East Anglia
Offshore Wind

VATTENFALL

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East Anglia THREE

Chapter 27

Traffic and Transport

Environmental Statement
Volume 1
Document Reference – 6.1.27

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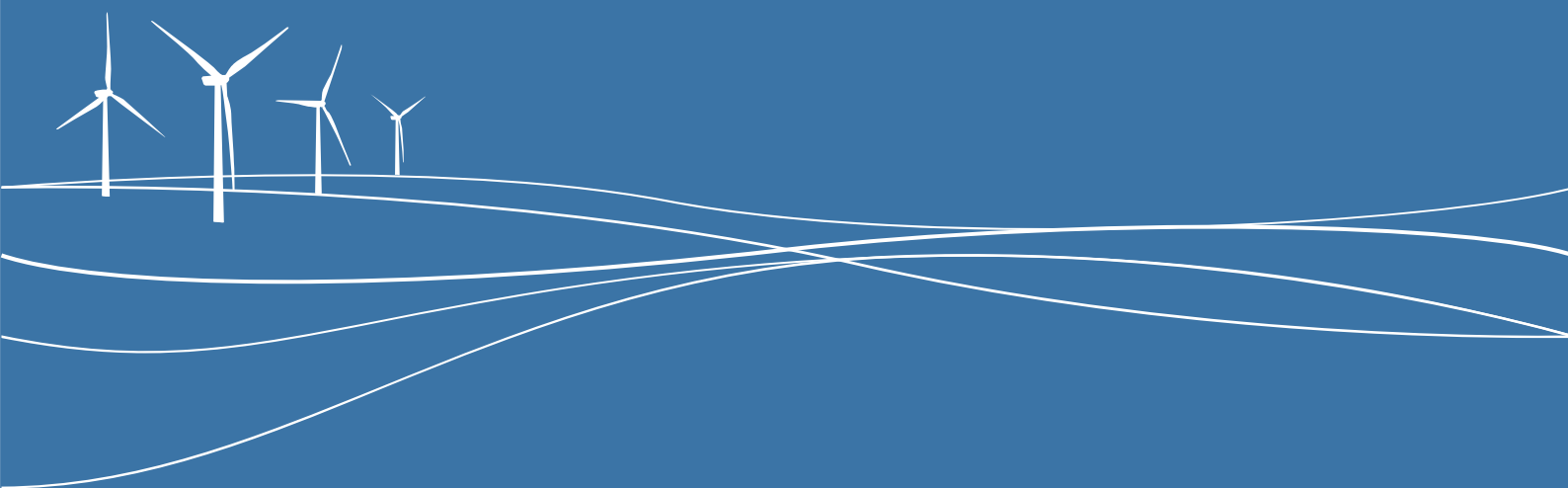
East Anglia THREE Limited
Date – November 2015
Revision History – Revision A



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27 TRAFFIC AND TRANSPORT

27.1 Introduction

1. This chapter of the Environment Statement (ES) describes the existing onshore environment with regard to traffic and transport and assesses the potential impacts of the onshore electrical transmission works for the proposed East Anglia THREE project during the construction, operation and decommissioning phases of the works. This chapter has been prepared by Royal HaskoningDHV.

2. In preparing the transport strategy for the proposed East Anglia THREE Project, reference has been made to the applicable National Policy Statement (NPS) EN-1 which includes details on the assessment of traffic and transport. EN-1 outlines that if a project is likely to have significant transport implications, the applicant's ES should include a transport assessment and where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts.

3. Figures which complement the text in this chapter are provided in *Volume 2 Figures* and appendices are provided in *Volume 3 Appendices*.

4. The assessment contained within this chapter is supported by a Traffic Management Plan, an Access Management Plan and a Travel Plan which prescribe in detail the embedded mitigation necessary to manage the traffic and transport effects. These plans are provided in outline in *Volume 3*.

27.2 Consultation

5. Preliminary scoping discussions were undertaken with Suffolk County Council (SCC) on the 12th March 2014. The discussions confirmed that the general approach adopted for the East Anglia ONE Development Consent Order (DCO) application was accepted, with the notable exceptions outlined in *Table 27.1*.

6. The agreed methodology was incorporated into a Traffic and Transport Chapter that formed part of a Preliminary Environmental Information Report (PEIR) submitted in May 2014 for public consultation by East Anglia THREE Ltd (EATL) in accordance with Section 42 of the Planning Act 2008,

7. Further to the Section 42 consultation undertaken in Summer 2014, there have been a series of design updates, the most notable being the removal of the previously included open trenching option(Scenario 2 , see Chapter 1 Introduction, section 1.2). Following these design revisions a second meeting was held with SCC on the 18th

June 2015, *Table 27.2* provides a broad summary of all the issues and responses received and how they have been addressed.

