mobilisation Areas	Mobilisation areas located close to main A-roads where possible, minimising impacts upon local communities and utilising the most suitable roads. Mobilisation areas located away from population centres where practical to reduce impact on local communities and population centres.	✗	✓
Duct Installation	Suitable access points and identification of optimum routes for construction traffic to use. This minimises impacts on sensitive receptors.	✗	✓
Cable Pulling and Jointing Stage access	Suitable side accesses and road crossing locations reviewed from initial schedule of 200+ access points to 70+ realistic potential access points to minimise local route impacts.	✓	✓
HGV Vehicle Movement	Construction of an (up to) 6m wide running track with a maximum approximate length of 60km. This would reduce the number of access points required and HGV movements on the local road network.	✓ (12km)	✓ (60km)
	Consolidating HGVs at mobilisation areas to reduce vehicle movements along more sensitive local routes.	✓ (Ma1b only)	✓
	Carefully selected delivery routes utilising predominately A and B-roads acknowledging the sensitive receptors within the traffic and transport study area. Management measures to control timing of deliveries.	✓	✓
Employee Vehicle Movement	Consolidating onshore cable route section construction employee movements at mobilisation areas. Onward travel along the running track to place of work reducing vehicle movements along local routes.	✓ (Ma1b only)	✓

24.7.2 Scenario 1 - Worst Case

24.7.2.1 Scenario 1 - Construction Programme

133. Table 24.16 details the Scenario 1 project construction programme for a two phase cable pulling approach. In the two phase option, cables are installed in two consecutive years to facilitate the commissioning of the offshore wind turbine planting. For further details on the phasing please refer to Chapter 5 Project Description.

134. The cable pulling work period represents the maximum construction intensity period in terms of traffic generation and therefore informs the S1-WCS.

Table 24.16 Indicative project construction programme under Scenario 1

Activity	Year					
	2022	2023	2024	2025	2026	2027
Landfall						
Duct Installation Option A*						
Duct Installation Option B*						
Cable pulling, jointing and commission						
Phase 1						
Phase 2						
Onshore Cable Route						
Cable pulling, jointing and commission						
Phase 1						
Phase 2						
Onshore Project Substation						
Preconstruction works						
Primary works						
Electrical plant installation and commission						
Phase 1						
Phase 2						

*Two potential options for landfall duct installation: Option A install ducts prior to cable pulling; and Option B install ducts at the same time as Norfolk Vanguard.

135. The onshore cable pulling works are programmed for a two year period (2026-2027). The construction traffic derivation for the cable pulling phase includes a four month break in traffic movements during the winter period. The break in traffic movements informs the S1-WCS by condensing traffic movements into a shorter construction time period and thereby increasing daily movements. In real terms, a four month break is unlikely, however, the traffic derivation serves to simulate the accelerated working required to ensure construction keeps to the two year programme in the event of prolonged inclement weather.

136. It is considered that the earliest date that the cable pulling could commence would be 2026; as such a reference year for background traffic of 2026 has been derived (refer to section 24.6.6) for the purpose of the Scenario 1 assessment. Background traffic flows for 2026 are presented in Appendix 24.3**.**

137. 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. Network peaks will be identified for all the critical junction locations to inform the S1-WCS.

138. The delivery of materials and plant to the cable pulling locations could occur between a typical 7am to 7pm delivery window. To account for breaks in deliveries such as lunch breaks and rest breaks, the HGV construction traffic would be profiled over a ten hour period resulting in a worst case higher hourly HGV flows.

139. To further inform the S1-WCS, it is proposed that delivery intensity is informed by a five day week (Monday to Friday 7am to 7pm) noting that the normal hours under the DCO also include Saturday working (7am to 1pm) with the potential to extend to a seven day working week only during 'essential work' as defined by the DCO.

24.7.2.2 Scenario 1 - Worst Case Traffic Demand

24.7.2.2.1 Scenario 1 - HGV Traffic Demand

140. Details of materials, plant, and timescales for the project have been informed by work undertaken by the project engineering consultants. Appendix 24.4 details the forecasts associated with the expected quantity of materials, plant and total HGV deliveries for each of the components of the onshore project area associated with the S1-WCS. Detail of the associated cable pulling traffic derivation is contained in Appendix 24.5.

141. Appendix 24.6 details the indicative maximum traffic generation forecasts broken down for each component of the onshore project area.

24.7.2.2.2 Scenario 1 - Peak HGV Construction Demand

142. Appendix 24.7 shows the disaggregation of components of the Scenario 1 onshore project area traffic demand (contained within Appendix 24.4 and 24.6) by activity over time (per component of the onshore project area). This data facilitates the derivation of total deliveries and HGV movements per day.

143. It is assumed that all cable pulling activities would be concentrated within a single year (2026). A total of 16 work gangs will construct jointing pits at 96[4] evenly spaced locations approximately 800m apart over 16 equidistant (3.8km) onshore cable route sections. Each work gang would complete six jointing pit locations in series with each jointing pit location constructed within an indicative five week construction programme with the worst case traffic demand occurring in week one.

144. To ensure the assessment considers the maximum impacts in the traffic and transport study area, it is necessary to assign the traffic demand for a total of 16

[4] The 96 jointing pits are derived from the cable route length (60km) / typical cable lengths (800m) equalling 75 jointing pit locations as detailed in Chapter 5 Project Description. A 20% contingency has been added to each of the 16 equidistant cable sections resulting in a final total of 96 jointing pit locations.

cable route sections to the network (assumed to be concurrently working at peak intensity). This method has the advantage of assessing the peak impact on all minor links and is therefore appropriate for screening traffic and transport effects.

24.7.2.2.3 Scenario 1 - Contingencies

145. To ensure that minor omissions and uncertainties in design can be accommodated within future assessed traffic flows, a 20% contingency has been applied to all onshore infrastructure HGV flows.

24.7.2.2.4 Scenario 1 - Employee Traffic Demand

146. The project engineering consultants have provided details of the expected resourcing requirements during the Scenario 1 worst case peak construction at each of the onshore infrastructure components. Based on this input, it is estimated that a workforce of 180 employees will be required during construction peaks serving cable route sections and the onshore substation. This information is set out in Appendix 24.7.

147. It is envisaged that construction employees will work during the hours of 7am to 7pm.

148. Table 24.17 summarises the total onshore infrastructure component's employee demand to be assessed.

Table 24.17 Scenario 1 employee summary per infrastructure component

Infrastructure component	ES assessed employees	Notes
Cable pulling	170	16 concurrent cable route sections
Onshore project substation	10	Lower intensity, latter stages of the onshore project substation programme
Totals	180	

149. In recognition of the large geographical area and rural nature of the traffic and transport study area it has been assumed, as a worst case, that all construction employees travel by car. To be conservative, no allowance has been made for the opportunities for employees to car share, walk and cycle or use public transport. Measures to encourage mode shift / vehicle share are included in the outline travel plan (OTP) (document reference 8.8) submitted as part of the DCO application.

24.7.2.2.5 Scenario 1 - Summary of Traffic Demand Assumptions

150. The key assumptions that have informed the construction traffic demand WCS are summarised in Table 24.18.

Table 24.18 Scenario 1 WCS traffic demand assumptions

Construction parameters
The cable pulling activity (programmed for 2026-2027) would generate the highest construction intensity with the maximum project demand for delivery of materials and transportation of personnel anticipated during this period.
The cable pulling activities would be concentrated within a single year (2026), thereby condensing project traffic movements into a shorter period.
A total of 16 cable route sections working concurrently at maximum intensity
The cable pulling activity would be subject to a four-month winter break, thereby condensing project traffic movements into a shorter period.
Earliest start of construction 2026.
7am to 7pm working day with a reduced ten hour delivery window.
Five day working week (Monday – Friday).
An appropriate level of contingency (20%) reflecting the uncertainties in the design has been applied to all cable pulling and substation material quantities.
A contingency of 20% has been applied to the 75 jointing pit locations in the event that the 800m jointing pit separation cannot be achieved. This results in 96[5] jointing pit locations being assessed.
Traffic Derivation
A maximum of 70% of the project traffic demand would be generated from a single port location to reflect the 'distance deterrent' for supply to the extreme east of the onshore cable route from a western supply chain origin and vice versa.
No reduction to project traffic applied for construction workers to allow for travel by non-car modes (e.g. bus, rail, walking and cycling) or travel. Sustainable Travel mode share will be determined by the Project Travel Plan.
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. To assess the worst case highway capacity impacts, workers are assumed to arrive /depart during the network peak hours.

24.7.2.3 Scenario 1 - Traffic Distribution

151. At present, 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, after the DCO has been determined. The following sections describe the assumptions that have been adopted to inform the distribution of HGV and construction employee traffic.

24.7.2.3.1 Scenario 1 - HGV Distribution

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

153. A review of the potential supply chain within the traffic and transport study area indicates that while there are a number of local suppliers that may meet some of Norfolk Boreas's demand, they are unlikely to meet the substantive material demands required of the project.

[5] The 96 jointing pits are derived from the cable route length (60km) / typical cable lengths (800m) equalling 75 jointing pit locations as detailed in Chapter 5 Project Description. A 20% contingency has been added to each of the 16 equidistant cable sections resulting in a final total of 96 jointing pit locations.

154. A viable alternative for sourcing bulk materials would be to import materials from the ports local to the project. Kings Lynn Port to the west and Lowestoft / Great Yarmouth Ports to the south-east are considered to be the most likely source for all materials with appropriate facilities to import and offload construction materials and, as such, it is assumed that all HGV movements would have an origin and destination in these regions (noting that in practice, some of the demand could be met by local supply chain). The relevant port locations are presented graphically in relation to all onshore infrastructure locations in Figure 24.7.

155. A single port could have the capacity to provide all required materials for the project, 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'. Rather, it is considered reasonable to assume that two ports (one from the south-east, and one from the west) would be utilised for importing materials.

24.7.2.3.2 Scenario 1 - Delivery Locations

156. Figure 24.7 details the onshore project area. The site delivery strategy is as follows:

- Onshore cable corridor: Delivery of plant and materials would be direct to each jointing pit location, which are placed approximately every 800m along the 60km onshore cable corridor; and
- Onshore project substation: Deliveries would occur directly to the temporary construction compound at the substation site.

24.7.2.3.3 Scenario 1 - Employee Distribution

157. The availability of local labour and rented accommodation has been reviewed as part of the socio economics study (as detailed in Chapter 31 Socio-economics) to inform the potential construction employee distribution.

158. The types of specialist skills required for the project mean that construction personnel often have to be drawn from across the UK since they are unable to rely solely on local labour sources. Socio-economic data estimates have informed the broad assumption that 30% of the workforce would be drawn from the local area (resident) and 70% would be beyond a daily commute (in-migrant).

159. In-migrant personnel i.e. who reside beyond a reasonable daily commute (defined as up to a 45 minute drive to the onshore infrastructure sites) are likely to base themselves within local rented accommodation. To inform the distribution of labour from outside Norfolk, the availability of local rented accommodation within commuting distances of the project has been captured.

160. In informing the distribution of the employees who potentially could be drawn from the local area (resident workers), the socio economics study has examined the

distribution of residents within the local area (defined as a 90 minute drive to the onshore infrastructure sites) with the relevant skill sets. A 90 minute drive time has been selected for residents as they are more likely to travel further for available work.

161. In acknowledgement of the large geographical study area, three destination locations have been proposed for specific components of the onshore project area and are listed below:

- Origin Data Set A – based on a 45 minute and 90 minute drive time to the onshore project substation location in the vicinity of Necton;
- Origin Data Set B – based on 45 minute and 90 minute drive time to a central point along the onshore cable route in the vicinity of Cawston; and
- Origin Data Set C – based on a 45 minute and 90 minute drive time to the landfall location in the vicinity of Happisburgh.

162. The distribution of local rented accommodation per post code cluster is outlined within Appendix 24.8. The distribution of 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 (taken from a route planner) from the centre of the postcode cluster to either Origin Data Set A, B or C.

163. Appendix 24.8 also assigns each postcode cluster a point of entry on to the highway network to inform the distribution of available workforce from outside Norfolk.

164. The distribution of local available workforce per postcode cluster is outlined within Appendix 24.9. This has been factored using a gravity model approach, whereby the number of available workforce is divided by the journey time (taken from a route planner) from the centre of the postcode cluster to either Origin Data Set A, B or C.

165. Appendix 24.9 also assigns each postcode cluster a point of entry on to the highway network to inform the distribution of local available workforce.

166. Appendix 24.10 provides a summary of the traffic and transport study area point of entry links and their corresponding percentage distribution for resident and in-migrant employees from outside Norfolk.

167. Figures 24.8, 24.9 and 24.10 graphically depict the percentage distribution for resident and in-migrant employees point of entry onto the highway network for Destinations A, B and C respectively.

24.7.2.4 Scenario 1 - Construction Traffic Assignment

24.7.2.4.1 Scenario 1 - HGV Traffic Assignment

168. Utilising two port locations (Kings Lynn to the west and either Lowestoft or Great Yarmouth to the south-east) the links are categorised using distance deterrent to forecast the maximum traffic assignment on each link.

- Category 1 Links – A discrete port location would serve the demand for all onshore infrastructure locations with distance deterrent applied. Rather than apply a notional 50/50 east/west origin split, it has been assumed up to a maximum of 70% of traffic could be generated from either port location; and
- Category 2 Links – Regardless of origin, traffic converges on links local to the respective onshore infrastructure locations to complete the final part of the journey. These links are not subject to distance deterrent and have 100% of the required traffic demand assigned.

169. Table 24.19 summarises the links that have had 70% or 100% traffic flows assigned according to Link Category. The information is shown graphically in Figures 24.11 and 24.11a

Table 24.19 Scenario 1 link summary

Link category	Links affected
Category 1 Links with 70% flow assignments applied	2-10, 13a, 13b, 14, 18, 19, 29, 30, 32, 36, 39, 40a, 41, 44a, 44b, 45, 52-60, 64 and 65.
Category 2 Links with 100% flow assignments applied.	1a, 1b 16, 17, 21-25, 33, 34, 35a, 35b, 40b, 42, 46, 47b, 47c, 49, 66-79 and A-V.

170. The maximum daily traffic demand per week for each onshore infrastructure site location is contained within Appendix 24.7. Table 24.20 summarise the traffic assignment methodology.

Table 24.20 HGV assignment methodology

Steps	Description	Reference	Appendix Tables
Step 1	Assigns the peak daily construction HGV traffic deliveries travelling to each individual onshore infrastructure site location according to their assumed origin.	Appendix 24.11 (Kings Lynn) Appendix 24.12 (Lowestoft) Appendix 24.13 (Great Yarmouth)	Tables 1 & 2
Step 2	The sum of HGV daily deliveries per link for each port location.	Appendix 24.11 (Kings Lynn) Appendix 24.12 (Lowestoft) Appendix 24.13 (Great Yarmouth)	Table 3

Steps	Description	Reference	Appendix Tables
Step 3	Presenting 100% assignment and then applying a 70% distance deterrent. Summarises and colour codes each port assignment link flows.	Appendix 24.14 (HGV Assignment)	Kings Lynn (green) Table 1a (100% assignment) Table 1b (70% assignment). Lowestoft (blue) Table 2a (100% assignment) Table 2b (70% assignment). Great Yarmouth (purple) Table 3a (100% assignment) Table 3b (70% assignment).
Step 4	Table 5 represents the final consolidated daily HGV traffic deliveries and movements associated with each link within the Scenario 1 traffic and transport study area made up of the following composition. • Green – Kings Lynn origin – Category 1 link • Blue – Lowestoft origin – Category 1 link • Purple – Great Yarmouth origin – Category 1 link • Orange – All three port origins – Category 2 link	Appendix 24.14 (HGV Assignment)	Table 5 (Final assignment)

171. Scenario 1 - Employee Traffic Assignment

172. It is assumed all employees working on each of the onshore infrastructure sites would travel direct to each respective site.

173. Utilising the maximum daily employee numbers per week for each of the onshore infrastructure sites as contained within Appendix 24.7, Table 24.21 details the three steps used to assign traffic to the highway network:

Table 24.21 Employee assignment methodology

Steps	Description	Reference	Appendix Tables
Step 1	Assigns the daily peak employee traffic to the onshore project substation utilising 'Origin Data Set A' and according to their assumed origin link	Appendix 24.15 (onshore project substation)	Table 1 and 2
Step 2	Assigns the daily peak employee traffic to the 16 cable route sections utilising 'Origin Data Set B' and according to their assumed origin link	Appendix 24.16 (cable sections)	Tables 1 to 13

Steps	Description	Reference	Appendix Tables
Step 3	Provides a cumulative summation of the movement to all daily employee traffic movements	Appendix 24.17 (Employee assignment summary)	Table 1

24.7.2.5 Cable Logistics Area

174. During the cable pulling stage it is Norfolk Boreas Limited preferred strategy to deliver cable drums and associated materials directly to the joint locations from the supplier. However, in the event of delivery or installation issues occurring throughout the programme, a cable logistics area is provided along Link 68.

175. The Cable Logistics Area (as shown in Figure 24.2a) will also include a temporary site office, welfare and space for the storage of other materials associated with cable jointing such as cable joint kits and cement bound sand.

176. The HGV and Employee traffic demand associated with the Cable Logistics area is included in the S1 – WCS.

24.7.2.6 Scenario 1 – Summary

177. The resultant daily construction traffic demand for a 2026 assessment year is detailed in Appendix 24.18.

24.7.3 Scenario 2 – Worst Case

24.7.3.1 Scenario 2 - Construction Programme

178. Table 24.22 details the two-phase Scenario 2 project construction programme. It can be noted that a sequential approach has been adopted for construction stages. The duct (installation / primary works) period representing the maximum construction intensity period in terms of traffic and therefore informing the S2-WCS.

Table 24.22 Indicative project construction programme under Scenario 2

Activity	Year					
	2021	2022	2023	2024	2025	2026
Landfall						
Duct Installation						
Cable pulling, Jointing and Commission						
Phase 1						
Phase 2						
Onshore cable corridor						
Preconstruction works						
Duct installation works						
Cable pulling, jointing and commission						

Activity	Year					
	2021	2022	2023	2024	2025	2026
Phase 1						
Phase 2						
Onshore project substation						
Preconstruction works						
Primary works						
Electrical plant installation and commission						
Phase 1						
Phase 2						

179. The duct installation works are programmed for a two year period (2023-2024). The construction traffic derivation for the duct installation includes a three month break in traffic movements during the winter period. The break in activities informs the S2-WCS by condensing traffic movements into a shorter construction time period and thereby increasing daily movements. In real terms, a three month break is unlikely, however, the traffic derivation serves to simulate the accelerated working required to ensure construction keeps to the two year programme in the event of prolonged inclement weather.

180. It is considered that the earliest date that the duct installation / primary works period could commence would be 2023 as such a reference year for background traffic of 2023 has been derived (refer to 24.6.6) for the purpose of the Scenario 2 assessment. Background traffic flows for 2023 are presented in Appendix 24.19.

181. The remainder of the S2-WCS construction programme follows the assumptions set out within paragraphs 137 to 139 of the S1-WCS.

24.7.3.2 Scenario 2 – Worst Case Traffic Demand

24.7.3.2.1 Scenario 2 - HGV Traffic Demand

182. Details of materials, plant, and timescales for the project have been informed by work undertaken by the project engineering consultants. Appendix 24.20 details the forecasts associated with the expected quantity of materials, plant and total HGV deliveries for each of the components of the onshore project area associated with the S2-WCS.

183. Appendix 24.21 details the indicative maximum traffic generation forecasts broken down by each onshore component of the project.

24.7.3.2.2 Scenario 2 - Peak HGV Construction Demand

184. Appendix 24.22 shows the disaggregation of components of the onshore project

area traffic demand (contained within Appendix 24.20 and 24.21) by activity over time. This data facilitates derivation of total deliveries and HGV movements per day.

185. To meet the two year duct installation/primary works period, 15 onshore cable route sections of a total of 20 would be close to or at peak activity at any one time for the duration of the project.

186. To ensure the assessment considers the maximum impacts it is necessary to assign the traffic demand for a total of 20 onshore cable route sections to the network. This method has the advantage of ensuring the peak impact on all minor links is assessed and is therefore appropriate for screening traffic and transport effects.

187. There is a drawback in application of peak impact on all links, in that potential in-combination traffic flows on the Strategic/ Principal road network are over estimated by assigning traffic flows for all 20 onshore cable route sections (noting a maximum of 15 onshore cable route sections would be active at any one time).

188. To address this overestimate, it has been agreed by the Norfolk Boreas ETG that a 'primary route reduction factor' (a multiple of 15/20) can be applied to the project traffic flows assigned to the Strategic/Principal road network. This reduction factor is not applied to the local road network as traffic would be assigned to discrete onshore cable route sections and is less influenced by multiple onshore cable route section activity.

189. The trenchless crossing (TC) zones[6] (not including landfall) traffic demand departs from the above methodology. The 17 TC zones will be split into three groups based on their geographic location and then assigned a TC work gang as detailed:

- Gang 1 will construct TC1, TC2, TC3a, TC3b, TC4 and TC5;
- Gang 2 will construct TC6, TC7, TC8, TC9, TC10 and TC11; and
- Gang 3 will construct TC12, TC13, TC14, TC15 & TC16.

190. Each work gang will construct TCs consecutively within their TC geographic location. This constrains traffic demand to a level that would be generated by three TC zones active at any point within the construction programme (in effect a traffic demand 'cap').

191. The total traffic demand for each crossing can be split up to 75% drive side and 25% at the reception side. As a worst case assumption, each side of a TC has had 75% of the total traffic demand assigned to allow flexibility in construction approach.

[6] Trenchless crossing zones are areas within the onshore cable route which will house trenchless crossing entry or exit points. The 17 TC zones do not include the landfall zone.

24.7.3.2.3 Scenario 2 - Contingencies

192. An appropriate level of contingency has been applied to all onshore infrastructure HGV flows.

- 10% for landfall and TC zones; and
- 20% for duct installation, cable pulling and jointing, onshore project substation and National Grid substation extension.

24.7.3.2.4 Scenario 2 - Employee Traffic Demand

193. It is estimated that a workforce of 280 employees will be required during construction peaks, serving 15 onshore cable route sections as set out in Appendix 24.22.

194. Applying the same approach to construction workforce intensity as that adopted for HGV construction demand (i.e. assigning traffic to all 20 onshore cable route sections consecutively), a total of 400 employees over 20 onshore cable route sections has been assigned.

195. However, in contrast to the HGV derivation, no reduction factor has been applied to the workforce recognising the total workforce may be subject to fluctuations whereas material demand is finite.

196. Table 24.23 summarises the total onshore infrastructure component's employee demand to be assessed.

Table 24.23 Employee demand

Infrastructure component	Realistic programme	ES assessed employees	Notes
Duct installation	280	400	n/a
Landfall	20	20	n/a
Trenchless crossings	30	30	Three gangs of ten employees each
Onshore project substation	50	50	n/a
NG Substation Extension	50	50	n/a
Totals	430	550	n/a

197. The remainder of the S2-WCS employee traffic assessment would follow the assumptions set out within paragraph 149 of the S1-WCS.

24.7.3.2.5 Scenario 2 - Summary of Traffic Demand Assumptions

198. The key assumptions that have informed the construction traffic demand for S2-WCS are outlined in Table 24.24.

Table 24.24 Scenario 2 WCS traffic demand assumptions

Construction parameters
The duct installation activity (programmed for 2023-2024) would generate the highest construction intensity with the maximum project demand for delivery of materials and transportation of personnel anticipated during this period.
The duct installation activity would be subject to a three-month winter break, thereby condensing project traffic movements into a shorter period.
Earliest start of construction 2023.
7am to 7pm working day with a reduced ten hour delivery window.
Five day working week (Monday – Friday).
Maximum demand for Mobilisation Areas, landfall, onshore project substation and National Grid substation extension occurs concurrently.
Traffic demand equivalent to that of three trenchless crossings out of a total of 17 planned trenchless crossings assessed.
An appropriate level of contingency (20%) reflecting the uncertainties in the design has been applied to all duct installation, cable pulling and jointing and substation material quantities.
An appropriate level of contingency (10%) reflecting the uncertainties in the design has been applied to all trenchless crossing material quantities.
Traffic derivation
A 'Primary Route' reduction factor (0.75) to be applied to the project HGV traffic flows along the Strategic/ Principal road network to reflect a maximum realistic cumulative project traffic demand from 15 cable sections.
A maximum of 70% of the project traffic demand would be generated from a single port location to reflect the 'distance deterrent' for supply to the extreme east of the onshore cable route from a western supply chain origin and vice versa.
HGV traffic demand for each TC can be split up to 75% drive side and 25% at the reception side. Each side of a TC has had 75% of the total traffic demand assigned to allow flexibility in construction methodology.
No reduction to project traffic applied for construction workers to allow for travel by non-car modes (e.g. bus, rail, walking and cycling) or travel. Sustainable Travel mode share will be determined by the Outline Travel Plan.
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. To assess the worst case highway capacity impacts, workers are assumed to arrive /depart during the network peak hours.

24.7.3.3 Scenario 2 - Traffic Distribution

199. At present, 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, after the DCO application has been determined. The following sections describe the assumptions that have been adopted to inform the distribution of HGV and construction employee traffic.

24.7.3.3.1 Scenario 2 - HGV Distribution

200. Trips associated with bulk materials such as Cement Bound Sand (CBS) and stone aggregate would make up the majority of the total HGV movements for Scenario 2.

201. All other HGV distribution is as per Scenario 1 as detailed in paragraphs 153 to 154 (S1-WCS)

202. The distances to the port locations in relation to all onshore infrastructure locations are shown in Figure 24.12.

24.7.3.3.2 Scenario 2 - Delivery Locations

203. Figure 24.12 details the traffic and transport study area. The site delivery strategy is as follows:

- Landfall: deliveries would be made directly to the landfall south of Happisburgh with construction traffic using the B1159 to access the local routes leading to the landfall compound at the landfall site;
- Onshore cable route: Delivery of plant and materials would be direct to each of the 14 mobilisation areas. The mobilisation areas serve discrete lengths of the onshore cable route and are positioned to maximise construction productivity. They are sited at suitable locations close to public highways and are required to store equipment and provide welfare facilities;
- The 14 mobilisation areas serve a total of 20 cable route sections which typically head east and west from each mobilisation area;
- Trenchless Crossings: Materials and plant are assumed to be delivered directly to the 16 trenchless crossing locations;
- Onshore project substation: Deliveries would occur directly to the onshore project substation temporary construction compound; and
- National Grid substation extension and overhead line modification: Deliveries would occur directly to the National Grid temporary works and overhead line temporary works areas.