Table 27.1 Preliminary scoping

Consultee	Date /Document	Comment	Response / where addressed in the PEI
Suffolk County Council	12 March 2014/ Preliminary scoping note.	SCC requested that justification for length of haul road length for Scenario 1 be provided.	Chapter 5 Description of the Development provides details.
		SCC advised that they wish to see the assumption for East Anglia ONE that employee arrivals and departures would be spread over three hours refined.	East Anglia THREE has updated this assumption to reflect the potential for employees to depart entirely during the pm network peak hour, section 27.6.1 refers.
		It was noted that the agreed position on East Anglia ONE was that "Future highway junction capacity assessments would be undertaken if peak hour deliveries to Primary CCSs are required. The junctions to be subject to capacity assessment would be those on the A12 between the junction of the A12 and A14 at Sevenhills, and the junction of the A12 and the A1152 at Woods Lane. " SCC confirmed that "SCC would review the position for EA THREE and FOUR once details of Heavy Goods Vehicle (HGV) numbers are made available, but certainly flows akin to that for EA ONE would require this work to be revisited".	East Anglia THREE results in a reduced peak hour impact compared with East Anglia ONE. *Table 27.16* provides details of peak hour impacts upon sensitive junctions to inform further discussions with SCC regarding the need for junction capacity assessment.
		SCC agreed the distribution of HGV traffic used for East Anglia ONE was appropriate but wished to see the workforce distribution updated.	East Anglia THREE has updated the employee distribution based upon the latest socio economics data, section 27.6.1 refers.
		SCC advised that a high level base port assessment would be required but advised this was best deferred until East Anglia ONE Limited (EAOL) announced a	No announcement on a preferred base port has been made. East Anglia THREE base port

Consultee	Date /Document	Comment	Response / where addressed in the PEI
		preferred base port.	may not be the same as East Anglia ONE base port and a decision would be made at a later date
		SCC committed to identifying the sites that they consider require further consideration from a road safety perspective.	SCC has provided high level details of all the collisions within the study area, section 27.6.4 provides a detailed review of the collisions on all links exceeding GEART Rule 2 screening thresholds.
		SCC wish to see the environmental impact on cyclists considered.	*Table 27.7* details the sensitive links within the study area taking into account all vulnerable road users, including cyclists.
		SCC confirmed that the cumulative assessment should consider Adastral Park, Ipswich Northern Fringe and Sizewell C.	Section 27.7 provides a review of the cumulative impacts of these three projects with East Anglia THREE included at the request of SCC. It should be noted that Woods Lane housing development was added to the assessment following a successful appeal determination

Table 27.2 Consultation responses

Consultee	Date /Document	Comment	Response / where addressed in the PEI
Suffolk County Council	May 2014/PEIR response	SCC agreed to the concept of reducing the extent of haul road required by making use of existing minor roads/tracks, but expressed concerns with the suitability of some of the proposed points of access.	As a result of the feedback and a detailed assessment of constraints, the number of accesses required has been refined down from 59 to 37. Chapter 5 Description of the Development provides further detail.
		In determining employee distribution SCC wished to see two centroids for drive time based	Section 27.6.1 provides details of an updated methodology for determining employee

Consultee	Date /Document	Comment	Response / where addressed in the PEI
		around the primary CCSs rather than a single centroid at Woodbridge.	distribution incorporating two centroids based around the primary CCSs in response to SCC comments.
		SCC wished to see distance decay when determining employee distribution.	The socio-economics study applies a weighting to in-migrant workers of 1 to potential workforce with journey origins within 30 minutes and a weighting of 0.5 to those between 30 and 45 minutes.
		SCC queried if the assessment included for a degree of downsizing of vehicles from the Primary CCSs onwards that were more suitable to the local road network.	The assessment utilises vehicles for delivery of material that can access all routes within the study area (typically 20tonne payload) and therefore it is assumed that vehicles would report to the primary CCS before being assigned an appropriate access point for delivery.
		SCC wished to understand if vehicles going to the secondary CCSs would first return to the Primary CCS before exiting to the wider highway network.	There would be no requirement for HGVs to return the primary CCS.
		SCC advised that the assessment of impacts also needs to give consideration to percentage change in HGV numbers as well as total traffic.	In accordance with the IEMA guidelines, the 'All Traffic' assessment is for the effect of severance only to establish if traffic is presenting a perceived division within a community, whilst pedestrian amenity examines the impacts resulting from all traffic and also from the HGV component.
Suffolk County Council	18 June 2015 / Second Transport	It was agreed that the cumulative assessment should use TEMPro growth only for the assessment of severance and amenity. The driver	Section 27.7 provides a review of the cumulative impacts of East Anglia THREE.