24.7.3.3.3 Scenario 2 - Employee Distribution

204. The S2-WCS employee distribution methodology adheres to the methodology set out within the S1-WCS employee distribution (section 24.7.2.3.3, Appendices 24.9 24.10 and 24.11 and Figures 24.8, 24.9 and 24.10) refer.

24.7.3.4 Scenario 2 - Construction Traffic Assignment

24.7.3.4.1 Scenario 2 - HGV Traffic Assignment

205. For Scenario 2, a proportional two stage process has been developed to consolidate traffic assignments.

- Stage 1 (Classify): Classifying all links within the traffic and transport study area according to their project function; and
- Stage 2 (Categorise): Identify and categorise links based on distance between the port origin and final onshore infrastructure destination, applying a 'distance deterrent' factor to traffic flows.

Stage 1 (Classify)

206. As discussed in paragraph 188, a Primary Route reduction factor is applied to the Strategic/Principal highway network to address the over estimation of cumulative project traffic flows from maximum cable route intensity.

207. All links within the traffic and transport study area have been classified according to their interaction with the project traffic demand. Table 24.25 details the link classifications and road function of the links. The reduction factor has been applied to links identified as 'Primary Collector Routes'.

Table 24.25 Primary Route Classifications

Link Classification	Road function/ characteristics	Links
Primary Collector Route	Trunk and principal roads. Connecting primary destinations such as major urban areas.	1a, 1b, 2-12, 13a, 13b, 14, 19, 53-57, 64 and 65
Secondary Collector Route	Major urban road networks and inter-primary links between the primary collector routes and the minor local routes.	18, 24, 26-33, 36, 38, 39, 40a, 40b, 44a, 44b, 45, 46, 50-52, 58, 60, 62 and 63
Minor Local Routes	Distributor roads and local access routes usually Classified B and C class roads including some unclassified roads.	15-17, 20-23, 25, 3435a, 35b37, 41-43, 47a, 47b, 47c, 48, 49, 61 and 66-79

208. The classification of links is presented graphically in Figure 24.13.

Stage 2 (Categorise)

209. Stage 2 follows the same categorisation process as set out for Scenario 1 (paragraph 168 refers). Utilising two port locations (Kings Lynn to the west and either Lowestoft or Great Yarmouth to the south-east) the links are categorised using distance deterrent to forecast the maximum traffic assignment on each link.

210. Table 24.26 below summarises the links that have had 70% or 100% traffic flows assigned according to Link Category. The information is shown graphically in Figure 24.14.

Table 24.26 Scenario 2 Link Summary

Link category	Links affected
Category 1 Links with 70% flow assignments applied	2-10, 13a, 13b, 14, 18, 19, 29, 30, 32, 33, 36, 39, 40a, 41, 44a, 44b, 45, 52-60, 64 and 65.
Category 2 Links with 100% flow assignments applied.	1a, 1b, 16-17, 21, 22, 24, 25, 34, 35a, 35b, 37, 40b, 42, 46, 47b, 47c, 49 and 66-79.

211. The maximum daily traffic demand per week for each onshore infrastructure site location is contained within Appendix 24.22. Table 24.27 summarises the traffic assignment methodology.

Table 24.27 HGV assignment methodology

Steps	Description	Reference	Appendix Tables
Step 1	Assigns the peak daily construction HGV traffic deliveries travelling to each individual onshore infrastructure site location according to their assumed origin.	Appendix 24.23 (Kings Lynn) Appendix 24.24 (Lowestoft) Appendix 24.25 (Great Yarmouth)	Tables 1, 4, 5 & 6
Step 2	Primary route reduction factor (0.75) applied to Total Daily HGV Deliveries (gross) for all identified Primary Collector Roads as classified in Table 24.16.	Appendix 24.23 (Kings Lynn) Appendix 24.24 (Lowestoft) Appendix 24.25 (Great Yarmouth)	Table 2
Step 3	TC deliveries for both drive and reception sides assigned to links.	Appendix 24.23 (Kings Lynn) Appendix 24.24 (Lowestoft) Appendix 24.25 (Great Yarmouth)	Table 3
Step 4	The sum of HGV daily deliveries per link for each port location.	Appendix 24.23 (Kings Lynn) Appendix 24.24 (Lowestoft) Appendix 24.25 (Great Yarmouth)	Table 7
Step 5	Presenting 100% assignment and then applying a 70% distance deterrent. Summarises and colour codes each port assignment link flows.	Appendix 24.26 (HGV Assignment)	Kings Lynn (green) Table 1a (100% assignment) Table 1b (70% assignment). Lowestoft (blue)

Steps	Description	Reference	Appendix Tables
			Table 2a (100% assignment) Table 2b (70% assignment). Great Yarmouth (purple) Table 3a (100% assignment) Table 3b (70% assignment).
Step 7	Table 5 represents the final consolidated HGV daily traffic deliveries and movements associated with each link within the study area made up of the following composition. Green – Kings Lynn origin – Category 1 link Blue – Lowestoft origin – Category 1 link Purple – Great Yarmouth origin – Category 1 link Orange – All three port origins – Category 2 link	Appendix 24.26 (HGV Assignment)	Table 5 (Final assignment)

24.7.3.4.2 Scenario 2 - Employee Traffic Assignment

212. It is assumed all employees working on each of the onshore infrastructure sites would travel direct to each respective site.

213. Utilising the maximum employee numbers per week for each of the onshore infrastructure sites as contained within Appendix 24.22, the following five steps assign traffic to the highway network:

- Step 1: assigns the peak employee traffic to the onshore project substation and National Grid substation extension utilising 'Origin Data Set A' and according to their assumed origin link as shown in Appendix 24.27;
- Step 2: assigns the peak employee traffic to the mobilisation areas utilising 'Origin Data Set B' and according to their assumed origin link as shown in Appendix 24.28;
- Step 3: assigns the peak employee traffic to the trenchless crossing sites utilising 'Origin Data Set B' as shown in Appendix 24.29;
- Step 4: assigns the peak employee traffic to the landfall site utilising 'Origin Data Set C' and according to their assumed origin link as shown in Appendix 24.30; and

- Step 5: provides a cumulative summation of the movement to all employee traffic movements as shown in Appendix 24.31.

24.7.3.5 Scenario 2 – Summary

214. The resultant construction traffic demand for a 2023 assessment year is summarised in Appendix 24.31.

24.7.4 Traffic Impact Screening

215. With reference to the GEART (Rule 1 and Rule 2)[7], a screening process has been undertaken for the traffic and transport study area to identify routes that are likely to have an increase in traffic flows that would require further impact assessment.

216. Table 24.28 summarises the total daily peak vehicle movements (i.e. arrivals and departures) of all materials, personnel and plant for both Scenario 1 and Scenario 2. The table also provides a comparison of the peak daily construction flows with the forecast background daily traffic flows in 2026 for Scenario 1 and 2023 for Scenario 2 (assumed worst case realistic start of construction). Cells highlighted blue indicate GEART Rule 1 or Rule 2 screening thresholds have been met. Appendix 24.18 and Appendix 24.31 graphically depicts this demand on the highway network.

[7] 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 24.28 Existing and proposed daily traffic flows

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements Scenario 1		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements Scenario 2		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1a	A47	Low	20,153	1,978	124	100	0.6%	5.1%	19,166	1,882	551	415	2.9%	22.1%
1b	A47	Low	20,153	1,978	172	100	0.9%	5.1%	19,166	1,882	785	415	4.1%	22.1%
2	A47	Low	2,381	2,381	181	70	0.6%	3.0%	26,566	2,264	691	291	2.6%	12.8%
3	A47	Low	55,842	3,340	121	70	0.2%	2.1%	53,107	3,177	525	291	1.0%	9.1%
4	A47	Low	57,506	2,588	81	70	0.1%	2.7%	54,689	2,461	369	291	0.7%	11.8%
5	A47	Low	46,780	2,117	290	281	0.6%	13.3%	45,620	2,064	641	580	1.4%	28.1%
6	A47	Low	24,013	1,485	284	281	1.2%	18.9%	22,837	1,412	604	580	2.6%	41.1%
7	A47	Low	15,467	1,624	83	70	0.5%	4.3%	14,710	1,544	358	291	2.4%	18.8%
8	A146	Medium	14,406	784	77	70	0.5%	9.0%	13,701	746	322	291	2.4%	39.0%
9	A47	Low	38,953	1,223	326	323	0.8%	26.4%	37,045	1,163	648	637	1.7%	54.8%
10	A47	Medium	31,546	712	324	323	1.0%	45.4%	29,999	677	640	637	2.1%	94.1%
11	A1065	Low	8,626	577	10	0	0.1%	0.0%	8,2074	549	72	0	0.9%	0.0%
12	A1065	Medium	6,822	518	5	0	0.1%	0.0%	6,488	498	38	0	0.6%	0.0%
13a	A148	Low	16,791	1,000	336	323	2.0%	32.3%	15,968	951	683	595	4.3%	62.6%
13b	A148	High	12,553	559	215	206	1.7%	34.4%	11,938	570	508	453	4.3%	79.5%
14	A148	Medium	13,130	603	150	138	1.1%	22.9%	12,487	573	444	369	3.6%	64.4%
15	B1145 - Litcham	High	2,018	41	3	0	0.1%	0.0%	1,919	39	15	0	0.8%	0.0%
16	B1110/B1146 - Holt Road	Low	8,592	97	91	64	1.1%	65.5%	8,172	92	352	224	4.3%	242.0%
17	B1145 - Billingford Road	Medium	3,280	54	73	64	2.2%	118.2%	3,119	51	320	224	10.3%	436.7%
18	A1067	High	9,385	669	136	117	1.4%	17.5%	8,925	636	388	313	4.3%	49.2%
19	A148	Medium	13,785	1,188	335	323	2.4%	27.2%	13,110	1,129	678	637	5.2%	56.4%

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements Scenario 1		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements Scenario 2		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
20	Mill Common Road	Low	317	7	0	0	0.0%	0.0%	302	7	0	0	0.0%	0.0%
21	B1147 - Etling Green	Low	1,627	18	38	29	2.3%	166.3%	1,548	17	288	224	18.6%	1339.1 %
22	B1147 - Dereham Road	Low	2,500	23	58	29	2.3%	124.7%	2,378	22	312	224	13.1%	1004.3 %
23	Northgate - from junction with B1146	Low	2,018	41	104	64	5.2%	155.4%	1,919	39	4	0	0.2%	0.0%
24	A1067	Low	11,151	569	211	167	1.9%	29.4%	10,605	541	578	407	5.4%	75.3%
25	Elsing Lane	Low	579	6	50	30	8.6%	512%	551	6	92	72	16.7%	1291.3 %
26	A1074	Medium	26,093	1,165	31	0	0.1%	0.0%	24,815	1,108	118	0	0.5%	0.0%
27	A140	Medium	35,332	2,312	29	0	0.1%	0.0%	33,601	2,199	128	0	0.4%	0.0%
28	A140	Medium	23,020	1,309	29	0	0.1%	0.0%	22,480	1,278	152	0	0.7%	0.0%
29	A1067	Medium	14,008	971	164	117	1.2%	12.1%	13,322	924	451	313	3.4%	33.9%
30	A1067	Low	12,249	783	147	117	1.2%	15.0%	11,649	744	457	313	3.9%	42.0%
31	A1067	High	18,200	537	21	0	0.1%	0.0%	18,200	537	127	0	0.7%	0.0%
32	B1149 - Edgefield	Medium	4,730	88	103	92	2.2%	104.5%	4,499	83	263	212	5.8%	254.4%
33	B1149 - Holly road	Low	6,171	190	152	99	2.5%	52.3%	5,868	180	385	212	6.6%	117.8%
34	B1145 - west of Cawston	Medium	3,098	30	200	131	6.5%	430.8%	2,946	29	388	224	13.2%	772.6%
35a	B1159	Low	3,786	34	118	95	3.1%	279.4%	3,601	32	390	294	10.8%	910.4%
35b	B1159	Low	3,786	34	118	95	3.1%	279.4%	3,601	32	326	263	9.1%	816.3%
36	B1149 - Horsford	High	8,837	170	114	92	1.3%	54.1%	8,404	161	326	212	3.9%	131.6%
37	B1145 - Cawston road	Low	4,465	57	21	0	0.5%	0.0%	4,246	55	182	80	4.3%	146.4%

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements Scenario 1		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements Scenario 2		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
38	A140 - Cromer Road	Medium	21,150	788	66	0	0.3%	0.0%	20,400	760	292	0	1.4%	0.0%
39	A140 - Hevingham	Medium	15,420	639	128	46	0.8%	7.1%	15,080	625	417	129	2.8%	20.6%
40a	A140 - Roughton	Low	10,553	323	93	92	0.9%	28.6%	10,037	307	300	289	3.0%	94.3%
40b	A140 - Roughton	Low	14,226	640	287	197	2.0%	30.8%	13,529	609	428	184	3.2%	30.2%
41	B1436 - Felbrigg	Low	7,455	168	145	138	1.9%	81.8%	7,090	160	485	418	6.8%	260.9%
42	B1145 - Reepham Road	Medium	2,650	21	80	40	3.0%	190.2%	2,520	20	310	184	12.3%	916.7%
43	Cromer Road - Ingworth	Medium	1,150	4	10	0	0.9%	0.0%	1,094	3	26	0	2.3%	0.0%
44a	A149	Medium	9,554	387	104	92	1.1%	23.8%	9,086	368	391	289	4.3%	78.6%
44b	A149	Medium	9,554	387	127	92	1.3%	23.8%	9,086	368	420	262	4.6%	71.0%
45	A149	Medium	7,599	394	76	66	1.0%	16.8%	7,227	375	320	206	4.4%	54.8%
46	B1145	Low	6,470	105	110	67	1.7%	64.1%	6,153	100	465	224	7.5%	223.2%
47a	North Walsham Road - Edingthorpe Green	High	2,280	19	24	0	1.0%	0.0%	2,169	18	145	0	6.7%	0.0%
47b	North Walsham Road - Edingthorpe Green	Low	2,280	19	54	30	2.4%	162.4%	2,169	18	203	72	9.4%	403.5%
47c	North Walsham Road - Edingthorpe Green	High	2,280	19	37	30	1.6%	162.4%	2,169	18	203	184	9.4%	1031.2%
48	B1159 - Bacton Road	High	2,801	53	0	0	0.0%	0.0%	2,664	50	0	0	0.0%	0.0%
49	B1159	High	4,059	75	33	30	0.8%	40.6%	3,860	71	214	184	5.5%	257.8%
50	A1151	Medium	11,714	411	14	0	0.1%	0.0%	11,140	391	158	0	1.4%	0.0%

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements Scenario 1		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements Scenario 2		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
51	A1151	Medium	21,800	788	15	0	0.1%	0.0%	20,800	752	88	0	0.4%	0.0%
52	A149 - Wayford Road	Low	15,035	205	89	66	0.6%	32.4%	14,298	195	297	206	2.1%	105.6%
53	A149	Medium	37,480	1,130	281	281	0.8%	24.8%	35,644	1,075	634	630	1.8%	58.6%
54	A149	High	30,007	655	93	92	0.3%	14.1%	28,535	623	251	248	0.9%	39.7%
55	A149	Low	14,153	193	93	92	0.7%	47.8%	14,459	183	251	248	1.9%	134.9%
56	A149	Medium	9,789	390	97	92	1.0%	23.7%	9,310	371	270	248	2.9%	66.8%
57	A149	Low	9,965	557	97	92	1.0%	16.6%	9,477	530	271	248	2.9%	46.7%
58	NDR - Link a	Low	40,150	1,572	237	231	0.6%	14.7%	37,825	1,481	487	453	1.3%	30.6%
59	NDR - Link b	Low	28,553	1,118	231	231	0.8%	20.6%	26,380	1,033	472	453	1.8%	43.8%
60	NDR - Link c	Low	20,895	818	117	117	0.6%	14.3%	19,580	767	400	313	2.0%	40.8%
61	B1436 - Thorpe Market Road	Medium	5,208	121	20	0	0.4%	0.0%	4,953	115	76	0	1.5%	0.0%
62	A1042	Medium	25,000	725	35	0	0.1%	0.0%	24,533	712	164	0	0.7%	0.0%
63	A1151	Medium	13,960	527	5	0	0.0%	0.0%	13,940	526	67	0	0.5%	0.0%
64	A12	Medium	11,363	634	72	70	0.6%	11.1%	10,807	603	299	291	2.8%	48.2%
65	A47	Medium	17,153	345	323	323	1.9%	93.6%	16,313	328	639	637	3.9%	194.1%
66	Wendling – Dereham Road	Medium	1,521	59	109	69	7.2%	117.7%	1,447	56	192	152	13.2%	272.6%
67	North Walsham Road / Happisburgh Road	Low	1,170	47	104	64	8.9%	137.6%	1,113	45	159	80	14.3%	179.3%
68	The Street / Heydon Road	Low	837	46	105	65	12.6%	141.9%	796	44	160	80	20.1%	182.2%

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements Scenario 1		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements Scenario 2		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
69	Little London Road	High	585	23	81	**61	13.8%	259.8%	556	22	260	**240	46.7%	1077.0%
70	Plantation Road	Low	1,170	47	50	30	4.3%	65.0%	1,113	45	284	184	25.5%	412.5%
71	Vicarage Road / Whimpwell Street	High	2,340	82	51	31	2.2%	38.1%	2,225	78	64	30	2.9%	39.0%
72	Dereham Road / Longham Road - Dillington	Medium	1,170	47	54	34	4.7%	73.6%	1,113	45	184	144	16.5%	322.8%
73	Hoe Road South	Low	936	35	49	29	5.3%	83.1%	890	33	158	144	17.7%	430.4%
74	Mill Street, Elsing Road – Swanton Morley	Medium	936	35	50	30	5.3%	85.3%	890	33	103	72	11.5%	215.2%
75	B1354 - Blickling	Medium	2,340	82	110	70	4.7%	85.8%	2,225	78	72	72	3.2%	92.2%
76	High Noon Road / Church Road	Low	585	23	51	31	8.8%	134.4%	556	22	92	72	16.5%	322.8%
77	Hall Lane – North Walsham	Low	585	23	50	30	8.6%	129.9%	556	22	92	72	16.5%	322.8%
78	Bylaugh	Low	585	23	50	30	8.5%	128.0%	556	22	92	72	16.5%	322.8%
79	B1145 / Suffield Road	Medium	2,340	82	75	31	3.2%	38.4%	2,225	78	92	72	4.1%	92.2%
A	Dale Road	Low	585	23	54	34	9.3%	147.2%	Not assessed as worst case scenario for Scenario 2					
B	Bradenham Lane	Medium	585	23	109	69	18.6%	294.2%						
C	Norwich Road	Low	585	23	49	29	8.4%	124.7%						
D	Lime Kiln Road (west)	Low	585	23	54	34	9.2%	143.7%						

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements		Percentage increase	
			Scenario 1						Scenario 2					
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
E	Mill Lane	Low	585	23	54	34	9.3%	147.2%						
F	Heydon Road	Medium	585	23	49	29	8.3%	123.1%						
G	B1145 - Cawston road	High	585	23	52	32	8.9%	136.6%						
H	Wood Dalling Road	High	585	23	52	32	8.9%	136.6%						
I	Southgate (Road to Southgate from B1149)	Low	585	23	49	29	8.3%	123.1%						
J	Banningham Road	Low	585	23	54	34	9.2%	144.0%						
K	Greens Road, B1145, Felmingham Road, Brick Kiln Lane	Low	585	23	69	37	11.8%	158.4%						
L	Paston Road	Low	585	23	50	30	8.6%	129.9%						
M	North Walsham Road / Happisburgh Road	High	585	23	53	33	9.1%	141.9%						
N	Bacton Road	Low	585	23	53	33	9.1%	141.9%						
O	Edingthorpe Road	Low	585	23	53	33	9.1%	141.9%						
P	Edingthorpe	Low	585	23	53	33	9.1%	141.9%						
Q	Hole House Road	Low	585	23	53	33	9.1%	141.9%						
R	North Walsham Road, Grub Street	Medium	585	23	51	31	8.7%	132.2%						
S	Walcott Green	Low	585	23	51	31	8.7%	132.2%						
T	Unnamed Road	Low	585	23	54	34	9.2%	144.0%						
U	Swanton Road	Low	585	23	49	29	8.4%	124.7%						

Link	Description	Link sensitivity	Background 2026 flows (24hr AADT*)		2026 construction vehicle movements Scenario 1		Percentage increase		Background 2023 flows (24hr AADT*)		2023 construction vehicle movements Scenario 2		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
V	Lime Kiln Road	Low	585	23	54	34	9.1%	143.7%						
Links 66, 67, 69 to 79 and A to V utilise estimated base flows as described in sections 24.5.2.1 and 24.5.3.														
*	AADT – Annual Average Daily Traffic													
**	Links with traffic deliveries utilising smaller vehicles													
%	Exceeds GEART screening thresholds													

217. In accordance with GEART, only those sensitive links that show greater than 10% increase in total traffic flows (or HGV component) or, for all other links, a greater than 30% increase in total traffic or the HGV component are considered when assessing the traffic effect of severance and pedestrian amenity upon receptors.

218. It is noted from Table 24.28 that 63 of the 108 links for Scenario 1 and 60 of 86 links for Scenario 2 are above the GEART screening thresholds. Table 24.29 provides a summary of those links that will be taken forward for further assessment and those that are screened out for both Scenario 1 and Scenario 2.

Table 24.29 Link screening summary (Scenario 1 and 2)

	Further assessment	No further assessment
Scenario 1 Links	10, 13a, 13b, 16, 17, 18, 21, 22, 23, 24, 25, 32, 33, 34, 35a, 35b, 36, 40b, 41, 42, 46, 47b, 47c, 49, 52, 54, 55, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79 and A to V	1a, 1b, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 19, 20, 26, 27, 28, 29, 30, 31, 37, 38, 39, 40a, 43, 44a, 44b, 45, 47a, 48, 50, 51, 53, 56, 57, 58, 59, 60, 61, 62, 63 and 64.
Scenario 2 Links	6, 8, 9, 10, 13a, 13b, 14, 16, 17, 18, 19, 21, 22, 24, 25, 29, 30, 32, 33, 34, 35a, 35b, 36, 37, 40a, 40b, 41, 42, 44a, 44b, 45, 46, 47b, 47c, 49, 52, 53, 54, 55, 56, 57, 58, 59, 60, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79.	1a, 1b, 2, 3, 4, 5, 7, 11, 12, 15, 20, 23, 26, 27, 28, 31, 38, 39, 43, 47a, 48, 50, 51, 61, 62, 63.

24.7.5 Monitoring

219. An OTMP (Document reference 8.8) and OTP (Document refence 8.9) have been submitted in support of the DCO application.

220. The OTMP (document reference 8.8) sets out the standards and procedures for managing the impact of HGV traffic during the construction period, including localised road improvements necessary to facilitate the safe use of the existing road network. The OTP (document refence 8.9) sets out how construction employee traffic would be managed and controlled.

221. Both documents contain a commitment to monitoring and enforcement measures to ensure the project's HGV and employee traffic is within the bounds of the worst case impacts assessed.

222. Final plans which accord with these outline documents would be submitted to and approved by the relevant local authority (in consultation with the relevant highway authority) prior to commencement of relevant works as per DCO Requirement 21).

24.7.6 Potential Impacts during Construction

223. From the screening exercise it is evident that Scenario 1 and Scenario 2 have a similar quantum of highways links with the potential to be impacted by the project's traffic. However, it can be noted a greater magnitude of change (and therefore

greater impact significance) would potentially be experienced as a result of Scenario 2 traffic generation.

224. For ease of review and to minimise repetition, the assessment of effects has been ordered with Scenario 2 first, thereby facilitating the subsequent Scenario 1 assessment to cross reference affected links and compare magnitude. Any effects unique to Scenario 1 will be evidenced in the assessment.

24.7.6.1 Impact 1: Severance

24.7.6.1.1 Scenario 2

225. With reference to Table 24.28 it is noted that the forecast peak daily change in total traffic flow for link 69 is greater than the 30% change in total traffic threshold whereby GEART suggests negative impacts may be experienced.

226. The remaining links all experience traffic flows significantly below the 30% thresholds. This results in the magnitude of effect assessed as very low on low to high sensitivity links leading to impact significance on all remaining links of **negligible** to **minor adverse.**

227. Link 69 (shown on Figure 24.3) is Little London Road from the B1145 Lyngate Road junction to an access point approximately 210m east.

228. Link 69 is a narrow lane with no footway. The lane is lined with established hedgerows, walls and a number of private residential accesses. The route is assessed as unsuitable for conventional (20t payload) tipper trucks and therefore in order to safely traverse along the narrow lane, mitigation is proposed in the form of splitting HGV payloads into smaller 10t vehicles at mobilisation area (MA)10.

229. By halving the size of vehicle loads, this in effect doubles the daily number of HGVs (from 120 to 240 movements) therefore giving rise to severance traffic effects.

230. The increase of 240 HGV movements on link 69; is assessed as a high magnitude of effect on a high value receptor; resulting in the prediction of a **major adverse** impact.

231. The 240 HGV movements represents the worst case scenario where construction of all infrastructure components are undertaken concurrently and assigned to link 69. Table 24.30 breaks down the worst case scenario into the separate infrastructure components and their programmed date of works, as detailed within Appendix 24.22.

Table 24.30 Link 69 Traffic Derivation

Infrastructure component	Programmed date of infrastructure component	Work Gang	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Indicative peak construction duration
Section 16a: Mobilisation area (MA) 10	22.04.2024 – 14.07.2024 (inc)	Duct Installation Gang	40	80	3 weeks
TC 14 – Paston Way CWS (East)	15.05.2023 – 18.06.2023 (inc)	TC Gang 3*	72	144	2 weeks
TC 15 – North Walsham and Dilham Canal (West)	19.06.2023 – 23.07.2023 (inc)	TC Gang 3*	72	144	2 weeks
*	TC gang 3 would only work on one TC at any one time during the construction programme.				

232. It can be noted from Table 24.30 that the construction programme presented is sufficient to also allow sequential construction of the three components.

233. Notwithstanding, a sequential peak of 144 daily movements would still represent an increase of 25.9% for all vehicles and 654% for HGVs, therefore mitigation has been explored.

234. As detailed in the construction programme (Appendix 24.22) section 16a of the duct installation is predicted to last a total of 12 weeks during year 2 (2024). The greatest opportunity to reduce the effects of severance upon Link 69 would be to focus on elongating the currently defined construction programme.

235. For example, an increase in total construction programme from 12 weeks to 24 weeks would see a reduction from 96 peak daily movements to 48.

236. Furthermore, the locations of the drive and reception side of the TC zone have not been selected at this time. Therefore 75% of the traffic (required at the drive side) has been assigned to each side.

237. There is therefore an opportunity to further reduce the TC traffic demand by placing both TC 14 and TC 15 reception sides to the area which link 69 serves. This would reduce the 144 daily movements to 48 (25%).

238. In summary, mitigation for link 69 may comprise one or more of the following mitigation measures:

1. Extend construction programme for section 16a of the duct installation;
2. Locate the reception sides of TC 14 and TC 15 to the area which link 69 serves; and
3. Sequential planning of construction activities to reduce peak HGV demand.

239. Table 24.31 contains forecast daily traffic demand with the implementation of mitigation measures.

Table 24.31 Resultant link 69 traffic demand

Infrastructure component	Work Gang	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 16a:MA10	Duct Installation Gang	20	40	24 weeks
TC 14 – Paston Way CWS (East)	TC Gang 3	24	48	2 weeks
TC 15 – North Walsham and Dilham Canal (West)	TC Gang 3	24	48	2 weeks

240. A reduction to 48 daily HGV movements is assessed as an achievable peak. With this much reduced demand the effect is considered to be of low magnitude. However, noting the high sensitivity of the receptor it is expected that the residual impact significance would be 'marginally' **moderate adverse**.

241. The assessed residual impact is very localised (impacting on a small number of dwellings) and is for a relative short duration of time. It is considered community engagement to establish clear lines of communication to the appointed contractor would serve to identify periods that are particular sensitive to HGV movements and that could further mitigate this impact.

242. The OTMP (document reference 8.8) contains a specific commitment to managing the HGV movements on link 69 to the assessed levels.

24.7.6.1.2 Scenario 1

243. With reference to Table 24.28 it is noted the peak daily change in total traffic flow for all screened links is less than the 30% change in total traffic threshold. Therefore, 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**.

24.7.6.2 Impact 2: Pedestrian Amenity

24.7.6.2.1 Scenario 2

244. The peak daily change in total flows or HGV component for links 16, 17, 21, 22, 25, 32, 33, 34, 35a, 35b, 36, 37, 41, 42, 46, 47b, 47c, 49, 52, 55, 65-70, 72, 73, 74, 76, 77 and 78 are greater than the 100% GEART impact threshold whereby GEART suggests negative impacts may be experienced.

245. In addition, links 75 and 79 experience increases close to the 100% threshold. These links are also considered further noting that a small change in demand could result in potentially significant impacts. Table 24.32 presents the impacts associated with each identified link.

246. 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**.

247. Table 24.32 presents the impact assessment for each identified link. To establish the context for the impact assessment reference is made to Norfolk County Council's route hierarchy plan (Appendix 24.1).

Table 24.32 Scenario 2 Pedestrian amenity assessment

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
16	B1110/B1146 - Holt Road	Main Distributor Others – 3A2	92	316	242.0%	Receptors would experience a peak flow of 32 HGVs per hour during the defined hours of construction. The link serves one mobilisation area and two TC zones Sporadic settlements with no footways provided, indicating minimal pedestrian activity along the link.	Medium	Low	**Minor Adverse**
17	B1145 - Billingford Road	Main Distributor Others – 3A2	51	275	436.7%	Receptors would experience a peak flow of 28 HGVs per hour during the defined hours of construction. The link serves one mobilisation area and two TC zones. The majority of the route has no footways indicating minimal pedestrian activity. Where the link passes through the village of Billingford a footway is provided and a 30mph speed limit is in force.	Medium	Medium	**Moderate Adverse**
21	B1147 - Etling Green	Local Access – 3B2	17	240	1339.1%	Receptors would experience a peak flow of 24 HGVs per hour during the defined hours of construction. Classified as a 'Local Access' route within NCC Route hierarchy plan. The link serves a mobilisation area and one side of a TC zone. No footways are provided along entire link indicating minimal pedestrian footfall predicted.	High	Low	**Moderate Adverse**
22	B1147 - Dereham Road	Local Access – 3B2	22	246	1004.3%	Receptors would experience a peak flow of 25 HGVs per hour during the defined hours of construction. Classified as 'Local Access' route within NCC Route hierarchy plan. The link serves a mobilisation area and one TC zone.	High	Low	**Moderate Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
25	Elsing Lane	Local Access – 3B2	6	77	1291.3%	Receptors would experience a peak flow of 8 HGVs per hour during the defined hours of construction. Classified as 'Local Access' route within NCC Route hierarchy plan. The link serves a single TC zone.	Medium	Low	**Minor Adverse**
32	B1149 - Edgefield	Main Distributor Others – 3A2	83	296	254.4%	Receptors would experience a peak flow of 30 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves access to two mobilisation areas and three TC zones. Majority of route has no footways, indicating minimal pedestrian movement. Link 32 routes through the villages of Holt and Edgefield where at least one footway is provided adjacent to the road. A speed limit of 30mph is in force in throughout both villages.	Low	Medium	**Minor Adverse**
33	B1149 -Holt Road	Main Distributor Others – 3A2	180	393	117.8%	Receptors would experience a peak flow of 40 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves access to two mobilisation areas and two TC zones. Majority of route has no footways, indicating minimal pedestrian movement.	Low	Low	**Minor Adverse**
34	B1145 – west of Cawston	Main Distributor Others – 3A2	29	252	772.6%	Receptors would experience a peak flow of 26 HGVs per hour during the defined hours of construction. The link serves one mobilisation area and two TC zones.	Medium	Medium	**Moderate Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						However, evidence of existing industrial park and HGV movements routeing through Cawston identified indicating the highway has been adapted to accommodate HGV demand.			
35a	B1159	Main Distributor Others – 3A2	32	326	910.4%	Receptors would experience a peak flow of 33 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves access to the landfall site, two mobilisation areas and two TC zones resulting in a large increase in HGV flows over baseline flows.	High	Low	**Moderate Adverse**
35b	B1159	Main Distributor Others – 3A2	32	296	816.3%	Receptors would experience a peak flow of 30 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link provides access to two mobilisation areas and two TC zones resulting in a large increase in HGV flows over baseline flows.	High	Low	**Moderate Adverse**
36	B1149 – Holt Road	Main Distributor Others – 3A2	161	374	131.6%	Receptors would experience a peak flow of 38 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link provides access to two mobilisation areas and two TC zones. Majority of route has no footways indicating minimal pedestrian movement. Link 36 routes through the village of Horsford where a footway is provided and a 30mph speed limit is in force	Low	High	**Moderate Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						which would reduce the speed of HGVs.			
37	B1145 – Cawston Road	Main Distributor Others – 3A2	55	134	146.4%	Receptors would experience a peak flow of 14 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. No footways provided along entire link indicating minimal pedestrian footfall predicted.	Low	Low	**Minor Adverse**
41	B1436 - Felbrigg	Main Distributor Others – 3A2	160	578	260.9%	Receptors would experience a peak flow of 58 HGVs per hour during the defined hours of construction. Link 41 enables construction traffic originating from Kings Lynn port to the west to access five mobilisation areas and eight TC zones.	High	Low	**Moderate Adverse**
42	B1145 – Reepham Road	Main Distributor Others – 3A2	20	204	916.7%	Receptors would experience a peak flow of 21 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves two TC zones resulting in a large increase in HGV flows over baseline flows.	High	Medium	**Major Adverse**
46	B1145	Main Distributor Others – 3A2	100	324	223.2%	Receptors would experience a peak flow of 33 HGVs per hour during the defined hours of construction. The link serves access to a mobilisation area and two TC zones which result in an increase in HGV flows over baseflows during the construction period. However, the road is classified as a 'Main Distributor Others' route which serves existing industrial estates and commercial properties. The B1145 does not provide for	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						pedestrian access along its length and a designated walking route on an adjacent side road and an underpass is provided to the residential areas to the east.			
47b	North Walsham Road - Edingthorpe Green	Special Access – 3B3	18	90	403.5%	Receptors would experience a peak flow of 9 HGVs per hour during the defined hours of construction. Classified as a 'Special Access' route within the NCC Route hierarchy plan. The link provides access to one TC zone.	Medium	Low	**Minor Adverse**
47c	North Walsham Road - Edingthorpe Green	Special Access – 3B3	18	201	1031.2%	Receptors would experience a peak flow of 21 HGVs per hour during the defined hours of construction. Classified as a 'Special Access' route within the NCC Route hierarchy plan. The link provides access to one mobilisation area and two TC zones. A number of route constraints exist for a large increase in HGV flows including poor geometry and on road footpaths with on street parking.	High	High	**Major Adverse**
49	B1159	Main Distributor Others – 3A2	71	255	257.8%	Receptors would experience a peak flow of 26 HGVs per hour during the defined hours of construction. Classified as a 'Main Distributor Other' route within the NCC Route hierarchy plan. The link routes through the villages of Walcott, Keswick and Broomholm. The link provides access to one mobilisation area and two TC zones. Evidence of direct residential frontage and on street parking exist on the route. Bacton primary school exists adjacent to the B1159.	Medium	High	**Major Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
52	A149 - Wayford Road	Principal – 2C	195	400	105.6%	Receptors would experience a peak flow of 41 HGVs per hour during the defined hours of construction. Classified as a 'Principal route within the NCC Route hierarchy plan and is designed for high vehicle capacity.	Low	Low	**Minor Adverse**
55	A149	Principal – 2C	183	431	134.9%	Receptors would experience a peak flow of 44 HGVs per hour during the defined hours of construction. Classified as a 'Principal Road' route within the NCC Route hierarchy plan and is designed for high vehicle capacity.	Low	Low	**Minor Adverse**
65	A47	Strategic Lorry route*	328	966	194.1%	Receptors would experience a peak flow of 97 HGVs per hour during the defined hours of construction. Classified as a Strategic Lorry Route as defined by Suffolk County Council and is designed for high vehicle capacity and has adequate separation from pedestrian activity.	Low	Medium	**Minor Adverse**
66	Wendling – Dereham Road	Minor local - 4A	56	207	272.6%	Receptors would experience a peak flow of 21 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. The link provides access to one mobilisation area and one side of a TC Zone. A single footway is provided sporadically along the northern verge linking bus stops to local residential dwellings indicating minimal pedestrian movement.	Low	Medium	**Minor Adverse**
67	North Walsham Road / Happisburgh	Minor local - 4A	45	124	179.3%	Receptors would experience a peak flow of 13 HGVs per hour during the defined hours of construction. A low increase in HGVs relative to baseline movements.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
	Road					The link provides access to one mobilisation area located approximately 800m from the junction with the B1159. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. No sensitive receptors are identified along the route.			
68	The Street / Heydon Road	Local Access – 3B2	44	124	182.2%	Receptors would experience a peak flow of 13 HGVs per hour during the defined hours of construction. The link provides access to one mobilisation area. The road is classified as a 'Local Access' route which serves existing agricultural estates and an airfield. The route does not provide for pedestrian access along its length.	Medium	Low	**Minor Adverse**
69	Little London Road	Minor local - 4A	22	262	1077.0%	Receptors would experience a peak flow of 27 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. From the B1145 Lyngate Road Junction to an access point approximately 210m east. The link would serve cable section 16a and two TC zones. The link is a narrow lane with no footway. The lane is lined with established hedgerows, walls and a number of private residential accesses.	High	High	**Major Adverse**
70	Plantation Road	Main Distributor Others – 3A2	45	228	412.5%	Receptors would experience a peak flow of 23 HGVs per hour during the defined hours of construction. The link provides access to a mobilisation area and a TC zone which result in an increase in HGV flows over base	Medium	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						flows during the construction period. The B1145 does not provide for pedestrian access along its length and there are a number of agricultural properties accessed off the link.			
72	Dereham Road / Longham Road - Dillington	Minor local - 4A	45	188	322.8%	Receptors would experience a peak flow of 18 HGVs per hour during the defined hours of construction. The link provides access to a mobilisation area and a TC zone which result in an increase in HGV flows over base flows during the construction period. The B1145 does not provide for pedestrian access along its length and there are a handful of agricultural properties accessed off the link.	Medium	Medium	**Moderate Adverse**
73	Hoe Road South	Minor local - 4A	33	177	430.4%	Receptors would experience a peak flow of 18 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. The link provides access to one TC zone and comprises of a rural narrow lane. Minimal frontage access is located at its junction with the B1147. No footways are provided along the route indicating minimal pedestrian activity.	Medium	Low	**Minor Adverse**
74	Mill Street, Elsing Road – Swanton Morley	Local Access – 3B2	33	105	215.2%	Receptors would experience a peak flow of 11 HGVs per hour during the defined hours of construction. The link serves 1 side of a TC zone. The road is classified as a 'Local Access' route and passes through the village of Swanton Morley. Frontage development and footway provision is evident	Low	Medium	**Minor Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						within Swanton Morley.			
75	B1354	Tourist Access - 3B4	78	150	92.2%	Receptors would experience a peak flow of 15 HGVs per hour during the defined hours of construction. Part classified as a 'Tourist Access' route within the NCC Route hierarchy plan east of New Road as this route passes the Blickling Estate (National Trust) site. The link serves one side of a TC zone. No footways are provided along the route indicating minimal pedestrian activity.	Low	Medium	**Minor Adverse**
76	Hall Lane – North Walsham	Local Access – 3B2	22	94	322.8%	Receptors would experience a peak flow of 10 HGVs per hour during the defined hours of construction. The link provides access to one side of a TC zone. The road is classified as a 'Minor Local 4a' route and is signed as a designated route for HGVs to an existing agricultural property. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
77	Bylaugh	Minor local - 4A	22	94	322.8%	Receptors would experience a peak flow of 10 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local 4a' route and extends approximately 260m from its junction with North Walsham Road to the side access proposed. The link provides access to one side of a TC zone. No footways are provided along the route indicating minimal pedestrian activity.	Medium	Low	**Minor Adverse**
78	B1145 / Suffield Road	Minor local - 4A	22	94	322.8%	Receptors would experience a peak flow of 10 HGVs per hour during the defined hours of construction. The road is classified as a 'Minor Local 4a' route and extends approximately 450m from its junction with North Walsham Road to the side access proposed. The link provides access to one side of a TC zone. No footways are provided along the route indicating minimal pedestrian activity.	Medium	Low	**Minor Adverse**
79	High Noon Road / Church Road	Main Distributor Others – 3A2	78	150	92.2%	Receptors would experience a peak flow of 15 HGVs per hour during the defined hours of construction. The link provides access to one side of a TC zone. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan from its junction with the A140 and Suffield Road No footways provided along entire link indicating minimal pedestrian footfall predicted.	Low	Medium	**Minor Adverse**

*Taken from Suffolk County Councils Lorry Route Network Plan

248. With reference to Table 24.32 the links initially assessed as having significant adverse pedestrian amenity impacts (**moderate** and **major adverse**) are considered in more detail below.

Moderate Adverse Impacts

249. It is proposed to provide a series of 'enhanced' mitigation measures that have been outlined in the OTMP (Document reference 8.8) and will be contained within the finalised traffic management plan (TMP) as outlined in Table 24.33. 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 24.33 Enhanced TMP measures

Enhanced TMP Measures
Driver training and toolbox talks
Driver information packs to include: • Delivery timing 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'
Day time parking controls and stewardship (where a need is identified)
Engagement structure – to provide clear governance and reporting (stakeholders) structure
Monitoring and Reporting – To monitor traffic flows at mobilisation areas, jointing pit locations and the onshore project substation
Contact information at all roadwork sites and robust complaint response standards (7 days)

250. The measures are designed to familiarise drivers with the identified sensitivities within the traffic and transport study area 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.

251. It can be noted from Table 24.32 that links 17, 21, 22, 34, 35a, 35b, 36, 41 and 72 would experience potentially **moderate adverse** impacts.

252. 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 links 17, 21, 22, 35a, 35b, 36, 41 and 72 are expected to be no greater than **minor adverse**.

253. With regard to link 34 (B1145 – west of Cawston) it is assessed that further mitigation is required (in addition to enhanced TMP measures) to mitigate the effects on pedestrian amenity. A commitment is given to a highway mitigation

scheme to include a package of measures to enhance road safety, pedestrian facilities and controlled parking measures to be agreed with Norfolk County Council, the final scope will be included in the finalised TMP. With these measures implemented the residual impact on link 34 is assessed as **minor adverse**.

Major Adverse Impacts

254. Table 24.32 demonstrates that links 42, 47c, 49 and 69 all experience **major adverse** impacts. The following section provides a more comprehensive description of these impacts and details specific mitigation measures to be applied in addition to the enhanced TMP discussed in paragraph 249.

Link 42

255. Link 42 is the B1145 road linking the village of Bawdeswell from the A1067 and on to the village of Reepham. This link is used to access two TC zones (TC 6 and TC 7). The link is considered a medium sensitivity route containing direct frontage development and an entrance to a garden centre.

256. The worst case traffic demand has been developed assuming construction of all infrastructure components being undertaken concurrently. With respect to link 42, this approach results in 184 construction vehicle movements on the link. Table 24.34 breaks down the worst case scenario for link 42 into the separate infrastructure components and their programmed date of works as detailed within Appendix 24.22.

Table 24.34 Link 42 Traffic Derivation

Activity	Programmed date of infrastructure component	Work Gang	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 8a: MA5b	08.11.2023 – 12.04.2024 (includes winter break)	Duct Installation Gang	20	40	11 weeks
TC 6 – Marriott's Way (north and south side)	15.05.2023 – 16.06.2023	TC Gang 2*	72	144	2 weeks
TC 7 – Marriott's Way North and Kerdiston CWS (south side)	19.06.2023 – 21.06.2023	TC Gang 2*	36	72	2 weeks

* TC gang 2 would only work on one TC at any one time during the construction programme.

257. As can be seen from Table 24.34 all three infrastructure components would not occur at the same time.

258. Notwithstanding, when considering the discrete components, it can be seen from Table 24.34 that the HGV movements would peak at 144 daily movements and would still represent an increase of 720% for HGVs.

259. As detailed in the construction programme (Appendix 24.22) TC 6 of the duct installation is predicted to last a total of five weeks during year 1 (2023). The greatest opportunity to reduce the effects of severance upon Link 42 would be to focus on elongating the currently defined construction programme.

260. For example, week one of the construction programme includes the mobilisation and delivery of stone for the construction of the TC compound, week five then demobilises and removes the stone. Increasing each peak period to two weeks would ultimately reduce the traffic movements by 50%.

261. The proposed mitigation measures, breakdown of the infrastructure components and programme amendments would result in the following reduced construction traffic demand as presented in Table 24.35.

Table 24.35 Resultant link 42 traffic demand

Activity	Work Gang	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 8a: MA5b	Duct Installation Gang	20	40	11 weeks
TC 6 – Marriott's Way (north and south side)	TC Gang 2*	36	72	4 weeks
TC 7 – Marriott's Way North and Kerdiston CWS (south side)	TC Gang 2*	36	72	2 weeks

*TC gang 2 would only work on one TC at any one time during the construction programme.

262. The implementation of the proposed mitigation measures (including enhanced TMP) would substantially reduce the number of HGV traffic movements along link 42 to 72 per day.

263. Therefore, the magnitude of effect is predicted to reduce to low on a medium value sensitive receptor; resulting in a **minor adverse** residual impact.

264. The OTMP (document reference 8.8) contains a specific commitment to managing the HGV movements for link 42 to the mitigated levels.

Link 47c and Link 49

265. Links 47c and 49 both provide access to MA10 and two TC zones (TC15 and 16). Link 47c road from the B1145 through a residential area of North Walsham and on to the

villages of Bacton and Broomholm. The link is considered a high sensitivity route and contains several constraints including poor geometry, on road footpaths and on street parking. This link would not be suitable for the forecast increase in construction traffic.

266. Link 49 comprises the B1159 road from its junction with North Walsham Road (west of Happisburgh) north to its junction with Coast Road. The link passes through the villages of Walcott, Bacton and Broomholm. Link 49 is considered a high sensitivity route and contains several constraints including poor geometry, on street parking and a primary school immediately adjacent to the B1159.

267. It is worth noting that link 49 follows the agreed HGV routes associated with the nearby Bacton Gas Terminal, where HGV traffic is directed north on the B1159 (links 35 and 49), continuing north onto the B1159 – Coast Road.

268. The worst case scenario assumes construction of all infrastructure components being undertaken concurrently. This methodology assigns 184 construction vehicle movements onto links 47c and 49. Table 24.36 breaks down the worst case scenario for links 47c and 49 into the separate infrastructure components and their programmed date of works as detailed within Appendix 24.22.

Table 24.36 Links 47c and 49 traffic derivation

Activity	Programmed date of infrastructure component	Work Gang	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 17a: MA10a	26.02.2024 – 01.11.2024	Duct Installation Gang	20	40	20 weeks
TC 15 – North Walsham and Dilham Canal (East side)	19.06.2023 – 21.07.2023	TC Gang 3*	36	72	2 weeks
TC 16 – Bacton Woodland (West and East side)	24.07.2023 – 25.08.2023	TC Gang 3*	72	144	2 weeks

*TC gang 3 would only work on one TC at any one time during the construction programme.

269. As can be seen from Table 24.36 (based on the construction programme presented) all three infrastructure components would not occur at the same time.

270. Notwithstanding, when considering the discrete components, it can be seen from Table 24.36 that the HGV movements would still peak at 144 daily movements and would still represent an increase of 800% for HGVs on link 47c and 203% on Link 49.

271. As detailed in the construction programme (Appendix 24.22) TC 16 of the duct installation is predicted to last a total of 5 weeks during year 1 (2023). The greatest opportunity to reduce the effects of severance upon Link 47c and 49 would be to focus on elongating the currently defined construction programme.

272. For example, week one of the construction programme includes the mobilisation and delivery of stone for the construction of the TC compound, week five then demobilises and removes the stone. Increasing each peak period to two weeks would ultimately reduce the traffic movements by 50%.

273. It is further proposed that deliveries along links 47c and 49 are restricted so that no HGV movements occur within the village during school drop off (8am to 9am) and pick up times (3pm to 4pm).

274. The proposed mitigation measures, breakdown of infrastructure components and programme amendments would result in the following forecast reduced construction traffic demand as presented in Table 24.37.

Table 24.37 Resultant link 47c and 49 traffic demand

Activity	Work Gang	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 17a: MA10a	Duct Installation Gang	20	40	18 weeks
TC 15 – North Walsham and Dilham Canal (East side)	TC Gang 3	36	72	2 weeks
TC 16 – Bacton Woodland (West and East side)	TC Gang 3	36	72	4 weeks

275. With the introduction of a package of mitigation measures the peak number of vehicle movements is forecast to reduce to 72 per day.

276. Therefore, the magnitude of effect is predicted to reduce to very low on a high value sensitive receptor; resulting in a **minor adverse** residual impact.

277. The OTMP (document reference 8.8) contains a specific commitment to managing the HGV movements for link 47c and 49 to the mitigated levels.

Link 69

278. Link 69 has been considered for mitigation during the assessment of Impact 1: Severance assessment Scenario 2. The mitigation proposals discussed in section 24.7.6.1.1 would equally apply to Impact 2: Amenity and would reduce the forecast traffic demand to 48 daily HGV movements.

279. With this much reduced demand the effect is considered to be of low magnitude. However, noting the high sensitivity of the receptor it is expected that the residual impact significance would be 'marginally' **moderate adverse**.

280. The assessed impact is very localised (impacting on a small number of dwellings) and is for a relative short duration of time. It is considered undertaking community engagement to establish clear lines of communication to the appointed contractor, would serve to identify periods that are particularly sensitive to HGV movements and that could further mitigate this impact upon these receptors.

281. The OTMP (document reference 8.8) contains a specific commitment to managing the HGV movements for link 69 to the mitigated levels.

24.7.6.2.2 Scenario 2 Summary

282. Table 24.38 provides a summary of the potential pedestrian amenity impacts and the expected resultant residual impacts following application of the proposed mitigation.

Table 24.38 Scenario 2 Pedestrian amenity summary

Link	Link description	Initial impact assessment	Residual impact assessment	Potential mitigation measures (additional to Outline TMP)
16	B1110/B1146 – Holt Road	**Minor adverse**	n/a	n/a
17	B1145 - Billingford Road	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
21	B1147 – Etling Green	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
22	B1147 – Dereham Road	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
25	Elsing Lane	**Minor adverse**	n/a	n/a
32	B1149 - Edgefield	**Minor adverse**	n/a	n/a
33	B1149 -Holt Road	**Minor adverse**	n/a	n/a
34	B1145 – west of Cawston	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures • Highway Mitigation Scheme
35a	B1159	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
35b	B1159	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
36	B1149 – Holt Road	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
37	B1145 - Cawston Road	**Minor adverse**	n/a	• n/a

Link	Link description	Initial impact assessment	Residual impact assessment	Potential mitigation measures (additional to Outline TMP)
41	B1436 - Felbrigg	**Moderate adverse**	**Minor adverse**	• Enhanced TMP measures.
42	B1145 – Reepham Road	**Major adverse**	**Minor adverse**	• Enhanced TMP measures. • No concurrent Infrastructure components construction. • Extend TC 6 peak construction period.
46	B1145	**Minor adverse**	n/a	n/a
47b	North Walsham Road - Edingthorpe Green	**Minor adverse**	n/a	n/a
47c	North Walsham Road - Edingthorpe Green	**Major adverse**	**Minor adverse**	• Enhanced TMP measures. • No concurrent Infrastructure component construction. • Extend TC 16 Peak construction period. • Restrict delivery window to outside of school pick up and drop off times.
49	B1159	**Major adverse**	**Minor adverse**	• Enhanced TMP measures; • No concurrent Infrastructure component construction. • Extend TC 16 Peak construction period. • Restrict delivery window to outside of school pick up and drop off times.
52	A149	**Minor adverse**	n/a	n/a
55	A149	**Minor adverse**	n/a	n/a
65	A47	**Minor adverse**	n/a	n/a
66	Wendling – Dereham Road	**Minor adverse**	n/a	n/a
67	North Walsham Road / Happisburgh Road	**Minor adverse**	n/a	n/a
68	The Street / Heydon Road	**Minor adverse**	n/a	Refer to section 24.8 for a proposal to implement a scheme developed for cumulative impact.
69	Little London Road	**Major adverse**	**Moderate adverse**	• Enhanced TMP measures; • No concurrent Infrastructure component construction. • Increase construction programme for section 16a of duct installation. • Locate reception sides of TCs to area served by link 69. • Consolidate TC Employees at MA10 to transfer via multi-occupancy vehicles.
70	Plantation Road	**Minor adverse**	n/a	n/a

Link	Link description	Initial impact assessment	Residual impact assessment	Potential mitigation measures (additional to Outline TMP)
72	Dereham Road / Longham Road - Dillington	**Moderate adverse**	**Minor adverse**	Enhanced TMP measures.
73	Hoe Road South	**Minor adverse**	n/a	n/a
74	Mill Street, Elsing Road – Swanton Morley	**Minor adverse**	n/a	n/a
75	B1354	**Minor adverse**	n/a	n/a
76	Hall Lane – North Walsham	**Minor adverse**	n/a	n/a
77	Bylaugh	**Minor adverse**	n/a	n/a
78	B1145 / Suffield Road	**Minor adverse**	n/a	n/a
79	High Noon Road / Church Road	**Minor adverse**	n/a	n/a

24.7.6.2.3 Scenario 1

283. The peak daily change in total flows or HGV component for links 17, 21, 22, 23, 25, 32, 34, 35a, 35b, 42, 47b, 47c, 66-69, 76-78 and A to V are greater than the 100% GEART impact threshold whereby GEART suggests negative impacts may be experienced (paragraph 44). Table 24.39 presents the impacts associated with each identified link.