Consultee	Date /Document	Comment	Response / where addressed in the PEI
	Meeting	delay, air quality and noise assessments should consider the local impacts from other relevant developments.	
		SCC provided details of the junctions that would require further consideration of driver delay impacts.	*Table 27.16* provides details of peak hour impacts upon sensitive junctions to inform further discussions with SCC regarding the need for junction capacity assessment.
		SCC advised that the road safety assessment should concentrate on vulnerable road users and corridor type assessment rather than a more 'cluster assessment'.	Section 27.6.4.5 provides a detailed review of the collisions on all links exceeding GEART Rule 2 screening thresholds.
		It was agreed that the access points off minor distributors should not be over engineered, recognising the limited period they would be used and low traffic loading. For these locations, a reduced design solution was agreed with associated temporary traffic management.	The Outline Access Management Plan and Outline Traffic Management Plan contained in Volume 3 provide details of the proposed access arrangements.
Suffolk County Council	4 September 2015/Review of ES Chapters	SCC expressed concerns with the assumption that local workers would be drawn from within a 60 minute drive time and considered drive times of up to 90 minutes to be reasonable. This would influence the ratio of local workforce sourced which in turn could change the traffic distribution of the workforce.	It has been agreed with SCC to sensitivity test a scenario whereby the catchment area for local workers would be increased to a 90 minute drive time, thereby also increasing the potential for local employment from 34% to 66%. Appendix 27.16 contains the sensitivity test, Section 27.6.4.6 assesses the outputs.
		SCC wished to understand what control measures would be established to achieve an employee to vehicle ratio of 2.5.	Section 27.6.1.3 provides details of the worst case assumptions regarding the vehicle to employee ratio, whilst the Outline Travel Plan provides details of how this

Consultee	Date /Document	Comment	Response / where addressed in the PEI
			ratio will be controlled and enforced.
		SCC advised that, Woods Lane housing development should also be included in the cumulative traffic assessment (in addition to those sites previously agreed)	Section 27.7 provides an assessment of the cumulative impacts of East Anglia THREE in combination with other developments.
		SCC requested clarification as to whether highway improvements/traffic management measures agreed for East Anglia ONE would be retained for East Anglia THREE. This included the junction of the B1113/Bullen Lane and the identified HGV 'pinch point' on the B1079 Grundisburgh Road.	The Outline Traffic Management Plan provides detail of highway improvements/traffic management measures to be introduced for East Anglia THREE.
		SCC expressed the view that the width of temporary haul road should be 6.0m rather than 5.5m as assumed. Should this additional width be required would lead to additional HGV demand to deliver the extra stone.	The assumptions that underpin the design of haul road have been developed by specialist construction consultant (AECOM). It is considered a maximum 5.5m width will be required for the majority of the haul route as the hourly frequency of HGVs indicates single lane working can be managed. (*Table 27.18* contains detail of HGV demand on local routes). The stone quantities for the haul road contain a 20% to allow for place to place widening should it be required.

27.3 Scope

27.3.1 Study Area

8. The study area has been informed by determining the most probable routes for traffic, for both the movement of materials and employees, during both construction and operational phases of the proposed project. The study area has been

determined with reference to the Suffolk road hierarchy and assigns trip origins on the 'A' class road network and trip ends at the Primary and Secondary Construction Consolidation Sites (CCS) which serve the on-shore cable route.

9. The study area is illustrated in *Figure 27.1* and is divided into 42 separate highways sections known as links, which can be defined as sections of road with similar characteristics and traffic flows.

27.3.2 Worst Case

10. This section details the worst case construction scenarios which have influenced the traffic demand for the project and therefore forms a basis for the subsequent impact assessment.

11. The onshore cable route is approximately 37km long and was determined during the development of the onshore electricity transmission works for East Anglia ONE. As outlined in Chapter 4 Site Selection and Alternatives, the decision to identify an onshore cable route that was of sufficient width to place ducting for export cables for two future projects was a key outcome of route selection and consultation with the local authorities.

12. On 17th June 2014 East Anglia ONE Limited (EAOL) received consent for East Anglia ONE (Planning Inspectorate 2014). The DCO for East Anglia ONE includes cable ducts for two further projects.

13. Therefore, there is a commitment that the ducts for the proposed East Anglia THREE project would be installed at the same time as the cables are laid for East Anglia ONE. The ducts would be installed along the onshore cable route and all horizontal directional drilling (HDD) operations and trenchless crossing techniques would be undertaken at the same time.

14. Cable installation for the proposed East Anglia THREE project would therefore consist of pulling cables through ducts which would have already been installed as part of the East Anglia ONE Project installation.

15. There are two possible approaches for the onshore cable installation that have been assessed for East Anglia THREE; a full project description is contained in Chapter 5 Description of Development.