284. In addition, the minor links 73, 74 and 75 experience low baseline HGV flows with increases close to the 100% threshold. These links are also considered further noting that a small change in demand could result in potentially significant impacts.

285. The remaining links all experience traffic flows significantly below the 100% thresholds 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**.

286. Table 24.39 presents the impact assessment for each identified link. To establish the context for the impact assessment reference is made to Norfolk County Council's route hierarchy plan (Norfolk County Council, 2017), (Appendix 24.1).

Table 24.39 Scenario 1 Pedestrian amenity assessment

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
17	B1145 - Billingford Road	Main Distributor Others – 3A2	54	117	118.2%	Receptors would experience a peak flow of 12 HGVs per hour during the defined hours of construction. The link serves cable sections 3 and 4 resulting in a slight increase in HGV flows over baseline flows. The majority of the route has no footways indicating minimal pedestrian movement. Where the link passes through the village of Billingford a footway is provided and a 30mph speed limit is in force.	Low	Medium	**Minor Adverse**
21	B1147 - Etling Green	Local Access – 3B2	18	47	166.3%	Receptors would experience a peak flow of 5 HGVs per hour during the defined hours of construction. Classified as a 'Local Access' route within NCC Route hierarchy plan. The link serves cable section 4 resulting in a low increase in HGV flows over baseline flows. No footways provided along entire link indicating minimal pedestrian footfall predicted.	Low	Low	**Minor Adverse**
22	B1147 - Dereham Road	Local Access – 3B2	23	53	124.7%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. Classified as 'Local Access' route within NCC Route hierarchy plan. The link serves cable section 4 resulting in a low increase in HGV flows over baseline flows.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
23	Northgate - from junction with B1146	Minor local - 4A	41	105	155.4%	Receptors would experience a peak flow of 11 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. The link provides access to cable section 3 and 4. A low increase in HGV flows relative to baseline HGV flows. No footways provided along entire link indicating minimal pedestrian footfall predicted.	Low	Low	**Minor Adverse**
25	Elsing Lane	Local Access – 3B2	6	36	512.0%	Receptors would experience a peak flow of 4 HGVs per hour during the defined hours of construction. Classified as 'Local Access' route within NCC Route hierarchy plan. The link serves cable section 5.	Low	Low	**Minor Adverse**
32	B1149 - Edgefield	Main Distributor Others – 3A2	88	179	104.5%	Receptors would experience a peak flow of 18 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves access to 4 cable sections (8, 9, 10 and 11). Majority of route has no footways, indicating minimal pedestrian movement. Link 32 routes through the villages of Holt and Edgefield where at least one footway is provided adjacent to the road. A speed limit of 30mph is in force in throughout the village extents.	Low	Medium	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
34	B1145 – west of Cawston	Main Distributor Others – 3A2	30	161	430.8%	Receptors would experience a peak flow of 17 HGVs per hour during the defined hours of construction. The link serves one mobilisation area and two TC zones. However, evidence of existing industrial park and HGV movements routeing through Cawston identified indicating the Highway has been adapted to accommodate HGV demand.	Medium	Medium	**Moderate Adverse**
35a	B1159	Main Distributor Others – 3A2	34	129	279.4%	Receptors would experience a peak flow of 13 HGVs per hour during the defined hours of construction. The link serves one mobilisation area and two TC zones. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves access to three cable sections (14, 15 and 16) resulting in a medium increase in HGV flows over baseline flows.	Medium	Low	**Minor Adverse**
35b	B1159	Main Distributor Others – 3A2	34	129	279.4%	Receptors would experience a peak flow of 13 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link provides access to three cable sections (14, 15 and 16) resulting in a medium increase in HGV flows over baseline flows.	Medium	Low	**Minor Adverse**
42	B1145 – Reepham	Main Distributor	21	61	190.2%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction.	Low	Medium	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
	Road	Others – 3A2				Classified as 'Main Distributor Others' route within NCC Route hierarchy plan. The link serves cable section 7 resulting in a low HGV demand.			
47b	North Walsham Road - Edingthorpe Green	Special Access – 3B3	19	49	162.4%	Receptors would experience a peak flow of 5 HGVs per hour during the defined hours of construction. Classified as a 'Special Access' route within the NCC Route hierarchy plan. The link provides access to cable section 14.	Low	Low	**Minor Adverse**
47c	North Walsham Road - Edingthorpe Green	Special Access – 3B3	19	49	162.4%	Receptors would experience a peak flow of 5 HGVs per hour during the defined hours of construction. Classified as a 'Special Access' route within the NCC Route hierarchy plan. The link provides access to cable section 14. A number of route constraints exist for a large increase in HGV flows including poor geometry and on road footpaths with on street parking.	Low	High	**Moderate Adverse**
66	Wendling – Dereham Road	Minor local - 4A	59	127	117.7%	Receptors would experience a peak flow of 13 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. The link provides access to cable sections 1 and 2. A single footway is provided sporadically along the northern verge linking bus stops to local residential dwellings indicating minimal pedestrian movement.	Low	Medium	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
67	North Walsham Road / Happisburgh Road	Minor local - 4A	47	111	137.6%	Receptors would experience a peak flow of 12 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. The link serves cable section 15 and 16. No sensitive receptors are identified along the route, indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
68	The Street / Heydon Road	Local Access – 3B2	46	111	141.9%	Receptors would experience a peak flow of 13 HGVs per hour during the defined hours of construction. The road is classified as a 'Local Access' route which serves existing agricultural estates and an airfield. The link provides access to cable sections 9 and 10. The route does not provide for pedestrian access along its length.	Low	Low	**Minor Adverse**
69	Little London Road	Minor local - 4A	23	84	259.8%	Receptors would experience a peak flow of 9 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan. From the B1145 Lyngate Road Junction to an access point approximately 210m east. The link would serve cable section 14. The link is a narrow lane lined with no footway. The lane is lined with established hedgerows, walls and a number of private residential accesses.	Medium	High	**Moderate Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
73	Hoe Road South	Minor local - 4A	35	64	83.1%	Receptors would experience a peak flow of 7 HGVs per hour during the defined hours of construction. Classified as a 'Minor Local 4a' route within the NCC Route hierarchy plan The link provides access to cable section 4 and comprises of a rural narrow lane. Minimal frontage access is located at its junction with the B1147. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
74	Mill Street, Elsing Road – Swanton Morley	Local Access – 3B2	35	65	85.3%	Receptors would experience a peak flow of 7 HGVs per hour during the defined hours of construction. The road is classified as a 'Local Access' route which routes through the village of Swanton Morley. The link serves access to cable section 5. Frontage development and footway provision is evident within Swanton Morley.	Low	Medium	**Minor Adverse**
75	B1354	Tourist Access - 3B4	82	152	85.8%	Part classified as a 'Tourist Access' route within the NCC Route hierarchy plan east of New Road as this route passes the Blickling Estate (National Trust) site. No footways are provided along the route indicating minimal pedestrian activity.	Low	Medium	**Minor Adverse**
76	Hall Lane – North Walsham	Local Access – 3B2	23	55	134.4%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						The link provides access to cable section 12. The road is classified as a 'Minor Local 4a' route and is signed as a designated route for HGVs to an existing agricultural property. No footways are provided along the route indicating minimal pedestrian activity.			
77	Bylaugh	Minor local - 4A	23	54	129.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 14. The road is classified as a 'Minor Local 4a' route and extends approximately 260m from its junction with North Walsham Road to the side access proposed. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
78	B1145 / Suffield Road	Minor local - 4A	23	53	128.0%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 5. The road is classified as a 'Minor Local 4a' route and extends approximately 450m from its junction with North Walsham Road to the side access proposed. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
A	Dale Road	Minor local - 4A	23	58	147.2%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 2. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
B	Bradenham Lane	Minor local - 4A	23	92	294.2%	Receptors would experience a peak flow of 10 HGVs per hour during the defined hours of construction. The link provides access to cable sections 1 and 2. No footways are provided along the route indicating minimal pedestrian activity.	Medium	Medium	**Moderate Adverse**
C	Norwich Road	Minor local - 4A	23	53	124.7%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 4. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
D	Lime Kiln Road (west)	Minor local - 4A	23	57	143.7%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 6. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
E	Mill Lane	Minor local - 4A	23	58	147.2%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						The link provides access to cable section 3. No footways are provided along the route indicating minimal pedestrian activity.			
F	Heydon Road	Minor local - 4A	23	52	123.1%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 9. Minimal frontage at junction with B1145 and no footways are provided along the route indicating minimal pedestrian activity.	Low	Medium	**Minor Adverse**
G	B1145 - Cawston road	Main Distributor Others – 3A2	23	55	136.6%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 8. The route is lined with footways on each verge with a number of residential properties indicating pedestrian activity.	Low	High	**Moderate Adverse**
H	Wood Dalling Road	Minor local - 4A	23	55	136.6%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 8. The route is part provided with a footway on the western verge with a number of residential properties indicating pedestrian activity.	Low	High	**Moderate Adverse**
I	Southgate (Road to	Minor local - 4A	23	52	123.1%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
	Southgate from B1149)					The link provides access to cable section 9. No footways are provided along the route indicating minimal pedestrian activity.			
J	Banningham Road	Local Access – 3B2	23	57	144.0%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 11. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
K	Greens Road, B1145, Felmingham Road, Brick Kiln Lane	Main Distributor Others – 3A2 and Minor local - 4A	23	60	158.4%	Receptors would experience a peak flow of 7 HGVs per hour during the defined hours of construction. The link provides access to cable section 13. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
L	Paston Road	Minor local - 4A	23	54	129.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 14. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
M	North Walsham Road / Happisburgh Road	Minor local - 4A	23	57	141.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 15. Frontage development with no footway provision is	Low	High	**Moderate Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
						evident within Ridlington indicating minimal pedestrian activity.			
N	Bacton Road	Minor local - 4A	23	57	141.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 15. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
O	Edingthorpe Road	Minor local - 4A	23	57	141.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 15. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
P	Edingthorpe	Minor local - 4A	23	57	141.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 15. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
Q	Hole House Road	Minor local - 4A	23	57	141.9%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 15. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
R	North Walsham Road, Grub Street	Local Access – 3B2	23	55	133.2%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 16. No footways are provided along the route indicating minimal pedestrian activity.	Low	Medium	**Minor Adverse**
S	Walcott Green	Minor local - 4A	23	55	133.2%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 16. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
T	Unnamed Road	Minor local - 4A	23	57	144.0%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 11. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**
U	Swanton Road	Minor local - 4A	23	53	124.7%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 4. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2026 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cons'tion					
V	Lime Kiln Road	Minor local - 4A	23	57	143.7%	Receptors would experience a peak flow of 6 HGVs per hour during the defined hours of construction. The link provides access to cable section 6. No footways are provided along the route indicating minimal pedestrian activity.	Low	Low	**Minor Adverse**

*Taken from Suffolk's Lorry Route Network Plan (Suffolk County Council, 2017)

287. With reference to Table 24.39, the links initially assessed as having potentially significant adverse pedestrian amenity impacts (**moderate** and **major adverse**) are considered in more detail below.

288. It can be noted from Table 24.39 that links 34, 47c, 69, B, G, H and M would experience potentially **moderate adverse** impacts. Table 24.39 demonstrates no links would experience major adverse impacts.

289. Paragraph 249 sets out the concept of enhanced mitigation measures contained within the OTMP (document reference 8.8) submitted with the DCO application.

290. 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 links 34, 47c, 69, B, G, H and M are expected to be no greater than **minor adverse**.

24.7.6.2.4 Scenario 1 Summary

291. Table 24.40 provides a summary of the potential pedestrian amenity impacts during Scenario 1 and the expected resultant residual impacts following application of the proposed mitigation.

Table 24.40 Scenario 1 Pedestrian amenity summary

Link	Link description	Initial impact assessment	Residual impact assessment	Potential mitigation measures (additional to OTMP)
17	B1145 - Billingford Road	**Minor adverse**	n/a	n/a
21	B1147 – Etling Green	**Minor adverse**	n/a	n/a
22	B1147 – Dereham Road	**Minor adverse**	n/a	n/a
23	Northgate - from junction with B1146	**Minor adverse**	n/a	n/a
25	Elsing Lane	**Minor adverse**	n/a	n/a
32	B1149 - Edgefield	**Minor adverse**	n/a	n/a
34	B1145 – west of Cawston	**Moderate adverse**	**Minor adverse**	Enhanced TMP measures.
35a	B1159	**Minor adverse**	n/ae	n/a
35b	B1159	**Minor adverse**	n/a	n/a
42	B1145 – Reepham Road	**Minor adverse**	n/a	n/a
47b	North Walsham Road - Edingthorpe Green	**Minor adverse**	n/a	n/a
47c	North Walsham Road - Edingthorpe Green	**Moderate adverse**	**Minor adverse**	Enhanced TMP measures.
66	Wendling – Dereham Road	**Minor adverse**	n/a	n/a
67	North Walsham Road / Happisburgh Road	**Minor adverse**	n/a	n/a

Link	Link description	Initial impact assessment	Residual impact assessment	Potential mitigation measures (additional to OTMP)
68	The Street / Heydon Road	**Minor adverse**	n/a	n/a
69	Little London Road	**Moderate adverse**	**Minor adverse**	Enhanced TMP measures.
73	Hoe Road South	**Minor adverse**	n/a	n/a
74	Mill Street, Elsing Road – Swanton Morley	**Minor adverse**	n/a	n/a
75	B1354	**Minor adverse**	n/a	n/a
76	Hall Lane – North Walsham	**Minor adverse**	n/a	n/a
77	Bylaugh	**Minor adverse**	n/a	n/a
78	B1145 / Suffield Road	**Minor adverse**	n/a	n/a
A	Dale Road	**Minor adverse**	n/a	n/a
B	Bradenham Lane	**Moderate adverse**	**Minor adverse**	Enhanced TMP measures.
C	Norwich Road	**Minor adverse**	n/a	n/a
D	Lime Kiln Road (west)	**Minor adverse**	n/a	n/a
E	Mill Lane	**Minor adverse**	n/a	n/a
F	Heydon Road	**Minor adverse**	n/a	n/a
G	B1145 - Cawston road	Moderate adverse	Minor adverse	Enhanced TMP measures.
H	Wood Dalling Road	Moderate adverse	Minor adverse	Enhanced TMP measures.
I	Southgate (Road to Southgate from B1149)	**Minor adverse**	n/a	n/a
J	Banningham Road	**Minor adverse**	n/a	n/a
K	Greens Road, B1145, Felmingham Road, Brick Kiln Lane	**Minor adverse**	n/a	n/a
L	Paston Road	**Minor adverse**	n/a	n/a
M	North Walsham Road / Happisburgh Road	**Moderate adverse**	**Minor adverse**	Enhanced TMP measures.
N	Bacton Road	**Minor adverse**	n/a	n/a
O	Edingthorpe Road	**Minor adverse**	n/a	n/a
P	Edingthorpe	**Minor adverse**	n/a	n/a
Q	Hole House Road	**Minor adverse**	n/a	n/a
R	North Walsham Road, Grub Street	**Minor adverse**	n/a	n/a
S	Walcott Green	**Minor adverse**	n/a	n/a
T	Unnamed Road	**Minor adverse**	n/a	n/a
U	Swanton Road	**Minor adverse**	n/a	n/a
V	Lime Kiln Road	**Minor adverse**	n/a	n/a

24.7.6.3 Impact 3: Road Safety

24.7.6.3.1 Scenario 2

292. During stakeholder engagement, Highways England stated that they *'do not recognise GEART significance thresholds for assessing road safety (and capacity)'.* Therefore, as a 'first pass' only those links that exhibit a 'negligible' increase in total traffic or HGV component have been screened out.

293. Table 24.41 provides a summary of the collision clusters identified in Table 24.12 and includes details of the peak increase in daily construction flows in comparison to the forecast background daily traffic flows in 2023.

Table 24.41 Crashmap collision cluster information (Scenario 2)

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
2	1	A47 at the junction of Woodlane and Berrys Lane	2.6%	12.8%	It is considered that a peak change in total traffic of 2.6% and HGV traffic of 12.8% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore the impact is assessed as **minor adverse**.
	7	A47 junction with Taverham Road and Blind Lane			
	8	A47 roundabout with Dereham Road			
3	9	A47 roundabout with A11 Newmarket Road	1.0%	9.1%	It is considered that a peak change in total traffic of 1.0% and HGV traffic of 9.1% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
3/4/8	6	A146 (Loddon Road) junction with slip road onto A47	0.7% - 2.4%	9.1% - 39.0%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
5	10	A47 Cucumber Lane Roundabout	1.4%	28.1%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
	11	A47 Yarmouth Road			
	12	A47 North Bulringham			
5/6	13	A47 New Road roundabout with A1064	1.4% - 2.6%	28.1% - 41.1%	
6	14	A47 New Road			

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
	15	A47 junction with Branch Road	2.6%	41.1%	
6/9/53	16	A47 / Acle New Road / Runham Road Roundabout	1.7% - 2.6%	41.1% - 58.6%	
7	18	A47 Swaffham	2.4%	18.8%	It is considered that a peak change in total traffic of 2.4% and HGV traffic of 18.8% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
9	17	A47 River Yare Bridge	1.7%	54.8%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
9	19	A12 roundabout with Gapton Hall Road and Pasteur Road			
10	20	A12 roundabout with Lowestoft Road	2.1%	94.1%	
26	3	Dereham Road (A1074) at the junction of Larkman Lane and Marl Pit Lane	0.5%	0.0%	It is considered that a peak change in total traffic of 0.5% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the magnitude of impact is assessed as **minor adverse**.
26	21	Dereham Road (A1074) roundabout with Breckland Road			
26/27	2	A140, A1074 and Dereham Road (A1074) roundabout	0.4% - 0.5%	0.0%	It is considered that a peak change in total traffic of 0.5% represents a very low magnitude of change on a potentially high sensitive receptor. Therefore, the magnitude of impact is assessed as **minor adverse**.
27	4	A140 at the junction of Hellesdon Hall Road	0.4%	0.0%	
39	22	A140 (Hevingham) junction with Church Street	2.8%	20.6%	It is considered that a peak change in total traffic of 2.8% and HGV traffic of 20.6% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
53/54	23	A149 Acle New Road roundabout with Fuller's Hill	0.9% - 1.8%	39.7% - 58.6%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
62/ 63	5	A1052 (Chartwell Road) Roundabout with the A1151 (Wroxham Road and Sprowston Road) and Mousehold Lane	0.5% - 0.7%	0.0%	It is considered that a peak change in total traffic of 0.7% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the magnitude of impact is assessed as **minor adverse**

294. Table 24.41 identifies that of the 23 collision clusters within the traffic and transport study area, 11 would experience very low magnitude of effect on a high sensitive receptor resulting in a **minor adverse** impact. The remaining 12 sites would experience increases in HGV traffic which could potentially result in significant impacts and are therefore considered further in this assessment.

295. To inform the further review of the above identified junctions, detailed collision data (known as STATS19[8]) has been obtained from Norfolk County Council for the most recently available five year period (01.12.13 to 30.11.18).

296. The STATS19 collision data has been examined to identify any emerging patterns or factors that could be exacerbated by the project's traffic generation. The review is summarised below with full details included as Appendix 24.32.

Cluster Site 6

297. Cluster site 6 is located at the signalised junction of the A47 and A146 Loddon Road.

298. Within the latest five-year study period there have been seven slight collisions at Cluster site 6. In total of the seven collisions, six were collisions between vehicles turning right from the A47 south bound off-slip and vehicles going east on the A146. It is therefore considered that there is a pattern of collisions involving vehicle contravening the existing traffic signals.

299. A review of the baseline highway environment has identified that there is good forward visibility of the traffic signals on both approaches to the junction. 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

[8] 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).

junction 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 Loddon Road.

300. No HGV traffic is projected to turn right from the A47 on to the A149. This routing strategy would be secured through controls and measures (such as direction signing and delivery instructions) embedded within the outline OTMP.

301. It is therefore considered that an increase in total traffic of up to 2.4% through the junction represents a very low magnitude of effect on a potentially high sensitive receptor resulting in a **minor adverse** impact.

Cluster Site 10

302. Cluster site 10 is situated at a four-arm roundabout of the A47 and Cucumber Lane to the north of Brundall.

303. The roundabout junction has experienced 16 slight and three serious collisions within the latest five-year study period. A review of the collisions has indicated five were rear end shunt type collisions, six were attributable to drivers colliding with other vehicles whilst negotiating the roundabout and eight were loss of control collisions.

304. The rear end shunt type collisions all occurred on the A47 approaches to the roundabout with four occurring on the western arm and one on the eastern arm. The collisions resulting from drivers colliding with other vehicles whilst negotiating the roundabout all occurred as vehicles traveling from west to east through the roundabout. The loss of control collisions occurred on all approaches to the roundabout, with five of the eight collisions due to loss of control occurring whilst the carriageway was wet.

305. It concluded that there is a pattern of collisions involving rear end shunts and poor positioning for vehicles approaching the roundabout from the west. The junction is therefore assessed as a high sensitive receptor.

306. Cluster site 10 is located on link 5 that is projected to experience an increase in total traffic of 1.4% and HGV traffic of 28.1%. It is considered that an increase in HGV total traffic of 28.1% through represents a low magnitude of effect on a high sensitivity receptor resulting in a **moderate adverse** impact.

307. To mitigate the potential for construction traffic to escalate the identified pattern of rear end shunts it is proposed to introduce high friction surfacing on the approach to the junction (as per the western approach), this would assist drivers avoiding a collision if braking late. In addition to mitigate the collisions resulting from drivers colliding with other vehicles whilst negotiating the roundabout advanced lane

delineators would be provided on all approaches, this would assist drivers with understanding priorities on the approach to the roundabout.

308. With the implementation of the additional mitigation measures, the sensitivity of the junction would be expected to reduce to low. The magnitude of effect remains low upon a low sensitive receptor resulting in a **minor adverse** residual impact.

Cluster Site 11

309. Cluster site 11 is located at the on-slip from Plantation Road to the A47. Within the latest five-year study period, there have been six slight collisions of which all except one were rear end shunt type collisions. Noting the pattern of rear end shunt collisions, the cluster is assessed as a high sensitive receptor.

310. 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.

311. Cluster site 11 is located on link 5 that is projected to experience an increase in total traffic of up to 1.4% and HGV traffic of up to 28.1%. Noting that none of the recorded collisions involved HGVs and that the collisions are of a type that would be attributable to driver inattention, the percentage change in HGV traffic alone is not considered to be a material consideration. It is therefore considered that a change in total traffic of 1.4% through Cluster site 11 represent a very low magnitude of effect on a potentially high sensitive receptor resulting in a **minor adverse** impact.

Cluster Site 12

312. Cluster site 12 is located on the A47 south of North Burlingham within proximity of the staggered junction of the B1140 and Acle Road.

313. Cluster 12 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.

314. 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.

315. The construction of the proposed improvements is projected to start in spring 2020 and should be complete by the start of the project construction programme in 2022.

316. It is considered that the proposed corridor improvement programme would be appropriate to mitigate the traffic impact of the project and therefore both discrete cluster locations are considered as a low sensitivity receptor.

317. This is considered to represent a low magnitude of effect on a low sensitivity receptor resulting in a **minor adverse** residual impact.

318. Notwithstanding, during consultation, Highways England requested that a contingency mitigation plan for cluster 12 was considered in the event that the corridor improvement programme is delayed.

319. In response, an investigation into collision patterns at cluster 12 has been undertaken.

320. Within the latest five-year study period there have been 15 slight and three serious collisions. These 18 collisions comprised of 12 collisions between turning vehicles, five rear end shunt type collisions, and one loss of control collision due to aquaplaning.

321. A detailed review of the 12 turning collisions has identified that six occurred as vehicles turned from B1140 to the A47, four of which were right turning. In addition, four collisions occurred as vehicles turned from Acle Road to the A47, two of which were right turning and two left turning. The remaining two turning collisions occurred as vehicles turned right from the A47 on to the B1140 and Acle Road.

322. It is concluded that there is a pattern of collisions involving vehicles turning from the side roads on to the A47. Cluster site 12 is therefore assessed as a high sensitive receptor.

323. Cluster 12 is located on link 5 that is projected to experience an increase in total traffic of up to 1.4% and HGV traffic of up to 28.1%. However, no traffic is projected to turn on to or off the A47 at this location, as such the magnitude of effect is assessed as very low on a high sensitivity receptor resulting in a **minor adverse** impact. This routing strategy would be secured through controls and measures (such as direction signing and delivery instructions) embedded within the OTMP (document reference 8.8).

Cluster Site 13

324. Cluster site 13 is situated at a four-arm roundabout junction of the A47 and A1064 to the east of Acle.

325. Within the latest five-year study period four slight and one fatal collision have been recorded at this junction. The fatal collision involved a young driver who lost control and went over the central island and roundabout and finally collided with a recovery vehicle. The four remaining slight collisions involved three rear end shunts and one loss of control collision where the driver attempted to avoid a rear end shunt.

326. The four rear end shunt type collisions involved drivers approaching the roundabout from the east, three of which occurred when the carriageway was wet. 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.

327. However, a review of forward visibility to the give-way line has identified that existing vegetation is overgrown. 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 13 is of high sensitivity. It is noted that whilst there is a pattern of rear end shut type collisions at cluster site 13, the collisions are of a type that would be typical for this form of junction and existing road targeted road safety measures are provided. Therefore, the junction is assessed a low sensitive receptor.

328. Cluster site 13 is located at the intersection of link 5 and 6 that are projected to experience an increase in HGV traffic of up to 41.1%. This is considered to represent a medium magnitude of effect on a high sensitivity receptor resulting in a **major adverse** impact.

329. To mitigate the potential for construction traffic to escalate the identified pattern of rear end shunt collisions it is strongly recommended that the local highway authority increase the frequency of vegetation clearance in this location. Notwithstanding, Norfolk Boreas Limited would also ensure that the appointed contractor is made aware of this risk and require them to trim and maintain the vegetation in this location throughout construction.

330. With the implementation of the additional mitigation measures the sensitivity of the Cluster site 13 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.