- Single Phase: a single phase (up to 1200MW installed in a single construction period); or

- Two Phased: (two phases of up to 600MW each, with each start date separated by no more than 18 months).

16. With regard to the Two Phased approach, the first phase contains more activities for the construction of the substation than the second phase and therefore represents the worst case traffic generation.

17. EATL are currently considering both a High Voltage Direct Current (HVDC) and a Low Frequency Alternating Current (LFAC) electrical solution for the proposed East Anglia THREE project. A decision on the final electrical solution for the project would be made following consent during the final design stage of the project.

18. The LFAC electrical connection solution represents a greater demand for daily HGV movements than the HVDC solution (due to the greater requirement for cable associated with the LFAC solution) and therefore represents worst case.

19. Therefore, for ease of assessment and review, the transport assessment has been rationalised to two worst case approaches, namely:

- Single Phase, LFAC; and
- Two Phased, LFAC, phase 1 only

20. For ease of reference both approaches are herein simply referred to as the Single Phase and Two Phased approaches.

21. The parameters that have been utilised to derive the 'realistic worst case definition' for construction traffic for both the Single Phase and Two Phased approaches are outlined in *Table 27.3*.

Table 27.3.Worst Case Assumptions

Parameter	Notes
Construction	
Minimum construction duration for onshore cable route of 29 weeks	The minimum realistic duration the works can be completed in, resulting in the highest traffic demand due to the intensity of activities.
Minimum duration for the substation construction of 43 weeks with a further 12 weeks for commissioning	The minimum realistic duration the works can be completed in, resulting in the highest traffic demand due to the intensity of activities.
Minimum duration for individual construction activities.	Minimum durations for individual activities within the 29 week programme of the onshore cable route have been adopted to represent the peak

Parameter	Notes
	traffic demand for each activity.
Full overlap of the peak period of construction activity for all cable route sections.	Represents maximum possible intensity of activities resulting in peak traffic generation. This allows for any programme slippage or acceleration.
Earliest start of construction 2020.	2020 is the earliest realistic construction start date for the assessment of environmental impacts for both the Single Phase and Two Phased approach. 2020 would result in the greatest impact, compared to a later start date, as background traffic demand would be subject to limited growth and therefore traffic increase more significant.
No allowance for construction workers to be able to travel by non-car modes (bus, rail, walking and cycling) has been applied to the traffic demand.	Distributes construction employee travel to work by car only resulting in a higher traffic demand for the purpose of a robust assessment.
No allowance for reduction of HGV traffic due to intermodal freight transfer (rail, maritime).	Transfer of bulk materials by rail or maritime modes would lead to a reduction in HGV traffic on some of the links within the study area. However there would still be a need for local transfer by road therefore any potential gains have been disregarded for the purpose of this assessment.
All haul roads assumed to be fully removed after each project (or phase in the Two Phased approach).	The requirement to reinstate is included with the East Anglia ONE DCO. EATL is investigating whether haul road and CCS installed for East Anglia ONE could be left in-situ. However EATL must consider the worst case throughout the EIA of full reinstatement following East Anglia ONE completion and hence East Anglia THREE assesses the installation and removal of its own haul road. Subject to the necessary agreements and consents East Anglia ONE could leave sections of haul road in place for East Anglia Three. Furthermore, for the Two Phased approach East Anglia THREE Phase 1 could leave haul road in place for Phase 2. This could reduce the amount of stone that would need to be imported for East Anglia THREE Single Phase and Two Phase, Phase 2.
All surplus excavated material to be exported off	Assumes a worst case that surplus excavated material cannot be spread on site in all or some

Parameter	Notes
site.	locations.
HGV movements to occur over five days (Monday – Friday).	Results in peak traffic generation as deliveries can only be spread over five days. Weekends working would result in reduced daily traffic demand.
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, therefore as a worst case, during the construction duration, workers departing for home are assumed to overlap the evening network peak hour (17:00 – 18:00).	This assumes a worst case of peak construction worker movements occurring in the summer and overlapping with peak background traffic.
All HGV traffic to route to the Primary CCSs before transferring to the Secondary CCSs.	This strategy results in additional vehicle movements on the 'A' class roads, but manages HGV traffic on local roads.
An appropriate level of contingency (reflecting the uncertainties in the design) has been applied to all material quantities full details are contained in *Appendices 27.5 and 27.6*.	Ensures minor omissions or design changes can be accommodated within the assessed traffic flows.
Operation	
The onshore cables would require periodic testing every two-three years, as a worst case it is assumed that one visit per year per jointing bay would be required. The visits would comprise of up to three vehicles resulting in a six (two-way) vehicles movements per day.	Assuming annual monitoring of the onshore cable route is worst case with typical intervals closer to three to five years.
The substation would be staffed 24 hours a day by up to five full time members of staff resulting in 20 (two-way) vehicle movements per substation per day.	Assuming that the substation would be manned 24 hours a day results in a greater localised traffic impact than remote monitoring.
Decommissioning	
HGV and LCV traffic demand as per construction, assuming minimal opportunities to leave components in-situ or recycle materials on site.	Represents peak decommissioning traffic impacts.

27.3.3 Embedded Mitigation

22. In direct response to the policy and guidance framework and stakeholder engagement (outlined in section 27.2 and 27.4.1) a transport strategy has been developed recognising the need to manage the traffic impact. The transport strategy

contains the following 'embedded mitigation' measures relevant to both approaches which have been applied to the traffic forecasts contained in this Chapter:

- Primary CCSs located close to main A-roads, thereby minimising the impacts upon local communities and utilising the most suitable roads.
- The use of up to 37 strategic points of access (detailed in *Figure 27.3 and annotated access A, B, C, etc.*) close to the jointing bays to reduce the amount of temporary haul road required from approximately 35km for East Anglia ONE to approximately 18km for the proposed East Anglia THREE project. It is noted that the transport of stone for temporary haul roads is one of the largest traffic generators for the project (approximately 600 two-way HGV movements to install and remove a kilometre of haul road). *Figures 27.2* and *27.3* detail the HGV highway routes to the primary CCSs and the 37 points of access respectively.
- Primary CCSs, Secondary CCSs and the substation locations are located away from sensitive receptors to reduce the traffic impact upon local communities.
- The linear nature of the project would allow for the even distribution of activities and associated daily HGV demand.
- A Traffic Management Plan to manage the daily delivery profiles and control movements and routing.
- The Traffic Management Plan would control HGV movements between the Primary CCCs and the appropriate access point.
- A Travel Plan to manage the arrival and departure profile of staff and encourage sustainable modes of transport, especially car-sharing.
- The implementation of a minimum ratio of 2.5 employees to a vehicle for employees travelling to Primary CCS locations and access AC, AD and AL to reduce light commercial vehicle (LCV) traffic. *Figure 27.4* details the highway routes to these access points.
- The transfer of employees by minibus from Primary CCSs to access A to AB and AE to AK to minimise traffic generation on low trafficked local roads. *Figures 27.4* and *27.5* detailed the proposed employee routes to site. *Figure 27.5* details the highway routes to these access points.
- The use of a system of Primary CCSs to control delivery times and routes to the most sensitive locations on the highway network.

27.4 Assessment Methodology

27.4.1 Policy and Guidance

23. This Section sets out the salient traffic and transport policy and guidance that has informed the development of the ES for the proposed East Anglia THREE project and identifies how the application has been shaped by this framework.

27.4.1.1 National Policy Statements

24. The assessment of potential traffic and transport impacts has been made with specific reference to the Government's NPSs. NPSs set out policies or circumstances that Ministers consider should be taken into account in decisions on Nationally Significant Infrastructure Projects (NSIP). All six energy NPSs received designation by the Secretary of State for Energy and Climate Change on 19 July 2011. Those relevant to East Anglia THREE 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).

25. The specific assessment requirements for traffic and transport, as detailed in the NPSs, are summarised in *Table 27.4*, together with an indication of where each stipulation is addressed. Where any part of the NPS has not been followed within the assessment an explanation as to why the requirement was not deemed relevant, or has been met in another manner, is provided.

Table 27.4 NPS Assessment Requirements

NPS Requirement	NPS Reference	ES Response
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.	EN-1 Section 5.13.3	This ES has been produced in accordance with current ES transport guidance (referenced later in this section) 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	EN-1 Section 5.13.4	Section 27.3.3 outlines the embedded mitigation measures for construction, such as car-share and HGV controls. On appointment of principal contractors these measures would be formalised through further development of the Travel Plan and Traffic Management Plan

NPS Requirement	NPS Reference	ES Response
the need for parking associated with the proposal and to mitigate transport impacts.		for the construction phase. Section 27.6.2 details a small operational workforce which is below the DfT guidance whereby an operational workplace travel plan is required.

27.4.1.2 National Planning Policy Framework

26. The National Planning Policy Framework (NPPF) was published in March 2012 and replaces Planning Policy Statements for guiding development in England. Section 4 of the NPPF considers 'Promoting Sustainable Transport' and opens with the statement that 'Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives'. In respect of transport paragraph 32 of the NPPF states that:

"All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- Safe and suitable access to the site can be achieved for all people; and
- Improvements can be undertaken within the transport network that cost effectively limits the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe."

27. The NPPF has 'set the tone' for the development of the application ES.

27.4.1.3 The Guidelines for the Environmental Assessment of Road Traffic

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

29. 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.