Cluster Site 14

331. Cluster site 14 is located approximately 2.7km south east of Acle on the A47 New Road.

332. There have been ten slight and three serious collisions within the five-year study period of which approximately nine were rear end shunt type collisions and two were due to overtaking manoeuvres. Of the nine rear end shunt collisions, eight involved eastbound vehicles of which a majority stopped as a result of stationary traffic.

333. It concluded that there is a pattern of rear end shunt collisions, and as such the cluster is assessed as a high sensitive receptor. A review of the highway environment within the vicinity of Cluster site 14 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.

334. Cluster site 14 is located on link 6 that is projected to experience an increase in total traffic of up to 2.6% and HGV traffic of up to 41.1%. Noting that only one of the ten recorded collisions involved an HGV and that the collisions are of a type that would be attributable to driver inattention, the percentage change in HGV traffic alone is not considered to be a material consideration. It is considered that a change in total traffic of 2.6% through Cluster site 14 represent a very low magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

Cluster Site 15

335. Cluster site 15 is located at the priority junction of the A47 with Branch Road.

336. During the latest five-year study period there have been seven slight collisions and one serious collision. In total of the eight collisions, seven were rear end shunt type collisions and one was as a result of the vehicle pulling out into the path of an oncoming vehicle on the main carriageway.

337. Of the seven rear end shunt type collisions, four occurred due to queuing as a result of a vehicle waiting to turn right from the A47 (approaching from the west) on to Branch Road. It is concluded that there is a pattern of rear end shut collisions related to vehicles turning right into Branch Road, Cluster site 15 is therefore assessed as high sensitive receptor.

338. A review of the existing highway environment for vehicles approaching from the west on the A47 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.

339. Cluster site 15 is located on link 6 that is projected to experience an increase in total traffic of up to 2.6% and HGV traffic of up to 41.1%. However, none of this construction traffic would be expected to turn off/ onto the A47 at this location. Therefore, it is considered that an increase in total traffic of up to 2.6% represents a very low magnitude of effect on a high sensitivity receptor resulting in a **minor adverse** impact.

Cluster Site 16

340. Cluster site 16 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.

341. 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;

- A larger roundabout with traffic lights and a widened bridge over the railway line to accommodate widening of the A47 southern exit and approach
- Realignment to current highway standards to improve driver experience and safety.

342. The construction of the proposed improvements is projected to start in spring 2019 and should be complete by the start of the project construction programme in 2022.

343. Notwithstanding, during consultation, Highways England requested that a contingency mitigation plan on the junction was considered in the event that the corridor improvement programme is delayed.

344. In response, an investigation into collision patterns at cluster 16 has been undertaken.

345. The roundabout junction has experienced eight slight collisions within the latest five-year study period. Of these eight collisions, five were rear end shunt type collisions, one resulted from a driver driving in the wrong lane, and one occurred due to a driver failing to give way at the roundabout. The eighth collision occurred as an HGV turning right took a wide angle and colliding with a second vehicle.

346. It is noted that whilst there is a pattern of rear end shunt collision types at Cluster site 16, 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 low sensitive receptor.

347. Cluster 16 is located at the intersection of link 6, 9 and 53, that are projected to experience an increase in HGV traffic of up to 58.6%. The magnitude of effect is therefore considered to be medium on a low sensitivity receptor resulting in a **minor adverse** impact.

Cluster Site 17

348. Cluster site 17 is located on the A12 River Yare Bridge.

349. Within the latest five-year study period, there have ten collisions of which nine were rear end shunt type collisions, seven of which resulted in slight in jury and two in

serious injury. The remaining collision was a result of a driver falling asleep and colliding with an oncoming vehicle.

350. It concluded that there is a pattern of rear end shunt collisions, and as such the cluster is assessed as a high sensitive receptor. Cluster site 17 is located on link 9 that is projected to experience an increase in HGV traffic of up to 54.8%. This is considered to represent a medium magnitude of effect on a high sensitivity receptor resulting in a **major adverse** impact.

351. To mitigate the potential for construction traffic to escalate the identified pattern of rear end shunt collisions it is proposed to introduce 'Queues Likely' signage to make drivers aware of the potential for queuing traffic in this location.

352. With the implementation of the additional mitigation measures the sensitivity of the Cluster site 17 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.

Cluster Site 19

353. Cluster site 19 is situated at a four-arm roundabout junction of the A12 and A1243 to the west of Great Yarmouth. The junction forms part of Highways England's Great Yarmouth Junction Improvements as part of the A47 corridor improvement RIS scheme.

354. 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

355. The construction of the proposed improvements is projected to start in spring 2019 and should be complete by the start of the project construction programme in 2022.

356. Notwithstanding, during consultation, Highways England requested that a contingency mitigation plan on the junction was considered in the event that the corridor improvement programme is delayed.

357. In response, an investigation into collision patterns at cluster 16 has been undertaken.

358. The roundabout junction has experienced seven slight collisions within the latest five year study period. Of the seven collisions, four were rear end shunts with three occurring on the A12 southbound approach to the roundabout and one on the A12 northbound approach. The remaining collisions include a vehicle colliding with a load that had been shed by the vehicle in front, a collision between vehicles due to a driver going the wrong way at the roundabout and a collision between two vehicles

on the roundabout due to drivers not staying in lane whilst negotiating the roundabout.

359. It is concluded that there is no significant emerging pattern in collision type and location and collision types are typical for a roundabout junction. The junction is therefore assessed as low sensitivity.

360. Cluster site 19 is located on link 9 that is projected to experience an increase in HGV traffic of up to 54.8%. This is considered to represent a medium magnitude of effect on a low sensitivity receptor resulting in a **minor adverse** impact.

Cluster Site 20

361. Cluster site 20 is situated at a three-arm roundabout junction of the A12 and Lowestoft Road to the west of Hopton.

362. Within the latest five-year study period the roundabout junction has experienced five slight collisions. Of the five collisions, three were rear end shunts, of which two occurred on the A12 southern approach and one on the A12 northern approach. The remaining two collisions involved a single vehicle losing control and a vehicle swerving to avoid a collision with a turning vehicle.

363. It is concluded 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 low sensitivity.

364. Cluster site 20 is located on link 10 that is projected to experience an increase in total traffic of up to 2.1% and HGV traffic of up to 94.1%. Noting that none of the recorded collisions involved HGVs, the percentage change in HGV traffic alone is not considered to be a material consideration. It is therefore considered that a change in total traffic of 2.1% through Cluster site 20 represent a very low magnitude of effect on a low sensitivity receptor resulting in a **minor adverse** impact.

Cluster Site 23

365. Cluster site 23 is situated at a four-arm roundabout of the A12, A149 and B1141 in Great Yarmouth.

366. Within the latest five-year study period the roundabout junction has experienced ten collisions, of which, nine resulted in slight and one in serious injury. In total of the ten collisions, three were rear end shunts and two were attributable to collisions due to drivers not staying within their lane whilst negotiation the roundabout. The remaining two collisions involved a single vehicle losing control and a car colliding with a pedal cycle.

367. It is concluded 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 low sensitivity.

368. Cluster site 23 is located on the intersection of link 53 and 54 that is projected to experience an increase of HGV traffic of up to 58.6%. This is considered to represent a medium magnitude of effect on a low sensitivity receptor resulting in a **minor adverse** impact.

Other points of access

Onshore project substation and National Grid substation extension access

369. An A47 Access Technical note produced by Royal HaskoningDHV and provided to ETG stakeholders in April 2018 was produced (a subsequent clarification note was also produced which identified the preferred access strategy) both notes are presented in Appendix 24.33.

370. The note details three access options as follows:

- Access A (AC 178): Existing Necton National Grid Substation access utilising a U-turn strategy at Dereham to remove right turn access off the A47;
- Access A1 (AC 178): Upgrading the existing Necton National Grid Substation access to a Design Manual for Roads and Bridges (DMRB) compliant access; and
- Access B (AC 180): Construction of a new DMRB compliant access opposite 'Spicers Corner' junction for the onshore project substation.

371. Based on an evaluation of road safety and environmental impact, the technical note concludes there are no overriding reasons to reject any of these three access options.

372. The technical notes further concluded, there are no overriding technical/policy constraints preventing A or A1 being utilised concurrently with B. Rather, there are potential road safety benefits to be achieved by removing vehicle conflicts between the onshore project substation and National Grid substation traffic.

Road crossings and side accesses

373. A number of proposed (new) access points will be utilised on the highway network to access the onshore cable route infrastructure components. The accesses would introduce slow moving HGV traffic with the potential to lead to adverse road safety impacts.

374. In order to manage the potential impacts at the new accesses, each access would be designed in accordance with the relevant standards providing appropriate geometry and visibility splays. In addition, advanced warning signing and temporary speed

limits would also be provided as required.

375. The exact design of each access would be developed and agreed post-consent with Norfolk County Council and Highways England and presented within the final AMP secured through DCO Requirement 22. Generic designs are to be included in the OAMP which accompany the DCO application.

376. All new access points are subject to an independent Road Safety Audit prior to construction.

24.7.6.3.2 Scenario 1

377. Table 24.42 provides a summary of the collision clusters identified in Table 24.12 and includes details of the peak increase in daily construction flows in comparison to the forecast background daily traffic flows in 2026 (Scenario 1).

Table 24.42 Crashmap collision cluster information (Scenario 1)

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
2	1	A47 at the junction of Woodlane and Berrys Lane	0.6%	3.0%	It is considered that a peak change in total traffic of 0.6% and HGV traffic of 3.0% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore the impact is assessed as **minor adverse**.
	7	A47 junction with Taverham Road and Blind Lane			
	8	A47 roundabout with Dereham Road			
3	9	A47 roundabout with A11 Newmarket Road	0.2%	2.1%	It is considered that a peak change in total traffic of 0.2% and HGV traffic of 2.1% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
3/4/8	6	A146 (Loddon Road) junction with slip road onto A47	0.1% - 0.5%	2.1% - 9.0%	It is considered that a peak change in total traffic of 0.5% and HGV traffic of 9.0% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
5	10	A47 Cucumber Lane Roundabout	0.6%	13.3%	It is considered that a peak change in total traffic of 0.6% and HGV traffic

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
	11	A47 Yarmouth Road			of 13.3% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
	12	A47 North Burlingham			
5/6	13	A47 New Road roundabout with A1064	0.6% - 1.2%	13.3% - 18.9%	It is considered that a peak change in total traffic of 1.2% and HGV traffic of 18.9% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
6	14	A47 New Road	1.2%	18.9%	
	15	A47 junction with Branch Road			
6/9/53	16	A47 / Acle New Road / Runham Road Roundabout	0.8% - 1.2%	18.9% - 24.8%	It is considered that a peak change in total traffic of 1.2% and HGV traffic of 24.8% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
7	18	A47 Swaffham	0.5%	4.3%	It is considered that a peak change in total traffic of 0.5% and HGV traffic of 4.3% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
9	17	A47 River Yare Bridge	0.8%	26.4%	It is considered that a peak change in total traffic of 0.8% and HGV traffic of 26.4% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
9	19	A12 roundabout with Gapton Hall Road and Pasteur Road			
10	20	A12 roundabout with Lowestoft Road	1.0%	45.4%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
26	3	Dereham Road (A1074) at the junction of Larkman Lane and Marl Pit Lane	0.1%	0.0%	It is considered that a peak change in total traffic of 0.1% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the magnitude of impact

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
26	21	Dereham Road (A1074) roundabout with Breckland Road			is assessed as **minor adverse**.
26/27	2	A140, A1074 and Dereham Road (A1074) roundabout	0.1%	0.0%	It is considered that a peak change in total traffic of 0.1% represents a very low magnitude of change on a potentially high sensitive receptor. Therefore, the magnitude of impact is assessed as **minor adverse**.
27	4	A140 at the junction of Hellesdon Hall Road	0.1%	0.0%	
39	22	A140 (Hevingham) junction with Church Street	0.8%	7.1%	It is considered that a peak change in total traffic of 0.8% and HGV traffic of 7.1% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
53/54	23	A149 Acle New Road roundabout with Fuller's Hill	0.3% - 0.8%	14.1% - 24.8%	It is considered that a peak change in total traffic of 0.8% and HGV traffic of 24.8% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
62/ 63	5	A1052 (Chartwell Road) Roundabout with the A1151 (Wroxham Road and Sprowston Road) and Mousehold Lane	0.0% - 0.1%	0.0%	It is considered that a peak change in total traffic of 0.1% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the magnitude of impact is assessed as **minor adverse**

378. Table 24.42 identifies that of the 23 collision clusters within the traffic and transport study area, 22 would experience very low magnitude of effect resulting in a **minor adverse** impact. The remaining one site would experience increases in HGV traffic which could potentially result in significant impacts and are therefore considered further.

Cluster site 20

379. Refer to Scenario 2 assessment paragraphs 361 to 363.

380. Cluster site 20 is located on link 10 that is projected to experience an increase in total traffic of up to 1.0% and HGV traffic of up to 45.4%. Noting that none of the

recorded collisions involved HGVs, the percentage change in HGV traffic alone is not considered to be a material consideration. It is therefore considered that a change in total traffic of 1.0% through Cluster site 20 represent a very low magnitude of effect on a low sensitivity receptor resulting in a **minor adverse** impact.

Other points of access

Onshore project substation access

381. Under Scenario 1, the access to the onshore project substation would have been agreed with Highways England and implemented by Norfolk Vanguard (currently proposed to be Access B (AC 180) as described in paragraph 349). Scenario 1 construction traffic would utilise this access for all Norfolk Boreas onshore project substation works.

National Grid substation extension

382. Under Scenario 1, the National Grid substation extension would use existing A47 access which would have been agreed with Highways England and implemented by Norfolk Vanguard (potential Access A (AC 178), as described in paragraph 370).

Road crossings and side accesses

383. Refer to Scenario 2 assessment paragraphs 373 to 376.

24.7.6.4 Impact 4: Driver delay

384. The GEART screening thresholds do not apply to this effect as the potential impact is defined as significant when the traffic system surrounding the proposed project under consideration is at or close to capacity.

385. To facilitate the assessment of driver delay, Norfolk County Council and Highways England have identified four junctions that they consider most sensitive (section 24.6.5).

386. The project's peak hour traffic demand has been assigned to the sensitive junctions to facilitate an assessment of impact significance. Table 24.43 details the resultant traffic flows at the junctions during the network peak hours.

Table 24.43 Project peak hour traffic flows through sensitive junctions (Scenario 1 and 2)

Junction	Junction arm	Scenario 1 Arrivals per arm		Scenario 2 Arrivals per arm	
		Light vehicles	HGVs	Light vehicles	HGVs
Junction 1: Roundabout junction of the A47 / Gapton Hall	A47 (north)	0	17	0	32
	Pasteur Road	0	0	0	0
	A47 (south)	2	17	6	32

Junction	Junction arm	Scenario 1 Arrivals per arm		Scenario 2 Arrivals per arm	
		Light vehicles	HGVs	Light vehicles	HGVs
Network peak hours 08:00-09:00 and **16:30-17:30**	Gapton Hall Road	0	0	0	0
Total arrivals			36		70
Junction 2: Scenario 1 - Great Yarmouth origin port **Roundabout junction of the A47 'Vauxhall roundabout'** Network peak hours 07:45-08:45 and **17:00-18:00**	A47 (north)	1	15	4	29
	Runham Road	0	0	0	0
	A149 (south-east)	1	15	1	29
	A47 (south-west)	1	0	2	0
Total arrivals			33		65
Junction 2: Scenario 2 - Lowestoft origin port **Roundabout junction of the A47 'Vauxhall roundabout'** Network peak hours 07:45-08:45 and **17:00-18:00**	A47 (north)	1	12	4	20
	Runham Road	0	0	0	0
	A149 (south-east)	1	5	1	13
	A47 (south-west)	1	17	2	33
Total arrivals			37		73
Junction 3: **Roundabout junction of the B1141 and A149** **'Fuller's Hill Roundabout'** Network peak hours 07:45-08:45 and **16:15-17:15**	A149 – Lawn Avenue	1	5	2	13
	Fuller's Hill	0	0	0	0
	North Quay	0	20	0	45
	A149 – Acle New Road	0	15	0	32
Total arrivals			41		92
Junction 4: **Roundabout junction of the A47 and A1064 at Acle** Network peak hours **07:00-08:00** and 16:45-17:45	A1064	0	0	0	0
	A47 (east)	0	15	0	29
	A47 (west)	2	15	5	29
	New Road	0	0	0	0
Total arrivals			32		63
Notes The network peak hour with the highest traffic flows per junction is displayed in **bold**					

24.7.6.4.1 Scenario 2

387. It is considered that the increases in traffic flows through junctions 1, 2, 3 and 4 as detailed in Table 24.43 would require further assessments in the form of junction modelling.

388. As detailed in paragraph 122, Junctions 1 (Gapton Hall Roundabout) and 2 (Vauxhall Roundabout) form part of the proposed A47 corridor improvement RIS scheme due to commence construction in April 2021, with a likely completion by 2022, (approximately one year before when the project's peak construction is due to start).

389. The RIS scheme has announced its preferred option however no technical data of the final layout of junction 1 and 2 are available at this time. During consultation with Highways England, it was noted that an assessment of the likely traffic impacts of the project would be required on the existing junction layout in the event that the RIS scheme was to be delayed.

Managing driver delay on minor routes

390. Mitigation would be required for routes that do not allow two-way HGV traffic to ensure that the project's traffic demand would not have an adverse impact upon the free flow of traffic.

391. To reduce the requirement for hard engineering, mobile traffic management is proposed to control low HGV demand on lightly trafficked narrow roads. The use of mobile traffic management would avoid the need for temporary road closures and minimise road widening which could introduce delays and in many areas would require a full road closure to implement.

392. It is envisaged that mobile traffic management would comprise of a suitably marked pilot vehicle (with flashing ambers) with two-way radio communication with the HGV driver.

393. The desirable distance a HGV would be allowed to travel under pilot vehicle control would be 1km, this is based on a HGV travelling at 20km per hour for a period of three minutes (deemed an acceptable duration for other road users to be held up). To keep the pilot vehicle control distance to a minimum it may be necessary to introduce temporary passing bays to 'store' HGVs prior to being called.

394. Full details of the minor routes affected and the proposed traffic management is contained in the OTMP to be submitted with the DCO application.

Managing Driver Delay at Roadworks

395. Where appropriate, single lane operation of roads would be utilised during installation, typically with signal controls to allow movements to continue. 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.

396. Where temporary closures or diversions are required these would be in place for the period of time required for the duct installation (e.g. approximately one week with a maximum worst case of two weeks). To minimise the impact of closures or diversions, night working could be employed. The detailed installation method for each crossing utilising traffic management would be set out in the TMP and agreed with the relevant local authority and the Norfolk County Council / Highways England pursuant to the discharge of DCO Requirement 21.

397. It should be noted that trenchless crossing methods have been agreed for the following roads where standard traffic management techniques are not deemed to be suitable:

- A47;
- A140; and
- A149.

398. Following consultation with Norfolk County Council, the following roads have been put forward for consideration for trenchless crossing:

- A1067;
- B1145; and
- B1149.

399. To inform the preferred crossing method, a survey of traffic flows will be undertaken during peak hours and an appropriate crossing method will be agreed with Norfolk County Council (to be captured in the final TMP).To facilitate the connection to the wider national grid system it will be necessary to oversail the A47 (i.e. suspend safety netting above the live carriageway to capture lowered cables). To undertake this operation, it will be necessary to construct two scaffold towers adjacent to the carriageway and suspend netting from the two structures. Whilst the scaffold towers can be constructed with limited disturbance to the free flow of traffic, the netting must be installed during a temporary full road closure (for a matter of hours).

400. Norfolk Boreas Limited and National Grid are committed to work with Highways England to agree appropriate timings, diversions and consultation strategy to implement the road closure with the least disruption to the traveling public and local communities.

24.7.6.4.2 Scenario 1

401. It is considered that the increases in traffic flows through junctions 1, 2, 3 and 4 as detailed in Table 24.43 are of very low magnitude of effect leading to an assessed impact of **minor adverse** significance.

402. Based on current details known and ETG engagement, it is likely that by 2026 when the projects peak construction is due to start, the identified RIS schemes would have been constructed and in operation.

Managing driver delay on minor routes

403. Refer to Scenario 2 assessment paragraphs 390 to 394 which are relevant for Scenario 1.

Managing Driver Delay at Roadworks

404. Refer to Scenario 2 assessment paragraphs 395 to 396 which are relevant for Scenario 1.

24.7.7 Potential Impacts during Operation

24.7.7.1 Scenario 1 and Scenario 2

405. During the operational phase, traffic movements would be limited to those generated by the daily operation and periodic maintenance at the onshore project substation and National Grid substation and at link boxes along the onshore cable route.

406. Along the onshore cable route, periodic access to installed link boxes may be required for inspection, (estimated to be annually). These link boxes will be accessible from ground level and will be located close to existing access routes where possible. Access to the cable easement will be required to conduct emergency repairs if necessary.

407. The onshore project substation will not be manned; however, access will be required periodically for routine maintenance activities, estimated at an average of one visit per week for each of the onshore project substation and National Grid substation extension.

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

24.7.8 Potential Impacts during Decommissioning

24.7.8.1 Scenario 1 and Scenario 2

409. This section describes the potential impacts of the decommissioning of the onshore infrastructure with regards to impacts on traffic and transport. Further details are provided in Chapter 5 Project Description.

410. No decision has been made regarding the final decommissioning policy for the onshore cables, as it is recognised that industry best practice, rules and legislation change over time. It is likely the cables would be pulled through the ducts and removed, with the ducts themselves left in-situ.

411. In relation to the onshore project substation the programme for decommissioning is expected to be similar in duration to the construction phase. The detailed activities and methodology would be determined later within the project lifetime, but are expected to include:

- Dismantling and removal of outside electrical equipment from outside of the onshore project substation buildings;
- Removal of cabling from site;
- Dismantling and removal of electrical equipment from within the onshore project substation buildings;
- Removal of main onshore project substation buildings and minor services equipment;
- Demolition of the support buildings and removal of fencing;
- Landscaping and reinstatement of the site (including land drainage); and
- Removal of areas of hard standing.

412. Whilst details regarding the decommissioning of the onshore project substation 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.

413. The decommissioning methodology would need to be finalised nearer to the end of the lifetime of the project so as to be in line with current guidance, policy and legislation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees. The decommissioning works could be subject to a separate licencing and consenting approach.

24.8 Cumulative Impacts

414. The assessment of cumulative impacts has been undertaken as a two stage process. Firstly, all the impacts from previous sections have been assessed for the potential to

act cumulatively with other projects. This assessment has been set out in Table 24.44.

Table 24.44 Potential Cumulative Impacts

Impact	Potential for cumulative impact	Data confidence	Rationale
Construction: Impact 1 Severance	Yes	High	Cumulative impacts arising from two or more projects are possible due to the increase in traffic from the projects.
Construction: Impact 2 Pedestrian amenity	Yes	High	
Construction: Impact 3 Road safety	Yes	High	
Construction: Impact 4 Driver Delay	Yes	High	
Operation	No	High	No cumulative impacts are anticipated as there are no operational impacts associated with Norfolk Boreas.
Decommissioning	Yes	High	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 no worse than those identified during the construction stage.

415. The second stage of the CIA is an assessment of the onshore project area and the potential effects of other projects scoped into the CIA upon the same receptors. To identify whether this may occur, the potential nature and extent of effects arising from all projects scoped into the CIA have been identified.

416. Projects identified for potential cumulative impacts that were agreed as part of the Norfolk Boreas PEIR consultation (November 2018). These projects, as well as any relevant development applications submitted since this consultation considered projects and their anticipated potential for cumulative impact are detailed in Table 24.45.

417. The remainder of the section details the nature of the cumulative impacts against all those receptors scoped in for cumulative assessment.

Table 24.45 Summary of Projects considered for the CIA in Relation to Traffic and Transport

Project	Status	Development period	[9]Distance from Norfolk Vanguard site (km)	Project definition	Project data status	Included in CIA	Site location / rationale
National Infrastructure Planning							
Norfolk Vanguard Offshore Wind Farm	Application submitted	Expected construction 2021 to 2025	0 – projects are co-located	Full ES available: https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-vanguard/?ipcsection=docs	High	Scenario 1: Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction.
						Scenario 2: No	Norfolk Vanguard would not have been consented / constructed.
Hornsea Project Three Offshore Wind Farm	Application submitted	Expected construction start date 2021. Duration 6 to 10 years dependent on phasing.	0 – cable intersects project 32km between substation locations	Full ES available: https://infrastructure.planninginspectorate.gov.uk/projects/eastern/hornsea-project-three-offshore-wind-farm/?ipcsection=docs	Medium	Scenario 1: Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction.
						Scenario 2: Yes	
Dudgeon Offshore Wind Farm	Commissioned	Constructed	0	http://dudgeonoffshorewind.co.uk/	High	Scenario 1: No	Construction complete, minimal operational traffic demand.
						Scenario 2: No	
A47 corridor improvement	Pre-application	Start works April 2021	26.7	https://infrastructure.planninginspectorate.	Medium	Scenario 1: No	Scenario 1 does not generate significant impacts through sensitive junctions.

[9] Shortest distance between the considered project and Norfolk Boreas – unless specified otherwise.

Project	Status	Development period	[9]Distance from Norfolk Vanguard site (km)	Project definition	Project data status	Included in CIA	Site location / rationale
programme – A47 North Tuddenham to Easton Dualling	(application due 2020)	Open May 2023		gov.uk/projects/eastern/a47-north-tuddenham-to-easton/		Scenario 2: Yes	Insufficient information in the public domain with regards to final scheme proposal. Norfolk Boreas have liaised with Highways England to establish a suitable 'reference case' for highway capacity assessments, therefore it is taken forward into the CIA
A47 corridor improvement programme – A47 Blofield to North Burlingham	Pre-application (application due 2019)	Start works 2021 Open 2022	25	https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47-blofield-to-north-burlingham/	Medium	Scenario 1: No Scenario 2: Yes	
A47 corridor improvement programme – A47 / A11 Thickthorn Junction	Pre-application (application due 2019)	Start works 2021 Open 2023	18	https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47a11-thickthorn-junction /	Medium	Scenario 1: No Scenario 2: Yes	
A47/A12 Junction enhancements to the following junctions and roundabout; Vauxhall, Gapton Hall, Harfreys, Bridge Road and James Pagat Hospital	Pre-application (application due 2019)	Starts 2019/2020 with projected finish year of 2022	26.7km	https://highwaysengland.co.uk/projects/a47-great-yarmouth-junctions-improvements/	Medium	Scenario 1: No Scenario 2: Yes	

Project	Status	Development period	[9]Distance from Norfolk Vanguard site (km)	Project definition	Project data status	Included in CIA	Site location / rationale
Norwich Western Link	Pre-application	Expected construction start late 2022	2.8	https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/norwich/norwich-western-link/timeline	Medium	Scenario 1: No Scenario 2: Yes	If consent is granted, Norfolk Boreas Limited and its contractors would engage with stakeholders to establish opportunities to co-ordinate activities and avoid peak traffic impacts. This commitment would be contained in the OTMP which will be contained in the final DCO submission.
Third River Crossing (Great Yarmouth)	Pre-application (application due 2019)	Expected construction start in late 2020 Open early 2023	28	https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/great-yarmouth/third-river-crossing	Medium	Scenario 1: No Scenario 2: No	
King's Lynn B Power Station amendments	Approved	Expected construction start 2019 to 2022	28	https://www.kingslynnbccgt.co.uk/	Medium	Scenario 1: No	The King's Lynn B Power Station site is located west of the project's traffic and transport study area.