30. GEART is the guidance that informs this assessment and section 27.4.3 of this report contains full details of how the guidance has been applied.

27.4.1.4 The Strategic Road Network and the Delivery of Sustainable Development

31. The DfT Circular 02/2013 entitled 'The Strategic Road Network and the Delivery of Sustainable Development' was published in September 2013 replacing circular 02/2007 'Planning and the Strategic Road Network'. It sets out the ways in which 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.

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

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

27.4.2 Data Sources

33. The following data sources were used to inform the impact assessment (*Table 27.5)*.

Table 27.5 Data Sources

Data	Year	Coverage	Confidence	Notes
Classified Automatic Traffic Counts	2013	Two links within the study area.	High	Traffic counts commissioned by EAOL which provide classified hourly and daily traffic count data.
Classified Annual Average Daily Traffic (AADT) counts.	2014	15 links within the study area.	High	Data sourced from the DfT which provides classified AADT traffic count data.
Classified Automatic Traffic Counts	2015	12 links within the study area.	High	Traffic counts commissioned by EATL which provide classified hourly and daily traffic count data.

34. *Table 27.5* demonstrates that baseline traffic flow data for 29 of the 42 links (sections of road with similar characteristics and traffic flows) within the study area (see *Figure 27.1*) has been captured.

35. In addition to the data sources listed in *Table 27.5*, a desk-based assessment supported by site visits was undertaken to provide information with regard to the existing baseline highway network and details of historic personal injury collisions was obtained from SCC for the latest five year period available (1st March 2010 to 1st March 2015).

27.4.3 Impact Assessment Methodology

36. This section describes the assessment methodology, including data collation, impacts and impact assessment criteria that were used in the traffic and transport assessment.

37. The baseline environmental studies, surveys and the impact assessment for transport have been conducted in accordance with the relevant best practice from GEART.

27.4.3.1 Scale of Assessment

38. The following rules, taken from the GEART, have informed the screening process and thereby defined the extent and scale of this assessment:

- 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.

39. 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."*

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

41. Following Rule 1 and Rule 2 screening, 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.

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

27.4.3.1.1 Severance

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

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

27.4.3.1.2 Pedestrian amenity

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

46. 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.

27.4.3.1.3 Road safety

47. The salient GEART guidance on road safety is a follows:

"Where a development is expected to produce a change in the character of traffic (e.g. HGV movements on rural roads), then data on existing accidents levels may not be sufficient. Professional judgement will be needed to assess the implications of

local circumstances, or factors which may elevate or lessen the risk of accidents, e.g. junction conflicts."

48. In this context the scope of assessment will focus upon on those links where increases in traffic flows exceed GEART Rule 2 thresholds (specifically sensitive areas).

49. Having identified those links an examination of the existing collisions occurring upon these links will be undertaken to identify any areas of the highway with concentrations of collisions with similar patterns. These sites are considered to be sensitive to changes in traffic flows (sensitive receptors) and therefore a more detailed analysis of significance will be undertaken in the context of the proposals.

27.4.3.1.4 Driver delay

50. GEART recommends the use of proprietary software packages to model junction delay and therefore estimate 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.

51. During consultation with the highway authorities sensitive junctions have been identified that require an assessment of potential delays for drivers during peak hours.

52. 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 delays effect.

53. Driver delay may also be associated with the transportation of Abnormal Indivisible Loads (AILs), however, it is not anticipated that construction along the onshore cable route would result in the requirement for any AILs.

54. The construction of the substation for the worst case Single Phase however is likely to require the delivery of seven 350 tonne main converter transformers to the substation location. Prior to movement of these AILs a detailed abnormal load route study would be undertaken and agreed with the highway authorities and police to ensure the route is suitable and that deliveries are scheduled to minimise delay on the highway network and therefore driver delay effects associated with AILs are not likely to be significant and are not considered further in the report.

27.4.3.1.5 Other impacts

55. Traffic borne noise and vibration effects and air quality effects informed by the traffic data outlined in this chapter are assessed in Chapter 20 Air Quality and Chapter 26 Noise and Vibration, respectively.

27.4.3.2 Magnitude

56. *Table 27.6* 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 27.6 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.		
Road safety	Informed by a review of existing collision 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.			

27.4.3.3 Link based sensitive receptors

57. The sensitivity of a road can be defined by the type of user groups who may use it, e.g. elderly people or children. A sensitive area may be a village environment or where pedestrian or cyclist activity may be high, for example in the vicinity of a school. *Table 27.7* provides broad definitions of the different sensitivity levels.

Table 27.7 Example Definitions of the Different Sensitivity Levels for a Highway Link

Sensitivity	Definition
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.
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds.
*High sensitivity links are considered to be 'specifically sensitive areas' for the purposes of GEART Rule 2.	

58. A desktop exercise augmented by site visits has been undertaken to identify the sensitive receptors in the study area utilising the definitions outlined in Table 27.7. The routes that are adjacent to (and therefore serving) the sensitive receptors have been assigned sensitivity value according to the highest value receptor on the route under consideration. For example, using the methodology adopted, a village road providing access to schools (high sensitivity receptors) and residential dwellings with good footways (low sensitivity receptors), would be identified as a high sensitivity route.

59. All routes within the study area have been assessed and assigned sensitivity. *Table 27.8* details the routes and the rationale for the applied link sensitivity and *Figure 27.6* illustrates these routes graphically.

60. The access strategy for the project has been underpinned by the use of the available 'A' class roads to access site compounds, substation locations or points along the onshore cable route, where possible. This strategy has been specifically adopted in order to reduce traffic impacts on sensitive receptors.

61. In general terms 'A' class roads are more heavily trafficked than "B", "C" or unclassified roads forming part of the immediate surrounding highway network. For this reason additional construction or maintenance vehicles when added to baseline flows will have a reduced environmental impact on the receptors that adjoin the heavily trafficked routes.

Table 27.8 Link Based Sensitive Receptors

Link ID #	Link Description	Link sensitivity	Comments
1	A14 between the J51 and J52	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
2	A14 between the J52 and J53	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
3	A1156 south from J53	Medium	The road is a main (A) road however, the road is directly fronted by residential properties and shops and has high pedestrian and cycle activity.
4	A14 between the J53 and J55	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
5	A12 south from J55	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
6	Paper Mill Lane	Low	The road has limited frontage development.
7	B1113	Medium	The road is a main (B) road with sporadic frontage development.
9	A14 between the J55 and J56	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
10	A14 between the J56 and J58	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
11	A14 south from J58	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
12	Trimley Road	High	The road passes close to Trimley St Martin Primary School and residential properties that directly front onto the road with narrow footways and forms part of an on road Regional Cycle Route, number 41.
13	Newbourne Road / Ipswich Road	High	The road passes close to Waldringfield Primary School and residential properties that directly front onto the road with no footway and forms part of an on road Regional Cycle Route, number 41.
14	A12 between J58 and Top Street	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.

Link ID #	Link Description	Link sensitivity	Comments
15	Top Street	Low	Top Street in the locality of the Primary CCS is a modern road with agricultural land either side.
16	A12 between Top Street and the A1152	Medium	The road is a main (A) road but sections are directly fronted by residential properties.
17	A12 north from the A1152	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
18	B1078 west from the A12	Medium	The road is a main (B) road with sporadic frontage development.
19	B1079 from the A12 to Grundisburgh	Medium	The road is a main (B) road with sporadic frontage development.
20	Ipswich Road south from Grundisburgh	High	The road passes through Grundisburgh close to Grundisburgh Primary School and residential properties and forms part of an on road Regional Cycle Route, number 48.
21	B1077 between the B1078 and A1156	Medium	The road is a main (B) road with sporadic frontage development identified as an advisory cycle route by SCC.
22	A1214 west from the A12	High	The road is a main (A) road however, the road is directly fronted by residential properties, Kesgrave High School, the Ipswich Hospital and shops and has high pedestrian and cycle activity.
23	B1078 between the A140 and B1077	High	The road passes numerous small settlements where residential properties front directly onto narrow roads with no footways.
24	A140 north-east of J51	Low	A main (A) road with no frontage development.
25	A14 north of J51	Low	A modern main (A) road with no frontage development designed to carry high quantities of traffic.
26	A1152	High	The road passes close to Melton Community Primary School and residential properties and shops.
27	B1083 south from the A1152 to south	High	The road passes close to residential properties and a play area that front directly onto the road with no or

Link ID #	Link Description	Link sensitivity	Comments
	of Shottisham		narrow footways.
28	B1438	High	The road passes close to local schools, play areas, residential properties and shops.
29	B1083 south from Shottisham	High	The road passes close to shops and residential properties that front directly onto the road with no or narrow footways and forms part of an on road Regional Cycle Route, number 41.
30	School Lane and Waldringfield Road	High	The link is a narrow county lane with only sporadic footways and forms part of the on road Regional Cycle Route, number 41. The Waldringfield section of the road is also designated as a 'Quite Lane'.
31	Unnamed road west from Alderton	Medium	The link is a narrow lane with sporadic development. There is some potential for non-motorised activity associated with existing public rights of way and bridleways that cross road.
32	Falkenham Road	High	The road passes close to residential properties and a shop that front directly onto the road with only limited footway provision.
33	Park Lane	High	The road passes close to residential properties with no footway provision.
34	Newbourne Road	Medium	The link is a narrow lane with no development however There is some potential for non-motorised activity associated with existing public rights of way and bridleways that cross road.
35	Sandy Lane	High	The road passes close to residential properties with no footway provision.
36	Rosery Lane	Low	Only sporadic frontage development and little potential for non-motorised user activity.
37	Bealings Road and Boot Street	Medium	The link is a narrow lane with sporadic development however, there is some potential for non-motorised activity associated an on road Regional cycle route, number 48.
38	Grundisburgh Road	Medium	The link is a narrow lane with no frontage development however, there is some potential for non-motorised activity associated an on road Regional cycle route,