Project	Status	Development period	[9]Distance from Norfolk Vanguard site (km)	Project definition	Project data status	Included in CIA	Site location / rationale
						Scenario 2: No	The traffic and transport study area has been carefully screened by assigning traffic demand to the network and determining the scope and scale of the project's potential traffic impact. Traffic impacts outside of the traffic and transport study area are deemed to be 'insignificant' it therefore follows that there would not be a significant cumulative impact associated with King's Lynn B Power Station.
North Norfolk District Council							
PF/17/1951 Erection of 43 dwellings and new access with associated landscaping, highways and external works	Approved	Anticipated Q2 2018	0.7	https://idoxpa.north-norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=_NNORF_DCAPR_92323	High	Scenario 1: No Scenario 2: No	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2023 and 2026. Therefore, the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.
Bacton and Walcott Coastal Management Scheme	Approved	Construction start date Spring 2019	1.0	Public information leaflets available: https://www.north-norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf	Medium	Scenario 1: No Scenario 2: No	Project would not result in an increase in traffic movements.

Project	Status	Development period	[9]Distance from Norfolk Vanguard site (km)	Project definition	Project data status	Included in CIA	Site location / rationale
Coastal defence/protection works, Happisburgh PF/18/0751	Approved	Coastal protection over 10 year duration from August 2018	0.12	https://idoxpa.north-norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=_NNORF_DCAPR_93543	Medium	Scenario 1: No Scenario 2: No	Project would not result in an increase in traffic movements.
Breckland Council							
Erection of 85 Dwellings with Associated Open Space 3PL/2018/1246/F	Awaiting Decision	Application received 04/10/18.	1.26	http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2018/1246/F&from=planningSearch	Medium	Scenario 1: No Scenario 2: No	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2023 and 2026. Therefore, the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.
Residential development of 40 No. units comprising a mix of housing types, accommodating open space and	Approved	Application approved 11/02/19. Construction must begin within 2 years.	1.42	http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2018/0993/F&from=planningSearch	Medium	Scenario 1: No	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2023 and 2026. Therefore, the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.

Project	Status	Development period	[9]Distance from Norfolk Vanguard site (km)	Project definition	Project data status	Included in CIA	Site location / rationale
appropriate associated infrastructure with vehicle access via Hall Road 3PL/2018/0993/F						Scenario 2: No	

418. In summary, the following projects will be assessed for potential direct cumulative impacts:

Scenario 1

- Norfolk Vanguard Offshore Wind Farm; and
- Hornsea Project Three Offshore Wind Farm.

Scenario 2

- Hornsea Project Three Offshore Wind Farm;
- A47 corridor improvement programme – A47 North Tuddenham to Easton;
- A47 corridor improvement programme – A47 Blofield to North Burlingham;
- A47 corridor improvement programme – A47 / A11 Thickthorn;
- A47 corridor improvement programme – A47 Yarmouth Junctions;
- A47 Third River Crossing (Great Yarmouth)**;** and
- Norwich Western Link.

24.8.1 Cumulative Impacts during Construction

24.8.1.1 Norfolk Boreas (Scenario 2) and A47 Corridor improvement programme

419. Highways England has proposed six improvement schemes for the A47 as part of the 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 to support.

420. The A47 corridor improvement programmes are NSIPs which would require development consent. Current timescales estimate that the DCO applications for these schemes will be submitted in either 2019 or 2020, dependent on the scheme (see Table 24.45).

421. The schemes that could potentially impact on the project are:

- A47 North Tuddenham to Eastern dualling;
- A47 / A11 Thickthorn Junction;
- A47 Blofield to North Burlingham dualling;
- A47 Third River Crossing (Great Yarmouth); and
- A47 Great Yarmouth junction improvements.

422. The programme of construction works for the schemes is due to start in 2021 and predicted to end in 2023. The works are likely to finish before the commencement of construction works for the project. However, noting Scenario 2 is scheduled for construction between 2023 and 2024 and as such, any slippage in the programme could potentially lead to cumulative impacts with Scenario 2.

423. At this stage, three of the identified schemes have announced their preferred scheme options and further consultation is ongoing. The full DCO planning process has not yet begun.

424. With regards to highway capacity assessment, it has been agreed with Highways England that a suitable 'reference case' would be to assume no improvements are in place. This reference case has formed the basis of the detailed highway capacity assessments contained in this chapter.

425. With regards to the cumulative impacts associated with the potential overlap of construction traffic, noting the lack of information available at this stage, it is not possible to provide a meaningful assessment of cumulative impacts.

426. Therefore the OTMP (document reference 8.8), contains a commitment for Norfolk Boreas Limited and its contractors to engage with Highways England to establish opportunities to co-ordinate activities and avoid significant impacts resulting from cumulative peak traffic.

24.8.1.2 Norfolk Boreas and Norfolk Vanguard

427. Table 24.46 details the source of construction traffic data and vehicle derivation that has informed the Norfolk Boreas and Norfolk Vanguard CIA.

Table 24.46 Norfolk Boreas and Norfolk Vanguard CIA Projects Construction Traffic Data Source

Project	Source	Date	Notes
Norfolk Vanguard	Norfolk Vanguard ES Chapter 24: Section 24.7	July 2018	Construction traffic vehicle derivation remains unchanged from that submitted in the original Environmental Statement (ES).

428. As identified in Table 24.45, VWPL is also developing the sister project of Norfolk Boreas, Norfolk Vanguard. The development of Norfolk Boreas will use the same onshore cable route as Norfolk Vanguard with the addition of a spur to the Norfolk Boreas onshore project substation.

429. If it proceeds to construction, Norfolk Vanguard would install ducts for Norfolk Boreas thus negating trenching activities by facilitating the pulling of cables through the pre-installed ducts (Norfolk Boreas, Scenario 1). However, if Norfolk Vanguard does not proceed to construction, Norfolk Boreas would be required to undertake trenching activities under its own construction phase (Scenario 2).

430. Noting that Scenario 2 would only occur if Norfolk Vanguard does not proceed to construction, there would be no cumulative impacts between Norfolk Vanguard and Norfolk Boreas under Scenario 2.

431. The indicative programmes for both Norfolk Vanguard and Norfolk Boreas indicates that Norfolk Vanguard would be completing its cable pulling phase at the same time that Norfolk Boreas commences construction at the onshore project substation and landfall. The cumulative traffic demand of these phases would not result in a greater impact than that of the assessed Norfolk Boreas Scenario 2 worst case.

24.8.1.3 Norfolk Boreas and Hornsea Project Three

432. Ørsted is proposing to develop an offshore wind farm located in the southern North Sea, with a total generating capacity of up to 2,400MW (Hornsea Project Three).

433. The outline Export Cable Route (ECR) of Hornsea Project Three will make landfall at a location between Sheringham and Cley next the Sea. From the landfall location, the ECR heads approximately 55km south to connect to the Norwich Main National Grid Substation.

434. A high level construction programme indicates that onshore construction for a single phase is currently planned to commence in 2021 and last for a period of three years.

435. Table 24.47 shows the simplified onshore construction programmes for Norfolk Boreas and Hornsea Project Three taken from the sources identified in Table 24.9.

Table 24.47 Cumulative Project Onshore Construction Programmes

Activity	2020	2021	2022	2023	2024	2025	2026	2027
Norfolk Boreas Scenario 2[1]								
Landfall								
Duct Installation								
Cable Pull, Joint and Commission						Phase 1	Phase 2	
Onshore Cable Route								
Preconstruction works								
Duct installation works								
Cable pull, joint and commission						Phase 1	Phase 2	
Onshore Project Substation								
Preconstruction works								
Primary works								

Activity	2020	2021	2022	2023	2024	2025	2026	2027
Electrical plant installation and commission						Phase 1	Phase 2	
Hornsea Project Three								
Onshore substations								
Onshore Export Cables								
Landfall								
Key								
Project activity								
Peak project activity								

436. Table 24.47 indicates that Hornsea Project Three peak construction activity will likely coincide with Norfolk Boreas's Scenario 2 peak construction activities during the landfall, duct installation and onshore project substation works. These activities are predicted to occur during 2023, thus this period has been adopted for further cumulative assessment.

437. Table 24.48 details the source of construction traffic data and vehicle derivation that has informed the Norfolk Boreas and Hornsea Project Three CIA.

Table 24.48 Norfolk Boreas and Hornsea Project Three Construction Traffic Data Source

Project	Source	Date	Notes
Hornsea Project Three	Hornsea Project Three Deadline 4 - Appendix 7: The HGV Haul Road Reduction Report (REP-028)	February 2019	Revised HGV numbers due to a decrease in Haul Road depth*.
			Confirmation that for CIA purposes a normal (100%) HGV distribution was to be used rather than the sensitivity (200%) flows as presented in the Hornsea Project Three ES*.

*The updated Hornsea Project Three construction traffic numbers, and their use of the normal (100%) distributions for the CIA, have been agreed by Hornsea Project Three, Norfolk County Council (NCC) and Highways England as part of the Statements of Common Ground between Hornsea Project Three and NCC (REP4-019) and Highways England (REP4-017).

24.8.2 Further Cumulative Impact Assessment Norfolk Boreas Scenario 2 and Hornsea Project Three

24.8.2.1 Cumulative Assessment Methodology

438. The traffic and transport CIA methodology follows the method set out in section 24.4. This approach was discussed and agreed during Expert Topic Group (ETG)

meetings with relevant stakeholders, including Norfolk County Council as Local Highway Authority and Highways England.

439. Utilising The GEART (Institute of Environmental Assessment, 1993) the following staged process has been followed:

a. Identify sensitive receptors;

b. Define the scale of the assessment;

c. Identify relevant traffic effects;

d. Determine magnitude of effect; and

e. Assess Impact Significance.

24.8.2.2 Cumulative Impact Assessment Study Area

440. The Norfolk Boreas Scenario 2 and Hornsea Project Three traffic study areas have been reviewed to identify the highway links that are shared by both projects.

441. Figure 24.15 shows the Norfolk Boreas and Hornsea Project Three onshore cable routes including respective onshore substation locations.

442. Figure 24.16 includes the common links jointly used by Hornsea Project Three and Norfolk Boreas. The resultant CIA traffic and transport study area is divided into 29 separate links that are required by both projects and may be subject to cumulative impacts.

443. Table 24.49 details the links that make up the CIA traffic and transport study area.

Table 24.49 Common Highway Links

Norfolk Boreas Link No.	Hornsea Project Three Link No.	Description
1a	210	A47
1b	210	A47
2	129	A47
3	157	A47
4	144	A47
5	137	A47
8	141	A146
11	197	A1065
12	195	A1065
13a	198	A148
13b	34	A148

Norfolk Boreas Link No.	Hornsea Project Three Link No.	Description
14	36	A148
18	81	A1067
19	31	A148
24	109	A1067
29	110	A1067
30	111	A1067
32	59	B1149 – Norwich Road
33	76	B1149 – Holt Road
34	89	B1145 – Cawston
36	114	B1149 – Holt Road
37	78	B1145 – Cawston Road
39	118	A140 – Hevingham
40b	49	A140 – Alysham
41	190	B1436 – Felbrigg
58	204	NDR – Link a
59	202	NDR – Link b
60	201	NDR – Link c
68	208	The Street / Heydon Road

24.8.2.3 Existing Environment

24.8.2.3.1 Traffic Flow Data

444. The baseline traffic flow data has been taken from Table 24.10 and forecast flows for the 2023 assessment year are presented in Table 24.51.

24.8.2.3.2 Road Safety

445. Table 24.50 provides a summary of all identified collision clusters within the CIA traffic and transport study area; these are also shown graphically in Figure 24.17. These cluster sites are considered potentially sensitive to changes in traffic flow and are therefore assessed further in section 24.8.2.5.3.

Table 24.50 Crashmap Collision Cluster Information

Link	Collision ref no.	Description	No. of collisions			
			Total	Fatal	Serious	Slight
2	1	A47 at the junction of Woodlane and Berrys Lane	6	0	1	5
2	7	A47 junction with Taverham Road and Blind Lane	6	0	1	6
2	8	A47 roundabout with Dereham Road	5	0	1	4
3	9	A47 roundabout with A11 Newmarket Road	14	0	0	14
3/4/8	6	A146 (Loddon Road) junction with slip road onto A47	8	0	0	8
5	10	A47 Cucumber Lane Roundabout	11	0	2	9
5	11	A47 Yarmouth Road	5	0	1	4
5	12	A47 North Burlingham	11	0	2	9
7	18	A47 Swaffham	5	0	1	5
39	22	A140 (Hevingham) junction with Church Street	6	0	1	5

24.8.2.4 Traffic Impact Screening

446. With reference to the GEART (Rule 1 and Rule 2), a screening process has been undertaken for the CIA traffic and transport study area to identify routes that are likely to have an increase in traffic flows that would require further impact assessment.

447. Table 24.51 summarises the total daily peak vehicle movements (i.e. arrivals and departures) for both Norfolk Boreas and Hornsea Project Three.

448. Table 24.52 provides a comparison of the peak daily construction flows with the forecast background daily traffic flows in 2022 (assumed realistic worst case for start of construction) for both Norfolk Boreas and Hornsea Project Three separately and cumulatively.

Table 24.51 Existing and Proposed Norfolk Boreas and Hornsea Project Three Daily Traffic Flows

Link	Description	Link sensitivity*	Background 2023 flows (24hr AADT**)		2023 Norfolk Boreas (Scenario 2) daily construction vehicle movements		2023 Hornsea Project 3 daily construction vehicle movements		2023 total cumulative daily construction vehicle movements	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1a	A47	Low	19,166	1,882	551	415	336	176	887	591
1b	A47	Low	19,166	1,882	785	415	336	176	1,121	591
2	A47	Low	26,566	2,264	691	291	336	176	1,027	467
3	A47	Low	53,107	3,177	525	291	351	176	876	467
4	A47	Low	54,689	2,461	369	291	570	159	939	450
5	A47	Low	45,620	2,064	641	580	438	37	1,079	617
8	A146	Medium	13,701	746	322	291	114	20	436	311
11	A1065	Low	8,204	549	72	0	218	124	290	124
12	A1065	Medium	6,488	493	38	0	218	124	256	124
13a	A148	Low	15,968	951	683	595	456	242	1,139	837
13b	A148	High	11,938	570	508	453	295	156	803	609
14	A148	Medium	12,487	573	444	369	205	122	649	491
18	A1067	High	8,925	636	388	313	157	85	545	398
19	A148	Medium	13,110	1,129	678	637	102	40	780	677
24	A1067	Low	10,605	541	578	407	158	86	736	493
29	A1067	Medium	13,322	924	451	313	270	92	721	405
30	A1067	Low	11,649	744	457	313	379	104	836	417
32	B1149 - Edgefield	Medium	4,499	83	263	212	291	153	554	365
33	B1149 - Holly road	Low	5,868	180	385	212	394	162	779	374
34	B1145 - west of Cawston	Medium	2,946	29	388	224	370	127	758	351
36	B1149 - Horsford	High	8,404	161	326	212	635	187	961	399
37	B1145 - Cawston road	Low	4,246	55	182	80	82	0	264	80
39	A140 - Hevingham	Medium	15,080	625	417	129	431	149	848	278
40b	A140 - Roughton	Low	13,529	609	428	184	471	149	899	333
41	B1436 - Felbrigg	Low	7,090	160	485	418	471	149	956	567

Link	Description	Link sensitivity*	Background 2023 flows (24hr AADT**)		2023 Norfolk Boreas (Scenario 2) daily construction vehicle movements		2023 Hornsea Project 3 daily construction vehicle movements		2023 total cumulative daily construction vehicle movements	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
58	NDR - Link a	Low	37,825	1,481	487	453	655	190	1,142	643
59	NDR - Link b	Low	26,380	1,033	472	453	655	190	1,127	643
60	NDR - Link c	Low	19,580	767	400	313	678	187	1,078	500
68	The Street / Heydon Road	Low	796	44	160	80	248	118	408	198
*	Link sensitivity previously defined within section 24.6.3									
**	AADT – Annual Average Daily Traffic									

Table 24.52 Summary of Percentage Increases Over 2023 Baseline

Link	Description	2023 Norfolk Boreas Percentage Increase		2023 Hornsea Project 3 Percentage Increase		2023 Total Cumulative Percentage Increase	
		All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1a	A47	2.9%	22.1%	1.8%	9.4%	4.6%	31.4%
1b	A47	4.1%	22.1%	1.8%	9.4%	5.8%	31.4%
2	A47	2.6%	12.8%	1.3%	7.8%	3.9%	20.6%
3	A47	1.0%	9.1%	0.7%	5.5%	1.7%	14.7%
4	A47	0.7%	11.8%	1.0%	6.5%	1.7%	18.3%
5	A47	1.4%	28.1%	1.0%	1.8%	2.4%	29.9%
8	A146	2.4%	42.8%	0.8%	2.7%	3.2%	41.7%
11	A1065	0.9%	0.0%	2.7%	22.6%	3.5%	22.6%
12	A1065	0.6%	0.0%	3.4%	25.2%	4.0%	25.2%
13a	A148	4.3%	62.6%	2.9%	25.4%	7.1%	88.0%
13b	A148	4.3%	79.5%	2.5%	27.4%	6.7%	106.9%
14	A148	3.6%	64.4%	1.6%	21.3%	5.2%	85.7%
18	A1067	4.3%	49.2%	1.8%	13.4%	6.1%	62.5%

Link	Description	2023 Norfolk Boreas Percentage Increase		2023 Hornsea Project 3 Percentage Increase		2023 Total Cumulative Percentage Increase	
		All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
19	A148	5.2%	56.4%	0.8%	3.5%	6.0%	60.0%
24	A1067	5.4%	75.3%	1.5%	15.9%	6.9%	91.2%
29	A1067	3.4%	33.9%	2.0%	10.0%	5.4%	43.8%
30	A1067	3.9%	42.0%	3.3%	14.0%	7.2%	56.0%
32	B1149 - Edgefield	5.8%	254.4%	6.5%	183.3%	12.3%	437.8%
33	B1149 - Holly road	6.6%	117.8%	6.7%	89.9%	13.3%	207.7%
34	B1145 - west of Cawston	13.2%	772.6%	12.6%	439.0%	25.7%	1211.6%
36	B1149 - Horsford	3.9%	131.6%	7.6%	115.9%	11.4%	247.5%
37	B1145 - Cawston road	4.3%	146.4%	1.9%	0.0%	6.2%	146.4%
39	A140 - Hevingham	2.8%	20.6%	2.9%	23.8%	5.6%	44.4%
40b	A140 - Roughton	3.2%	30.2%	3.5%	24.5%	6.6%	54.6%
41	B1436 - Felbrigg	6.8%	260.9%	6.6%	93.0%	13.5%	353.8%
58	NDR - Link a	1.3%	30.6%	1.7%	12.8%	3.0%	43.4%
59	NDR - Link b	1.8%	43.8%	2.5%	18.4%	4.3%	62.2%
60	NDR - Link c	2.0%	40.8%	3.5%	24.4%	5.5%	65.2%
68	The Street / Heydon Road	20.1%	182.2%	31.1%	269.3%	51.2%	451.5%
%	Exceeded GEART screening thresholds for Norfolk Boreas alone as identified in ES Chapter 24 Traffic and tRANPOSRT (document reference 6.1.24)						
%	Exceeds GEART screening thresholds for Cumulative Impact Assessment.						

449. In accordance with GEART, only those sensitive links that show greater than 10% increase in total traffic flows (or HGV component) or, for all other links, a greater than 30% increase in total traffic or the HGV component are considered when assessing the traffic effect of severance and pedestrian amenity upon receptors.

450. It is noted from Table 24.51 and Table 24.52 that cumulatively, 24 of the 29 links are above the GEART screening thresholds. Table 24.53 provides a summary of those links that will be taken forward for further assessment and those that are screened out.

Table 24.53 Link Screening Summary

	Further assessment	No further assessment
Link	1a, 1b, 5, 8, 13a, 13b, 14, 18, 19, 24, 29, 30, 32, 33, 34, 36, 37, 39, 40b, 41, 58, 59, 60, 68.	2, 3, 4, 11, 12.

451. Table 24.54 sets out the mitigation strategy adopted for Norfolk Boreas in isolation on these shared links. This strategy will serve as a 'base case' for the subsequent CIA to determine the adequacy of these measures to mitigate cumulative traffic flows and if further mitigation is required.

Table 24.54 Norfolk Boreas Mitigation

Link	Link description	Initial impact assessment	Mitigation measures (additional to Outline TMP)	Residual impact assessment
Pedestrian Severance				
All shared links			n/a	Negligible to Minor adverse
Pedestrian Amenity				
Links 1a, 1b, 5, 8, 13a, 13b, 14, 18, 19, 24, 29, 30, 39, 40b, 58, 59, 60			Below GEART screening threshold for Norfolk Boreas alone	
32	B1149 - Edgefield	Minor adverse	n/a	Minor adverse
33	B1149 -Holt Road	Minor adverse	n/a	Minor adverse
34	B1145 – west of Cawston	Moderate adverse	Enhanced TMP measures and Highway Mitigation Scheme	Minor adverse
36	B1149 – Holt Road	Moderate adverse	Enhanced TMP measures.	Minor adverse
37	B1145 - Cawston Road	Minor adverse	n/a	Minor adverse
41	B1436 - Felbrigg	Moderate adverse	Enhanced TMP measures.	Minor adverse
68	The Street / Heydon Road	Minor adverse	n/a	Minor adverse

Link	Link description	Initial impact assessment	Mitigation measures (additional to Outline TMP)	Residual impact assessment
Road Safety				
Link (cluster) – 3/4(6), 5(11,12)		Minor adverse	n/a	Minor adverse
Links (cluster) – 5(10),		Moderate adverse	Enhanced TMP measures. High friction surfacing	Minor adverse

24.8.2.5 Potential Cumulative Impacts during Construction

24.8.2.5.1 Impact 1: Pedestrian severance

452. Impacts on pedestrian severance are influenced by increases in total traffic flow. Table 24.51 indicates that no links experience an increase in traffic above the severance threshold for very low magnitude of effect (30% increase in total traffic) and therefore a maximum **minor adverse** cumulative traffic impacts are assessed

24.8.2.5.2 Impact 2: Pedestrian amenity

453. It can be noted from Table 24.52 that the peak daily change in total flows or HGV component for links 13b, 32, 33, 34, 36, 37, 41, and 68 are greater than the 100% GEART impact threshold whereby GEART suggests negative impacts may be experienced (paragraph 44). These links have been taken forward for further assessment.

454. Noting link 37 is a shared link, the only HGV movements are those generated by Norfolk Boreas alone. Therefore, the Norfolk Boreas (in isolation) assessment remains valid for the CIA scenario, namely a low magnitude of effect on a low sensitive link representing a cumulative impact of **minor adverse** significance. On this basis link 37 is not considered further in this CIA.

455. The remaining links all experience cumulative traffic flows significantly below the 100% HGV thresholds and the magnitude of effect is assessed as very low on low to high sensitivity links representing a cumulative impact on all these links of **negligible** to **minor adverse** significance. On this basis these links are not considered further.

456. Detailed assessment of shared road links with potential cumulative significant impacts are shown in Table 24.55. To establish the context for the impact assessment reference is made to Norfolk County Council's Highway Route Hierarchy Plan (also presented in Table 24.55).

Table 24.55 Pedestrian Amenity Assessment

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cumul' Constr' flows					
13b	A148	Primary Route – 2B	570	1,179	106.9%	Receptors would experience a peak flow of 118 HGVs per hour during the defined hours of construction. Classified as a 'Primary Route' route within NCC Route Hierarchy plan and is designed for high vehicle capacity. Link 13b routes through the village of Letheringset and into the town of Holt where at least one footway is provided adjacent to the road. A speed limit of 30mph is in force throughout both settlements.	Low	High	**Moderate Adverse**
32	B1149 - Edgefield	Main Distributor Others – 3A2	83	448	437.8%	Receptors would experience a peak flow of 45 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route Hierarchy plan. Majority of route has no footways, indicating minimal pedestrian movement. Link 32 routes through the villages of Holt and Edgefield where at least one footway is provided adjacent to the road. A speed limit of 30mph is in force throughout the village extents.	Medium	Medium	**Moderate Adverse**
33	B1149 -Holt Road	Main Distributor Others –	180	393	207.7%	Receptors would experience a peak flow of 40 HGVs per hour during the defined hours of construction.	Medium	Low	**Minor Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cumul' Constr' flows					
		3A2				Classified as 'Main Distributor Others' route within NCC Route Hierarchy plan. Majority of route has no footways, indicating minimal pedestrian movement.			
34	B1145 – west of Cawston	Main Distributor Others – 3A2	29	555	1211.6%	Receptors would experience a peak flow of 56 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route Hierarchy plan. Within Cawston there is evidence of direct frontage development with narrow footways lining the route. Resident parking on the carriageway. Evidence of existing industrial park and HGV movements routing through Cawston identified indicating the Highway has been adapted to accommodate some HGV demand.	High	Medium	**Major Adverse**
36	B1149 – Holt Road	Main Distributor Others – 3A2	161	561	247.5%	Receptors would experience a peak flow of 57 HGVs per hour during the defined hours of construction. Classified as 'Main Distributor Others' route within NCC Route Hierarchy plan. Majority of route has no footways indicating minimal pedestrian movement. Link 36 routes through the village of Horsford where a footway is provided on both sides of the road for the majority of the village and two uncontrolled	Medium	High	**Major Adverse**

Link	Link description	NCC route hierarchy	2023 HGV flows (movements)		HGV flow increase	Assessment	Magnitude of effect	Link sensitivity	Impact significance
			Base	Base + Cumul' Constr' flows					
						crossing locations. A 30mph speed limit is in force which would reduce the speed of HGVs.			
41	B1436 - Felbrigg	Main Distributor Others – 3A2	160	727	353.8%	Classified as 'Main Distributor Others' route within NCC Route Hierarchy plan. Receptors would experience a peak flow of 73 HGVs per hour during the defined hours of construction.	High	Low	**Moderate Adverse**
68	The Street / Heydon Road	Local Access – 3B2	44	242	451.5%	The road is classified as a 'Local Access' route which serves existing agricultural estates and an airfield. The route does not provide for pedestrian access along its length. Receptors would experience a peak flow of 25 HGVs per hour during the defined hours of construction.	High	Low	**Moderate Adverse**

457. With reference to Table 24.55**,** links assessed as having potentially significant cumulative pedestrian amenity impacts (**moderate** and **major adverse**) are considered here further.

458. The Norfolk Boreas S2-WCS construction traffic demand was developed based on all construction activities requiring that road link being undertaken concurrently. This ensured that study-wide local impacts were not underestimated by optimising programmes, however, for individual links there is scope to interrogate these construction traffic flows for Norfolk Boreas S2-WCS alone in further detail, which is considered in the following sections.

Link 13b

459. Link 13b (shown on Figure 24.2) is the A148 from the junction with the A1067 to the junction with the B1110 and B1149 within Holt town centre. The link routes through a number of small settlements.

460. As shown in Table 24.56, link 13b enables Norfolk Boreas S2-WCS construction traffic originating from Kings Lynn Port to the west to access the landfall, seven mobilisation areas (MA) and 10 TC zones. A graphical representation of the construction programme with associated HGV movements is provided in Appendix 24.36.

Table 24.56 Link 13b Norfolk Boreas S2 Construction Activities Breakdown

Project	Construction elements
Norfolk Boreas S2	Landfall MA6 serving Cable Sections 9, 9a and 10. MA7 serving Cable Sections 11 and 12 MA8 serving Cable Sections 13 MA9 serving Cable Sections 14 and 15 MA10 serving Cable Sections 15 and 16a MA10a serving Cable Section 17a MA11 serving Cable Sections 17 and 18 TC Zones 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16

461. The link is considered a high sensitivity route, specifically as it routes through Letheringsett and Holt town centre with an increase in built up area with direct frontage development, local shops, a school and narrow footpaths lining the road.

462. The Norfolk Boreas S2-WCS traffic demand was developed assuming all construction activities requiring that road link could be undertaken concurrently. This approach results in 453 construction daily HGV movements predicted on link 13b (an 79.5% increase) for Norfolk Boreas S2 alone.

463. Table 24.57 breaks down the worst-case scenario for link 13b into the separate construction activity and their indicative programmed date of works.

Table 24.57 Link 13b Norfolk Boreas S2 Traffic Derivation

Construction activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
Section 9 and 9a: MA6-W	1	06.03.2023 – 31.12.2023 (inc)	Duct Installation Team	20	40 (28)***	7 consecutive weeks
Section 10:MA6-E	2	01.05.2023 – 29.10.2023 (inc)	Duct Installation Team	20	40 (28)***	7 consecutive weeks
Section 11:MA7-W	3	06.03.2023 – 01.10.2023 (inc)	Duct Installation Team	20	40 (28)***	6 consecutive weeks
Section 12: MA7-E	4	01.05.2023 – 16.06.2024 (inc)	Duct Installation Team	20	40 (28)***	10 consecutive weeks
Section 13: MA8-E	5	06.03.2023 – 24.12.2023 (inc)	Duct Installation Team	20	40 (28)***	7 consecutive weeks
Section 14: MA9-W	6	06.03.2023 – 04.02.204 (inc)	Duct Installation Team	20	40 (28)***	8 consecutive weeks
Section 15: MA10-W	7	26.02.2024 – 22.09.2024 (inc)	Duct Installation Team	20	40 (28)***	4 consecutive weeks
Section 16a: MA10-E	8	22.04.2024 – 14.07.2024 (inc)	Duct Installation Team	20	40 (28)***	3 consecutive weeks
Section 17a: MA10a-W	9	26.02.2024 – 03.11.2024 (inc)	Duct Installation Team	20	40 (28)***	5 consecutive weeks
Section 17: MA11-W	10	06.03.2023 – 24.03.2024 (inc)	Duct Installation Team	20	40 (28)***	9 consecutive weeks
Section 18: MA11-E	11	01.05.2023 – 09.06.2024 (inc)	Duct Installation Team	20	40 (28)***	10 consecutive weeks

Construction activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
TC 7 – Marriott's Way North and Kerdiston CWS (north side)	12	19.06.2023 – 23.07.2023 (inc)	TC Team 2*	36	72 (33.6)	2 weeks
TC8 – Ørsted (west and east side)	13	28.08.2023 – 01.10.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC9 – River Bure (west and east side)	14	10.04.2023 – 14.05.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC 10 - A140 (west and east side)	15	06.03.2023 – 09.04.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC 11 - Kings Beck (west and east side)	16	24.07.2023 – 27.08.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC 12 - A149 (west and east side)	17	06.03.2023 – 09.04.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 13 - N.Walsham Railway (west and east side)	18	10.04.2023 – 14.05.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 14 - Paston Way CWS (west and east side)	19	15.05.2023 – 11.06.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 15 - N.Walsham and Dilham Canal (west and east side)	20	19.08.2023 – 23.07.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 16 - Bacton Woodland (west and east side)	21	24.07.2023 – 27.08.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
Landfall	22	06.03.2023 – 23.07.2023 (inc)	Landfall Team	15	30 (21)	2 weeks

* TC teams would only work on one TC at any one time during the construction programme.

** Movements in brackets include the 70% distance deterrent factor applied.

*** Primary collector route factor (75%) not applied for refined programme.

464. As can be seen from Table 24.57 and Appendix 24.36 only 11 out of these 22 construction activities for Norfolk Boreas S2 alone could occur at the same time. The programme presents the following scenario peaks and averages predicted to occur on Link 13b.

- Primary peak of 1 weeks at 379 daily movements (incorporating ID 1, 2, 3, 4, 5, 6, 10, 11, 17 and 21).
- Secondary peak of 2 weeks between 373 to 376 daily movements (374 average daily movements).
- Typical movements for 9 weeks between 237 to 344 daily movements (281 average daily movements).
- Further typical movements for 22 weeks between 112 to 203 daily movements (169 average daily movements).
- Further typical movements for 50 weeks between 7 to 97 daily movements (45 average daily movements).

465. When this refined primary peak (1 week period) of 379 HGV movements for Norfolk Boreas S2 alone are added cumulatively to the peak Hornsea Project Three HGV movements (535) this represents a 93.8% increase over baseline flows, representing an impact of **minor adverse** significance.

466. The total package of mitigation measures for link 13b would consist of:

- Managed cumulative traffic demand to no greater than 535 daily HGV deliveries (to be captured in an update to the OTMP).

Link 32

467. Link 32 (shown on Figure 24.2) is the B1149 from the A148 Holt Road junction, through the village of Edgefield continuing south to the junction with the B1354.

468. Table 24.58 shows the Norfolk Boreas S2 construction activities that require link 32.

Table 24.58 Link 32 Norfolk Boreas S2 Construction Activities Breakdown

Project	Construction Activities
Norfolk Boreas S2	MA6 serving Cable Sections 9, 9a and 10. MA7 serving Cable Sections 11 and 12 TC Zones 7, 8 and 9

469. Link 32 is considered a medium sensitivity route, specifically due to routing through the village of Edgefield with evidence of direct frontage development, a village hall and a local pub. A single footpath is provided on the eastern side of the road

throughout the village.

470. The Norfolk Boreas S2-WCS traffic demand was developed assuming all construction activities requiring link 32 are undertaken concurrently. This approach results in 212 construction HGV movements predicted on the link for Norfolk Boreas S2 alone (a 254.4% increase).

471. Table 24.59 breaks down the worst-case scenario for link 32 into the separate construction activities and their indicative programmed date of works as detailed within Appendix 24.22. A graphical representation of the refined construction programme with associated HGV movements is provided in Appendix 24.37.

Table 24.59 Link 32 Norfolk Boreas S2 Traffic Derivation

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
Section 9 and 9a: MA6-W	1	06.03.2023 – 31.12.2023 (inc)	Duct Installation Team	20	40 (28)***	7 consecutive weeks
Section 10:MA6-E	2	01.05.2023 – 29.10.2023 (inc)	Duct Installation Team	20	40 (28)***	7 consecutive weeks
Section 11:MA7-W	3	06.03.2023 – 01.10.2023 (inc)	Duct Installation Team	20	40 (28)***	6 consecutive weeks
Section 12: MA7-E	4	01.05.2023 – 16.06.2024 (inc)	Duct Installation Team	20	40 (28)***	10 consecutive weeks
TC 7 – Marriott's Way North and Kerdiston CWS (north side)	5	19.06.2023 – 23.07.2023 (inc)	TC Team 2*	36	72 (50.4)	2 weeks
TC8 – Ørsted (west and east side)	6	28.08.2023 – 01.10.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC9 – River Bure (west side)	7	10.04.2023 – 14.05.2023 (inc)	TC Team 2*	36	72 (50.4)	2 weeks

* TC team 2 would only work on one TC at any one time during the construction programme.

**Movements in brackets include the 70% distance deterrent factor applied.

*** Primary collector route factor (75%) not applied for refined programme.

472. As can be seen from Table 24.59 and Appendix 24.37, only five of the seven construction activities for Norfolk Boreas S2 alone could occur at the same time. The

programme presents the following scenario peaks and typical average flows predicted to occur on Link 32.

- Primary peak of 1 weeks at 206 daily movements (incorporating ID 1,2,3,4 and 6).
- Secondary peak of 1 week at 193 daily movements (incorporating ID 1,2,3,4 and 5).

  Third peak of 3 week at 136 daily movements (incorporating ID 1,2,3,4 and 5 or 7).
- Further typical movements for 21 weeks at between 77 and 111 daily movements (88 average daily movements).
- Further typical movements for 33 weeks at between 7 and 63 daily movements (19 average daily movements).

473. The Norfolk Boreas S2 HGV primary peak in combination with Hornsea Project Three peak (359 daily movements) represents a 432.5% increase in cumulative HGVs on link 32 and an impact of **moderate adverse** significance.

474. The Norfolk Boreas S2 alone third peak movements in combination with Hornsea Project Three's peak HGV movements, represents 289 cumulative movements, corresponding to an impact of **minor adverse** significance.

475. Therefore, the mitigation for the cumulative impact on link 32 will be to deliver enhanced TMP measures (as already set out in the submitted OTMP) and to ensure that the total cumulative HGV movements do not exceed 289 daily HGV movements. The two mechanisms to achieve this aim are:

- Co- ordination between Hornsea Project Three and Norfolk Boreas S2 cumulative peak construction traffic demand to ensure they do not overlap during this two week window; or
- Extension of the Norfolk Boreas S2 programme that relates to this two week primary peak and secondary peak to reduce the daily construction traffic demand for Norfolk Boreas S2 alone to reduce the overall daily HGV demand, to Norfolk Boreas alone to 136 HGVs. This would ensure the combined total for Hornsea Project Three and Norfolk Boreas would not exceed 289 daily HGV movements.

476. The OTMP reflects these two mechanisms for delivering this mitigation.

Link 41

477. Link 41 (shown on Figure 24.2) is the B1436 – Felbrigg Road which connects the A148 at its northern junction with the A140 at its southern junction. The link routes

through the villages of Felbrigg and Roughton.

478. As shown in Table 24.60, link 41 enables Norfolk Boreas S2 construction traffic originating from Kings Lynn Port to the west to access the landfall, five mobilisation areas and eight TC zones.

Table 24.60 Link 41 Norfolk Boreas S2 Construction Activities Breakdown

Project	Construction Activity
Norfolk Boreas S2	Landfall MA8 serving Cable Sections 13 MA9 serving Cable Sections 14 and 15 MA10 serving Cable Sections 15 and 16a MA10a serving Cable Section 17a MA11 serving Cable Sections 17 and 18 TC Zones 9, 10, 11, 12, 13, 14, 15 and 16

479. The link is considered a low sensitivity route with sporadic frontage development.

480. The Norfolk Boreas S2-WCS construction traffic demand was developed assuming all construction activities requiring link 41 could be undertaken concurrently. This approach results in 418 construction HGV movements predicted on the link for Norfolk Boreas S2 alone (a 260.9% increase). For Norfolk Boreas S2 alone, this link was assessed as having a residual impact of minor adverse significance, following mitigation which consisted of a series of enhanced traffic management plan measures as set out in Table 24.33.

481. Table 24.61 breaks down the worst-case scenario for link 41 into the separate construction activities and their indicative programmed date of works as detailed within Appendix 24.22. A graphical representation of the refined construction programme with associated HGV movements is provided in Appendix 24.38.

Table 24.61 Link 41 Norfolk Boreas S2 Traffic Derivation

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
Section 13: MA8-E	1	06.03.2023 – 24.12.2023 (inc)	Duct Installation Team	20	40 (28)***	7 consecutive weeks
Section 14: MA9-W	2	06.03.2023 – 04.02.204 (inc)	Duct Installation Team	20	40 (28)***	8 consecutive weeks
Section 15: MA10-W	3	26.02.2024 – 22.09.2024 (inc)	Duct Installation Team	20	40 (28)***	4 consecutive weeks

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
Section 16a: MA10-E	4	22.04.2024 – 14.07.2024 (inc)	Duct Installation Team	20	40 (28)***	3 consecutive weeks
Section 17a: MA10a-W	5	06.03.2023 – 24.03.2024 (inc)	Duct Installation Team	20	40 (28)***	5 consecutive weeks
Section 17: MA11-W	6	06.03.2023 – 24.03.2024 (inc)	Duct Installation Team	20	40 (28)***	9 consecutive weeks
Section 18: MA11-E	7	01.05.2023 – 09.06.2024 (inc)	Duct Installation Team	20	40 (28)***	10 consecutive weeks
TC9 – River Bure (west and east side)	8	10.04.2023 – 14.05.2023 (inc)	TC Team 2*	36	72 (50.4)	2 weeks
TC 10 - A140 (west and east side)	9	06.03.2023 – 09.04.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC 11 - Kings Beck (west and east side)	10	24.07.2023 – 27.08.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC 12 - A149 (west and east side)	11	06.03.2023 – 09.04.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 13 - N.Walsham Railway (west and east side)	12	10.04.2023 – 14.05.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 14 - Paston Way CWS (west and east side)	13	15.05.2023 – 11.06.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 15 - N.Walsham and Dilham Canal (west and east side)	14	19.08.2023 – 23.07.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks
TC 16 - Bacton Woodland (west and east side)	15	24.07.2023 – 27.08.2023 (inc)	TC Team 3*	72	144 (100.8)	2 weeks

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
Landfall	16	06.03.2023 – 23.07.2023 (inc)	Landfall Team	30	60 (42)	2 weeks

* TC team 2 would only work on one TC at any one time during the construction programme.
**Movements in brackets include the 70% distance deterrent factor applied.
*** Primary collector route factor (75%) not applied for refined programme.

482. As can be seen from Table 24.61 and Appendix 24.38 only seven out of the 16 construction activities for Norfolk Boreas S2 alone could occur at the same time. The programme presents the following scenario peaks and averages predicted to occur on link 41.

- Primary peak of 2 weeks at 287 daily movements (incorporating ID 1, 2, 6, 7, 10 and 15);
- Secondary peak of 3 week between 224 to 242 daily movements (235 average daily movements);
- Third peak for 5 weeks between 174 to 208 daily movements (190 average daily movements);
- Typical movements for 36 weeks between 104 to 160 daily movements (93 average daily movements); and
- Further typical movements for 38 weeks between 7 to 69 daily movements (38 average daily movements).

483. The Norfolk Boreas S2 HGV primary peak in combination with Hornsea Project Three peak represents 436 daily HGV movements (a 272.5% increase in HGV flows) on link 41.

484. The HGV flows assessed for Norfolk Boreas S2 alone were 418 daily movements, i.e. 22 daily movements lower that the expected cumulative traffic demand. This was assessed as having a residual impact of **minor adverse** significance, following mitigation (the application of an enhanced TMP).

485. It is therefore, considered that the cumulative impact is within the tolerance of the assessment for Norfolk Boreas S2 alone, i.e. cumulative impacts would be no greater than **minor adverse** significance, following mitigation (the application of an enhanced TMP).

486. The total package of mitigation measures for link 41 would consist of:

- Enhanced traffic management plan measures (identified for Norfolk Boreas alone); and
- Managed cumulative traffic demand to no greater than 436 daily HGV deliveries (to be captured in an update to the OTMP).

Link 68

487. Link 68 (shown on Figure 24.2) represents The Street, starting from the junction with the B1149 to the junction with Heydon Road located approximately 950m north. Link 68 continues along Heydon Road for a further 1.5km.

488. As shown in Table 24.62, link 68 is used to access a single construction activity for Norfolk Boreas.

Table 24.62 Link 68 Norfolk Boreas S2 Construction Activity Breakdown

Project	Construction Activity
Norfolk Boreas	MA7 serving Cable Sections 11 and 12

489. The link is considered a low sensitivity route, as The Street and Heydon Road are local access roads with sporadic frontage developments.

490. The Norfolk Boreas S2-WCS traffic demand was developed assuming construction activities using that link could all be undertaken concurrently. This approach results in 80 construction HGV movements predicted on the link for Norfolk Boreas S2 alone (a 269.3% increase) and was assessed as having an impact of minor adverse significance.

491. Table 24.63 breaks down the worst-case scenario for link 68 into the separate construction activities and their programmed date of works as detailed within Appendix 24.22. A graphical representation of the refined construction programme with associated HGV movements is provided in Appendix 24.39.

Table 24.63 Link 68 Norfolk Boreas S2 Traffic Derivation

Construction Activity	ID	Programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 11:MA7-W	1	06.03.2023 – 01.10.2023 (inc)	Duct Installation Team	20	40	6 consecutive weeks
Section 12: MA7-E	2	01.05.2023 – 16.06.2024 (inc)	Duct Installation Team	20	40	10 consecutive weeks

492. As can be seen from Table 24.63 and Appendix 24.39 both construction activities for Norfolk Boreas S2 alone could occur at the same time. The programme presents the following scenario peaks and typical average flows predicted to occur on Link 68.

- Primary peak of 6 weeks at 71 daily movements (incorporating ID 1 and 2);
- Secondary peak of 16 weeks at 61 daily movements (incorporating ID 1 and 2);
- Typical movements for 17 weeks between 31 to 40 daily movements (36 average daily movements); and
- Typical further movements for 16 weeks at 9 daily movements.

493. Link 68 serves Hornsea Project Three's main construction compound at Oulton Airfield and is predicted to generate 118 HGV daily movements over a three year 'Maximum Design Scenario' period.

494. Link 68 also serves Norfolk Boreas S2 Mobilisation Area 7 (west and east) during the duct installation period and access points AC84, AC85 and AC88 during the Scenario 2 cable pull stage.

495. There has been extensive consultation between Hornsea Project Three and Norfolk County Council with regards to a highways mitigation scheme to address the cumulative impacts. Norfolk County Council has confirmed a preferred scheme option, which is summarised in Table 24.64.

Table 24.64 The Street, Oulton Proposed Highway Mitigation Scheme

Components
Improvement of existing bellmouth junction between The Street and the B1149 (Holt Road).
Up to 8 passing places along The Street for HGV opposing traffic (using Grasscrete paving) resulting in an overall carriageway width of 6.0m.
Widening of The Street near Dorking farm access (using full carriageway construction).
Trimming, but no removal, of vegetation and trees along The Street.
A means of priority work for southbound vehicles in the vicinity of The Old Railway. Gatehouse with a view to minimising the potential for two opposing HGVs to pass by this property simultaneously while also serving as a means of speed attenuation and mitigation to improve noise and vibration risk.
Temporary lowering of the existing 60mph speed limit to 30mph from the B1149 junction to the Hornsea Project Three main construction compound access.
Temporary signage along the B1145 and The Street as agreed with the Highway Authority to provide driver awareness and enforcement.
Regrading of existing road hump on The Street in the vicinity of the Old Railway Gatehouse to minimise noise and vibration impacts on the Old Railway Gatehouse.
Filter trench drainage of The Street along the regrading of the existing road hump.

496. Norfolk Boreas Limited support the implementation of the above preferred scheme option, as agreed between Hornsea Project Three and Norfolk County Council, as mitigation for the cumulative flows on the shared part of link 68. Following implementation of the mitigation measures, the magnitude of effect is assessed as medium on a low sensitivity receptor resulting in a residual impact assessment of **minor adverse**.

497. Norfolk Boreas Limited is committed to adopting the preferred mitigation scheme option for Norfolk Boreas S2 in isolation to ameliorate the potential disruption relating to the temporary roadworks required to implement the scheme. In effect this scheme of mitigation, on the shared part of Link 68, would be sufficient to mitigate impacts for Norfolk Boreas S2 alone, Hornsea Project Three alone or for both projects together. The first project to proceed to construction would deliver the full scheme of mitigation and the second project would be responsible for removing the measures once both project's construction phases are complete. This commitment, associated management of roadworks, and the process of coordination between the two projects will be captured in the OTMP.

Link 34

498. Link 34 (shown on Figure 24.2) is the B1145 from the B1149 Holt Road junction, through Cawston village to the eastern town extents of Reepham.

499. As shown in Table 24.65, link 34 is used to access a number of the Norfolk Boreas S2 construction activities including one mobilisation area and two TC zones.

Table 24.65 Link 34 Norfolk Boreas S2 Construction Activities Breakdown

Project	Construction Activities
Norfolk Boreas S2	MA6 serving Cable Sections 9, 9a and 10. TC Zones 7 and 8

500. The link is considered a medium sensitive route with evidence of direct frontage development and narrow footways lining the route through Cawston. There is also resident parking along the link within Cawston.

501. The Norfolk Boreas S2-WCS traffic demand was developed assuming all construction activities requiring that road link could be undertaken concurrently. This approach results in 224 construction HGV movements on the link for Norfolk Boreas alone (an 439 % increase). This was assessed as having a residual impact of minor adverse significance for Norfolk Boreas S2 alone (following the application of enhanced traffic management plan measures and a highway mitigation scheme).

502. Table 24.66 breaks down the worst-case scenario for link 34 into the separate construction activities and their indicative programmed date of works as detailed within Appendix 24.22. A graphical representation of the refined construction programme with associated HGV movements is provided in Appendix 24.40.

Table 24.66 Link 34 Norfolk Boreas S2 Traffic Derivation

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements	Peak construction duration
Section 9 and 9a: MA6-W	1	06.03.2023 – 31.12.2023 (inc)	Duct Installation Team	20	40	7 weeks
Section 10:MA6-E	2	01.05.2023 – 31.12.2023 (inc)	Duct Installation Team	20	40	7 weeks
TC 7 – Marriott's Way North and Kerdiston CWS (north side)	3	19.06.2023 – 23.07.2023 (inc)	TC Team 2*	36	72	2 weeks
TC 8 – Ørsted (north and south side)	4	28.08.2023 – 01.10.2023 (inc)	TC Team 2*	72	144	2 weeks

* TC team 2 would only work on one TC at any one time during the construction programme.

503. As can be seen from Table 24.66 and Appendix 24.40 only three of the four construction activities for Norfolk Boreas S2 alone could occur at the same time. The programme presents the following scenario peaks and averages predicted to occur on link 34.

- Primary peak of 1 weeks at 224 daily movements (incorporating ID 1, 2 and 4)
- Secondary peak of 1 week at 205 daily movements (incorporating ID 1, 2 and 4)
- Third peak of 2 week at 133 daily movements (incorporating ID 4)
- Typical movements for 23 weeks at between 80 and 99 daily movements (66 average daily movements)
- Further typical movements for 16 weeks at 9 daily movements

504. The Norfolk Boreas S2 HGV third peak in combination with Hornsea Project Three's peak construction HGV traffic is 260 daily movements, represents a 896.5% increase in HGVs on link 34 and an impact of **moderate adverse** significance.

505. To ensure that the total cumulative HGV movements do not exceed 260 daily HGV movements, two mechanisms are available:

- Co- ordination between Hornsea Project Three and Norfolk Boreas S2 cumulative peak construction traffic demand to ensure they do not overlap during this two week window; or
- Extension of the Norfolk Boreas S2 programme that relates to this two week primary peak and secondary peak to reduce the daily construction traffic demand for Norfolk Boreas S2 alone does not exceed 133 HGVs. This would ensure the combined total for Hornsea Project Three and Norfolk Boreas S2 would not exceed 260 daily HGV movements.

506. The OTMP will reflect these two mechanisms for delivering the management of cumulative HGV traffic.

507. As the residual impact remains moderate adverse, a range of additional traffic management measures are also proposed, including timing deliveries to avoid school pick up and drop off times during term time, enhanced pedestrian facilities, managed parking and road safety measures.

508. The total package of mitigation for link 34 would consist of:

- Enhanced traffic management plan measures (including the prohibition of deliveries during term time school pick up and drop off times – as captured within the OTMP);

- Managed cumulative traffic demand to no greater than 260 daily HGV deliveries (captured in the OTMP); and
- Commitment to deliver a scheme of highway mitigation to include enhanced pedestrian facilities, managed parking and road safety measures (to be captured in an update to the final TMP).

509. With this package of mitigation implemented, the magnitude of effect is assessed as low on a medium sensitivity receptor resulting in a residual impact of **minor adverse** significance.

510. Hornsea Project Three are currently in discussions with Norfolk County Council regarding a scheme of highway mitigation that would deliver the measures outlined above, i.e. enhanced pedestrian facilities, managed parking and road safety measures.

511. Norfolk Boreas is continuing to engage with Hornsea Project Three and Norfolk County Council to further understand the details of this highway mitigation scheme for cumulative construction traffic with a view to adopting those measures following a review by Norfolk Boreas during the DCO application process to confirm its appropriateness.

Link 36

512. Link 36 (shown on Figure 24.2) is the B1149 between the A1270 to the south and the B1145 to the north. The link routes through the village of Horsford.

513. As shown in Table 24.67, link 36 is used to access a number of Norfolk Boreas construction activities including two mobilisation areas and three TC zones.

Table 24.67 Link 36 Norfolk Boreas S2 Construction Activities

Project	Construction Activities
Norfolk Boreas S2	MA6 serving Cable Sections 9, 9a and 10. MA7 serving Cable Sections 11 and 12 TC Zones 7, 8 and 9

514. The link is considered a high sensitivity route, specifically as it routes through the village of Horsford with evidence of direct frontage development, a local pub, shops, cafe, village hall, mechanics garage, medical centre and a primary school. Footpaths typically line both sides of the road throughout the village.

515. Notwithstanding the B1149 is designated as a Main Distributor in Norfolk County Council's hierarchy which is predicated on the highway environment being suitable to receive high volumes of traffic. This is demonstrated on link 36 where the village

of Horsford has a number of pedestrian amenity and safety features to mitigate the impact of traffic. These include:

- Advanced warning signs;
- A series of vehicle actuated signs;
- Two controlled crossings in proximity to community facilities;
- 30mph speed limit through the village;
- Provision of footways either side of the carriageway within the majority of the village; and
- No on road parking.

516. The Norfolk Boreas S2-WCS traffic demand was developed assuming construction activities requiring link 36 could be undertaken concurrently. This approach results in 212 construction vehicle movements on the link for Norfolk Boreas S2 alone (an increase of 115.5%) and was assessed as having a residual impact of minor adverse significance for Norfolk Boreas S2 alone (following the implementation of enhanced traffic management plan measures).

517. Table 24.68 breaks down the worst-case scenario for link 36 into the separate construction activities and their indicative programmed date of works as detailed within Appendix 24.22. A graphical representation of the refined construction programme with associated HGV movements is provided in Appendix 24.41.

Table 24.68 Link 36 Norfolk Boreas S2 Traffic Derivation

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
Section 9 and 9a: MA6-W	1	06.03.2023 – 31.12.2023 (inc)	Duct Installation Team	20	40 (28)**	20 consecutive weeks
Section 10:MA6-E	2	01.05.2023 – 29.10.2023 (inc)	Duct Installation Team	20	40 (28)**	19 consecutive weeks
Section 11:MA7-W	3	06.03.2023 – 01.10.2023 (inc)	Duct Installation Team	20	40 (28)**	19 consecutive weeks
Section 12: MA7-E	4	01.05.2023 – 16.06.2024 (inc)	Duct Installation Team	20	40 (28)**	29 consecutive weeks
TC 7 – Marriott's Way North and Kerdiston CWS (north side)	5	19.06.2023 – 23.07.2023 (inc)	TC Team 2*	36	72 (50.4)	2 weeks

Construction Activity	ID	Indicative programmed date of construction activity	Work Team	Peak daily construction vehicle deliveries	Peak daily construction vehicle movements (**)	Peak construction duration
TC8 – Ørsted (west and east side)	6	28.08.2023 – 01.10.2023 (inc)	TC Team 2*	72	144 (100.8)	2 weeks
TC9 – River Bure (west side)	7	10.04.2023 – 14.05.2023 (inc)	TC Team 2*	36	72 (50.4)	2 weeks

* TC team 2 would only work on one TC at any one time during the construction programme.
**Movements within brackets have had a 70% distance deterrent factor applied.

518. As can be seen from Table 24.68 and Appendix 24.41 only five out of the seven construction activities could occur at the same time. The programme presents two distinct scenario peaks.

- Primary peak of 1 week at 206 daily movements (incorporating ID 1,2,3,4 and 6)
- Secondary peak of 1 week at 193 daily movements (incorporating ID 1,2,3,4 and 6)
- Third peak of 3 weeks at 136 daily movements (incorporating ID 1,2,3,4 and 5 or 7)
- Typical movements for 18 weeks at between 63 and 105 daily movements (89 average daily movements)
- Further typical movements for 36 weeks at between 7 and 77 daily movements (24 average daily movements)

519. Norfolk Boreas S2 primary peak daily movements (206) when combined with Hornsea Project Three's peak movements total 393 cumulative daily HGV movements, which represents a 244.1% increase over baseline flows. corresponding to an impact of **major adverse** significance.

520. The Norfolk Boreas S2 alone third peak movements in combination with Hornsea Project Three's peak HGV movements, represents 323 cumulative movements, corresponding to an impact of **minor adverse** significance.

521. Therefore, the mitigation for the cumulative impact on link 36 will be to deliver enhanced traffic management plan measures and to ensure that the total cumulative HGV movements do not exceed 323 daily HGV movements. The two mechanisms to achieve this aim are:

- Co- ordination between Hornsea Project Three and Norfolk Boreas S2 cumulative peak construction traffic demand to ensure they do not overlap during this three week window; or
- Extension of the Norfolk Boreas S2 programme that relates to this two week primary peak and secondary peak to reduce the daily construction traffic demand for Norfolk Boreas S2 alone to reduce the overall daily HGV demand, to Norfolk Boreas alone to 136 HGVs. This would ensure the combined total for Hornsea Project Three and Norfolk Boreas would not exceed 323 daily HGV movements.

522. The OTMP reflects these two mechanisms for delivering this mitigation.

Summary of the assessed CIA pedestrian amenity impacts

523. Table 24.69 summarises the assessed CIA pedestrian amenity impacts.

Table 24.69 Pedestrian Amenity Summary

Link	Link description	Initial cumulative impact assessment	Mitigation measures (additional to Outline TMP)	Residual impact assessment
13b	A148	Moderate adverse	• Managed Traffic Demand • Enhanced TMP measures.	Minor adverse
32	B1149 - Edgefield	Moderate adverse	• Managed Traffic Demand • Enhanced TMP measures.	Minor adverse
33	B1149 -Holt Road	Minor adverse	n/a	n/a
34	B1145 – west of Cawston	Major adverse	• Managed Traffic Demand • Enhanced TMP measures. • Highway Mitigation Scheme	Minor adverse
36	B1149 – Holt Road	Major adverse	• Managed Traffic Demand • Enhanced TMP measures.	Minor adverse
41	B1436 - Felbrigg	Moderate adverse	• Managed Traffic Demand • Enhanced TMP measures.	Minor adverse
68	The Street / Heydon Road	Moderate adverse	• Managed Traffic Demand • Highway Mitigation Scheme	Minor adverse

24.8.2.5.3 Impact 3: Road safety

524. During stakeholder engagement, Highways England stated that they *'do not recognise GEART significance thresholds for assessing road safety (and capacity)'.* Therefore, as a 'first pass' only those links that exhibit a negligible increase in total traffic or HGV component have been screened out.

525. Table 24.70 provides a summary of the collision clusters identified in the baseline study (Table 24.50 refers) and includes details of the peak increase in daily cumulative construction flows in comparison to the forecast background daily traffic flows in 2023.

Table 24.70 Crashmap collision cluster information (Cumulative)

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
2	1	A47 at the junction of Woodlane and Berrys Lane	3.9%	20.6%	It is considered that a peak change in total traffic of 3.9% and HGV traffic of 120.6% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore the impact is assessed as **minor adverse**.
	7	A47 junction with Taverham Road and Blind Lane			
	8	A47 roundabout with Dereham Road			
3	9	A47 roundabout with A11 Newmarket Road	1.7%	14.7%	It is considered that a peak change in total traffic of 1.7% and HGV traffic of 14.7% represents a very low magnitude of effect on a potentially high sensitive receptor. Therefore, the impact is assessed as **minor adverse**.
3/4/8	6	A146 (Loddon Road) junction with slip road onto A47	1.7% - 3.2%	14.7% - 41.7%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
5	10	A47 Cucumber Lane Roundabout	2.4%	29.9%	It is considered that the change in HGV traffic could lead to potentially significant impacts.
	11	A47 Yarmouth Road			
	12	A47 North Burlingham			
39	22	A140 (Hevingham) junction with Church Street	5.6%	44.4%	It is considered that the change in HGV traffic could lead to potentially significant impacts.

526. Table 24.70 identifies that of the seven collision clusters within the CIA traffic and transport study area, three would experience a very low magnitude of effect resulting in a **minor adverse** impact. The remaining five sites would experience increases in HGV traffic which could potentially result in significant impacts and are therefore considered further.

527. To inform the further review of the above identified junctions, detailed collision data (known as STATS19[10]) has been obtained from Norfolk County Council for the most recently available five year period (01.12.13 to 30.11.18).

528. The STATS19 collision data has been examined to identify any emerging patterns or factors that could be exacerbated by the project's traffic generation. The review is summarised below with full details included as Appendix 24.32.

Cluster Site 6

529. Refer to Scenario 2 assessment paragraphs 297 to 300.

530. It is considered that an increase in total traffic of up to 3.2% through the junction represents a very low magnitude of effect on a potentially high sensitive receptor resulting in a **minor adverse** impact.

Cluster Site 10

531. Refer to Scenario 2 assessment paragraphs 302 to 305.

532. Cluster site 10 is located on link 5 that is projected to experience an increase in total traffic of 2.4% and HGV traffic of 29.9%. It is considered that an increase in HGV total traffic of 29.9% through represent a low magnitude of effect on a high sensitivity receptor resulting in a **moderate adverse** impact.

533. To mitigate the potential for construction traffic to escalate the identified pattern of rear end shunts it is proposed to introduce high friction surfacing on the approach to the junction (as per the western approach), this would assist drivers avoiding a collision if braking late. In addition, to mitigate the collisions resulting from drivers colliding with other vehicles whilst negotiating the roundabout advanced lane markings would be provided on all approaches and lane delineation markings on the circulatory area; this would assist drivers with understanding priorities on the approach to the roundabout.

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

Cluster Site 11

535. Refer to Scenario 2 assessment paragraphs 309 to 310.

536. Cluster site 11 is located on link 5 that is projected to experience an increase in total traffic of up to 2.4% and HGV traffic of up to 29.9%. Noting that none of the

[10] 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).

recorded collisions involved HGVs and that the collisions are of a type that would be attributable to driver inattention, the percentage change in HGV traffic alone is not considered to be a material consideration. It is therefore considered that a change in total traffic of 2.4% through Cluster site 11 represent a very low magnitude of effect on a potentially high sensitive receptor resulting in a **minor adverse** impact.

Cluster Site 12

537. Refer to Scenario 2 assessment paragraphs 312 to 319.

538. Cluster 12 is located on link 6 that is projected to experience an increase in total traffic of up to 2.4% and HGV traffic of up to 29.9%. However, no traffic is projected to turn on to or off the A47 at this location, as such the magnitude of effect is assessed as very low on a high sensitivity receptor resulting in a **minor adverse** impact. This routing strategy would be secured through controls and measures (such as direction signing and delivery instructions) embedded within the outline CTMP.

Cluster Site 22

539. Cluster site 22 is located on the A140 west of Horsham St Faith within proximity of the staggered junction with Church Street.

540. Within the latest five-year study period there have been seven collisions, of which six were slight in severity and one was serious. In total of the seven collisions, four were collisions between vehicles turning in or out of Church Street and two were rear end shunt type collisions. The seventh collision was due to a loose object flying off the carriageway when a high-speed police vehicle passed. It is therefore considered that there is a pattern of collisions between turning vehicles.

541. Cluster site 22 is located on link 39 that is projected to experience an increase in total traffic of up to 5.6% and HGV traffic of up to 44.4%. However, no traffic is projected to turn on to or off the A140 at this location, as such the magnitude of effect is assessed as very low on a potentially high sensitivity receptor resulting in a **minor adverse** impact. This routing strategy would be secured through controls and measures (such as direction signing and delivery instructions) embedded within the OTMP.

24.8.2.5.4 Impact:4 Driver delay

542. The Norfolk Boreas impact assessment identified, in consultation with stakeholders, four critical junctions that could potentially be subject to driver delay effects:

- A12 Gapton Hall Roundabout;
- A47 Vauxhall Roundabout;
- A149 Fuller's Hill Roundabout; and
- Junction of the A47 and the A1064.

543. These critical junctions are not located along any shared road links between Norfolk Boreas and Hornsea Project Three, and therefore are scoped out from further assessment in this CIA.

24.8.3 Cumulative Impacts during Operation

544. No cumulative impacts are anticipated as operational impacts were scoped out of the traffic and transport assessment for Norfolk Boreas.

24.8.4 Cumulative Impacts during Decommissioning

545. Decommissioning of Norfolk Vanguard and Hornsea Project Three may potentially take place at the same time as Norfolk Boreas. The detail and scope of the decommissioning works for Norfolk Boreas 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 not anticipated to be worse than those during the construction stage.

24.9 Inter-relationships

546. 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 24.71 summarises the inter-relationships that are considered of relevance to traffic and transport and identifies where they have been considered within this ES.

Table 24.71 Chapter topic inter-relationships

Topic and description	Related Chapter	Where addressed in this Chapter	Rationale
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 traffic delay and traffic related air quality upon local residents.	Chapter 26 Air Quality	Traffic data included in the assessment is presented in Chapter 26 Air Quality.	Traffic has the potential to temporarily affect air quality.

Topic and description	Related Chapter	Where addressed in this Chapter	Rationale
The relationship between traffic delay and traffic related emissions upon the health of local residents.	Chapter 27 Human Health	Traffic data included in the assessment is presented in Chapter 26 Air Quality and Chapter 27 Human Heath.	Traffic movements associated with construction may generate localised dust emissions leading to potential complaints.

547. The potential for inter-relationship impacts has been identified and is summarised in Appendix 24.34 (Scenario 2) and Appendix 24.35 (Scenario 1), which sets out a link by link analysis of the accumulation of effects and reviews the mitigation proposed.

24.10 Interactions

548. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The worst case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered conservative and robust. For clarity the areas of interaction between impacts are presented in Table 24.72 along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 24.72 Interactions between impacts

Potential interaction between impacts Construction	1. Severance	2. Pedestrian Amenity	3. Highway Safety	4. Driver Delay
1. Severance	-	Yes	Yes	No
2. Pedestrian Amenity	Yes	-	Yes	No
3. Highway Safety	Yes	Yes	-	Yes
4. Driver Delay	No	Yes	Yes	-
Operation				
No significant impacts.				
Decommissioning				
It is anticipated that the decommissioning impacts will be no worse than those of construction.				

24.11 Summary

549. This chapter of the ES has assessed the potential impacts of the onshore element of Norfolk Boreas on the surrounding traffic sensitive receptors.

550. This chapter has been developed with regards to the legislative and policy framework outlined in section 24.2.1 and further informed by consultation with Highways England and Norfolk County Council.

551. Traffic demand has been calculated with regards to an access strategy that has been adopted for the project. The strategy seeks to manage the traffic impact through 'embedded mitigation' which would be implemented through an 'enhanced' TMP post-planning determination.

552. In accordance with national guidance (GEART) a traffic and transport study area was identified, baseline conditions established and sensitive receptors within the study identified. The traffic and transport study area was screened to identify routes that could be potentially impacted by the projects' traffic generation.

553. Two alternative scenarios were assessed for potential impacts:

- **Scenario 1** – Norfolk Vanguard proceeds to construction, and installs ducts and other shared enabling works for Norfolk Boreas.
- **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project

554. A total of 108 highway links within the traffic and transport study area have been assessed for the effects of severance, pedestrian amenity, road safety and driver delay. With the application of mitigation measures (as appropriate) the residual impact for all highway links (bar link 69 for Scenario 2) was assessed to be **not significant**.

555. In Scenario 2, Link 69 has a mitigated traffic demand of 48 daily HGV movements and the effect is considered to be of low magnitude. However, noting the high sensitivity of the receptor it is expected that the residual impact significance would be 'marginally' **moderate adverse**.

556. The assessed impact is very localised (impacting on a small number of dwellings) and is for a relative short duration. It is considered community engagement to establish clear lines of communication to the appointed contractor would serve to identify periods that are particularly sensitive to HGV movements and that could further mitigate this impact.

557. The OTMP (document reference 8.8) contains a specific commitment to managing the HGV movements for link 69 and notes the need for community engagement.

558. Table 24.73 summarises the traffic and transport impact assessment for Scenario 1 and Table 24.74 summarises the traffic and transport impact assessment for Scenario 2.

559. The traffic and transport CIA has assessed the potential impacts of the onshore aspects of the Norfolk Boreas with A47 Corridor Improvements, Norfolk Vanguard and Hornsea Project Three on the surrounding traffic sensitive receptors.

560. The assessment of potential cumulative impacts between Norfolk Boreas Scenario 1 and Norfolk Vanguard concluded that the cumulative traffic demand of these phases would not result in a greater impact than that of the assessed Norfolk Boreas Scenario 2 worst case

561. A detailed CIA was undertaken for Norfolk Boreas Scenario 2 and Hornsea Project Three. In accordance with national guidance (GEART), a CIA traffic and transport study area was identified via common links shared Norfolk Boreas and Hornsea Project Three projects, baseline conditions established and sensitive receptors identified.

562. The CIA traffic and transport study area was screened to identify highway links (defined as sections of road with similar characteristics and traffic flows) that could be potentially subjected to significant impacts by the projects' traffic generation.

563. A total of 27 highway links within the CIA traffic and transport study area were screened in and have been assessed for the effects of severance, pedestrian amenity and road safety.

564. With the application of mitigation measures (where required) the residual impact for all highway links was assessed to be not significant.

565. Table 24.75 summarises the cumulative traffic and transport impact assessment for Norfolk Boreas Scenario 2 and Hornsea Project Three.

Table 24.73 Potential impacts identified for traffic and transport under Scenario 1

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Additional Mitigation	Residual Impact
Construction						
Impact 1: Severance	10, 13a, 13b, 16, 17, 18, 21, 22, 23, 25, 29, 32, 33, 34, 35a, 35b, 36, 40b, 41, 42, 46, 47b, 47c, 49, 52, 54, 55, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79 and A to V	Low – High	Very Low	**Negligible to Minor adverse**	None required.	**Negligible to Minor adverse**
Impact 2: Pedestrian Amenity	10, 13a, 13b, 16, 17, 18, 21, 22, 23, 25, 29, 32, 33, 34, 35a, 35b, 36, 40b, 41, 42, 46, 47b, 47c, 49, 52, 54, 55, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79 and A to V	Low – High	Low – High	**Minor to Moderate adverse**	Specific targeted TMP measures.	**Minor adverse**
Impact 3: Road Safety	Clusters 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21.	Negligible - Low	Low - Medium	**Minor adverse**	None required.	**Minor adverse**
Impact 4: Driver Delay	Junctions: 1, 2, 3, 4	High	Low – Very Low	**Minor adverse**	None required.	**Minor adverse**

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Additional Mitigation	Residual Impact
Operation						
All impacts	All links	Low - High	Very Low	**Negligible**, or up to localised **minor adverse**	None required.	**Negligible**, or up to localised **minor adverse**
Decommissioning						
Impacts upon those links serving the cable route works would be significantly less than the construction phase whilst impacts upon those links primarily serving the onshore project substation (link 1) would be no worse than construction. Therefore, the overall magnitude of effect would be negligible to minor adverse and where appropriate similar mitigation strategies as presented for construction would be valid.						

Table 24.74 Potential impacts identified for traffic and transport under Scenario 2

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Additional Mitigation	Residual Impact
Construction						
Impact 1: Severance	6, 8, 9, 10, 13a, 13b, 14, 16, 17, 18, 19, 21, 22, 24, 25, 29, 30, 32, 33, 34, 35a, 35b, 36, 37, 40a, 40b, 41, 42, 44a, 44b, 45, 46, 47b, 47c, 49, 52, 53, 54, 55, 56, 57, 58, 59, 60, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79.	Low – High	Very Low	**Negligible to Minor adverse**	None required.	**Negligible to Minor adverse**
	69	High	High	**Major adverse**	Specific targeted TMP measures	**Moderate**
Impact 2: Pedestrian Amenity	6, 8, 9, 10, 13a, 13b, 14, 16, 17, 18, 19, 21, 22, 24, 25, 29, 30, 32, 33, 34, 35a, 35b, 36, 37, 40a, 40b, 41, 42, 44a, 44b, 45, 46, 47b, 47c, 49, 52, 53, 54, 55, 56, 57, 58, 59, 60, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79.	Low – High	Low – High	**Minor to Major adverse**	Specific targeted TMP measures.	**Minor adverse**

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Additional Mitigation	Residual Impact
	69	High	High	**Major adverse**	Specific targeted TMP measures	**Moderate adverse**
Impact 3: Road Safety	Clusters 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23.	Negligible - Medium	Low - Medium	**Minor adverse**	None required	**Minor adverse**
	10	High	Low	**Moderate adverse**	Specific targeted TMP measures.	**Minor adverse**
	13, 17	High	Medium	**Major adverse**	Specific targeted TMP measures.	**Minor adverse**
Impact 4: Driver Delay	Junctions: 1, 2, 3, 4	High	Low – Very Low	**Minor adverse**	None required.	**Minor adverse**
Operation						
All impacts	All links	Low - High	Very Low	**Negligible**, or up to localised **minor adverse**	None required.	**Negligible**, or up to localised **minor adverse**
Decommissioning						
Impacts upon those links serving the cable route works would be significantly less than the construction phase whilst impacts upon those links primarily serving the onshore project substation (link 1) would be no worse than construction. Therefore, the overall magnitude of effect would be negligible to minor adverse and where appropriate similar mitigation strategies as presented for construction would be valid.						

Table 24.75 Potential cumulative impacts identified for traffic and transport Norfolk Boreas Scenario 2 and Hornsea Project Three

Potential impact	Receptor	Value/ sensitivity	Magnitude	Significance	Mitigation	Residual impact
Construction						
Impact 1: Pedestrian Severance	Links: 1a, 1b, 5, 8, 13a, 13b, 14, 18, 19, 24, 29, 30, 32, 33, 34, 36, 37, 39, 40b, 41, 58, 59, 60, 68	Low – High	Very Low - Low	Negligible – Minor adverse	N/A	Negligible – Minor adverse
Impact 2: Pedestrian Amenity	Links: 1a, 1b, 5, 8, 13a, 14, 18, 19, 24, 29, 30, 33, 37, 39, 40b, 58, 59, 60	Low – High	Very Low	Negligible – Minor adverse	N/A	Negligible – Minor adverse
	13b, 32, 41, 68	Low – High	Low to High	Moderate adverse	Managed Traffic Demand Enhanced TMP measures. Highway Mitigation Scheme	Minor adverse
	34, 36	Medium - High	Medium - High	Major adverse	Managed Traffic Demand Enhanced TMP measures. Highway Mitigation Scheme	Minor adverse
Impact 3: Road Safety	Clusters: 1, 6, 7, 8, 9, 11, 12, 22.	High	Very Low	Minor Adverse	Enhanced TMP measures.	Minor adverse
	10.	High	Low	Moderate adverse	Specific targeted TMP measures.	Minor adverse
Operation						
All impacts	All links	Low - High	Very Low	Negligible, or up to localised minor adverse	n/a	Negligible, or up to localised minor adverse

Potential impact	Receptor	Value/ sensitivity	Magnitude	Significance	Mitigation	Residual impact
Decommissioning						
Impacts upon those links serving the cable route works would be significantly less than the construction phase whilst impacts upon those links primarily serving the onshore project substation (link 1) would be no worse than construction. Therefore, the overall magnitude of effect would be negligible to minor adverse and where appropriate similar mitigation strategies as presented for construction would be valid.						
Cumulative during operation						
No cumulative impacts are anticipated as there are no operational impacts associated with Norfolk Vanguard.						
Cumulative during 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 no worse than those identified during the construction stage.						

24.12 References

Breckland Council (2009). Adopted Core Strategy and Development Control Policies Development Plan Document. [Online] Available at: https://www.breckland.gov.uk/media/1574/Core-Strat-Final-20-03-2012/pdf/Core_Strat_Final_20_03_2012 [Accessed 04 September 2017].
Breckland Council (2017). *Breckland local Plan Pre-submission Publication Emerging Single Local Plan 2011-2036.* [Online] Available at: https://www.breckland.gov.uk/media/4486/Pre-Submission-Publication-Part-1/pdf/Breckland_Local_Plan_Pre-Submission_Publication_Part1 [Accessed 04 September 2017].
Broadland District Council (2015). Development Management DPD Adopted. [Online] Available at: https://www.broadland.gov.uk/downloads/file/1118/development_management_dpd_adopted [Accessed 04 09 2017].
Broadland District Council (2015). Development Management DPD Adopted. [Online] Available at: https://www.broadland.gov.uk/downloads/file/1118/development_management_dpd_adopted [Accessed 04 09 2017].
Collet and Sons Ltd (2018). Route Access Survey, Halifax: Collet and Sons Ltd.
Crashmap (2019). Crashmap. [Online] Available at: http://www.crashmap.co.uk/ [Accessed 18 February 2019].
Depart for Transport (2013) Circular 02/2013, Strategic road networks and the delivery of sustainable development. Available at https://www.gov.uk/government/publications/strategic-road-network-and-the-delivery-of-sustainable-development. Accessed 26/02/2019.
Department of Energy and Climate Change (2011a) Overarching NPS for Energy (EN-1) Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf. Accessed 26/02/2019.
Department of Energy and Climate Change (2011b) NPS for Renewable Energy Infrastructure (EN-3) Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf. Accessed 23/03/2018.
Department of Energy and Climate Change (2011c) NPS for Electricity Networks Infrastructure (EN-5) Available at: http://www.nemo-link.com/pdf/cpo/The_National_Policy_Statement_for_Electricity_Networks_Infrastructure_(EN-5).pdf. Accessed 23/03/2018.
Greater Norwich Development Partnership (2014). *Joint Core Strategy for Broadland, Norwich and South Norfolk.* [Online] Available at:

https://www.broadland.gov.uk/downloads/file/1310/joint_core_strategy_adopted_document_2014 [Accessed 04 September 2017].
Institute of Environmental Assessment (1993). Guidelines for the Environmental Assessment of Road traffic.
Norfolk Boreas Limited (2018). Norfolk Boreas Offshore Wind Farm Preliminary Environmental Information Report. Available online at https://corporate.vattenfall.co.uk/projects/wind-energy-projects/vattenfall-in-norfolk/norfolkboreas/documents/preliminary-environmental-information-report/. Accessed 16/01/2019.
Norfolk County Council (2011). Norfolk County Council Local Transport Plan 3.
Norfolk County Council (2017). Transport Asset Management Plan.
Norfolk County Council (2017). Transport Asset Management Plan - Route Heirarchy.
Norfolk Vanguard Limited (2018). Norfolk Vanguard Offshore Wind Farm Environmental Statement. Available online at: https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-vanguard/. Accessed 16/01/2019.
North Norfolk District Council (2008). Core Strategy - Incorporating Development Control Policies.
Ørsted Hornsea Project Three (2019) *Appendix 8 to Deadline 5 Submission - Main Construction Compound Access Strategy Vissim Modelling Update,* London: Ørsted.
Royal HaskoningDHV (2017). Norfolk Boreas Offshore Wind Farm Scoping Report.
Royal HaskoningDHV (2018). Norfolk Boreas Offshore Wind Farm Traffic and Transport Method Statement. Unpublished.
South Norfolk District Council (2015). South Norfolk Local Plan - Development Management Policies Document Adopted Version. [Online] Available at: https://www.south-norfolk.gov.uk/sites/default/files/Development_Management_Policies_Document_0.pdf [Accessed 04 09 2017].
Waveney District Council (2009). The approach to Future Development in Waveney to 2021 Core Strategy Development Plan Document. [Online] Available at: http://www.eastsuffolk.gov.uk/planning/local-plans/waveney-local-plan/existing-waveney-local-plan/core-strategy/adopted-core-strategy/ [Accessed 04 09 2017].
Waveney Disctrict Council (2011). Adopted Development Managament Policies. [Online] Available at: http://www.eastsuffolk.gov.uk/planning/local-plans/waveney-local-plan/existing-waveney-local-plan/development-management-policies/adopted-development-management-policies/ [Accessed 04 09 2017].

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