Link ID #	Link Description	Link sensitivity	Comments
			number 48.
39	Lower Road and Henley Road	High	The road passes close to residential properties that front directly onto the road with only limited footway provision as well as forming part of the Regional cycle route 48.
40	Old Ipswich Road	Medium	The road passes close to residential properties that front directly onto the road with narrow footways and forms part of an on road National cycle route, number 51.
41	Somersham Road	Low	Only sporadic frontage development and little potential for non-motorised user activity.
42	Bullen Lane	Medium	The link is a narrow lane with sporadic development. There is some potential for non-motorised activity associated with existing public rights of way and bridleways that cross road.

27.4.3.4 Other receptors

62. In addition to the consideration of the sensitivity of highway links, areas with existing road safety issues and congested junctions have also been assigned a degree of sensitivity.

63. With regards to highway safety areas with existing road safety concerns are considered to be highly sensitive to changes in traffic and are outlined further in section 27.6.4.

64. With regards to driver delay discussions with the local highway authority SCC have identified 11 junctions considered to be highly sensitive to changes in traffic. The location of these junctions is shown in *Figure 27.7*.

27.4.3.5 Impact significance

65. *Table 27.9* sets out the assessment matrix adapted from GEART which combines the initial impact assessment derived from the assessment framework presented in *Table 27.6* with the receptor value to determine the magnitude of impact.

Table 27.9 Impact Significance Matrix

Sensitivity	High	Medium	Low	Very Low
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

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

67. Embedded mitigation and existing commitments to good practice are discussed in section 27.3.3, and are referred to throughout the impact assessment. The impact assessment takes into account the embedded mitigation before coming to a conclusion of the potential impact to a receptor. If any additional mitigation is required, this is included within the impact assessment in section 27.6, and a description of any residual impact post-mitigation is provided.

27.4.4 Cumulative Impact Assessment

68. For a general introduction to the methodology used for the cumulative impact assessment, please refer to Chapter 6 Environmental Impact Assessment methodology. This chapter will assess those cumulative impacts that are specific to traffic and transport.

69. In its simplest form the Cumulative Impact Assessment involves consideration of whether impacts on a receptor can occur on a cumulative basis between the onshore elements of the proposed East Anglia THREE project and other activities, projects and plans for which sufficient information regarding location and scale exist and where there is the potential for timing of the projects to overlap.

70. The further details of the methods used for the cumulative impact assessment for traffic and transport, see section 27.7.

27.4.5 Transboundary Impact Assessment

71. There are no transboundary impacts with regards to traffic and transport.

27.5 Existing Environment

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

- Traffic count data from the Department for Transport;
- Desktop studies and site visits;
- Personal injury collision data and traffic count information sourced from SCC and Highways England; and
- Traffic surveys commissioned for East Anglia ONE and East Anglia THREE.

27.5.1 Existing Highway network

73. This section describes the highway network serving the project. The construction works are serviced by CCSs; two Primary CCSs and five Secondary CCSs. The main function of the Primary CCS is to provide a control point for HGVs delivering to the cable route, house site administration and welfare facilities, provide parking for staff transfer to mini-bus and provide storage for materials plant and equipment.

74. The Secondary CCSs are of sufficient size to accommodate limited storage of materials, equipment and labour facilities. Having reported to the Primary CCS a HGV driver would be directed to either a Secondary CCS or an appropriate point of access to the cable route before returning to the wider network via the appropriate designated route.

75. The onshore cable route has been separated into 11 sections (detailed in *Figure 27.2*) to determine the likely distribution of HGVs and employees on the highway network.

76. The existing road network is illustrated on *Figure 27.8* and is dominated by the A12 and A14 trunk roads, which are the responsibility, in part, of Highways England. The A12 and the A14 form strategic links within the SCC Lorry Route Network, which forms part of the Suffolk County Council Lorry Management Plan.

77. The A12 follows a general south-west to north-east alignment connecting London with Lowestoft, passing Ipswich along the southern and eastern sides. The A14 follows a general north-west to south-east alignment connecting the Midlands with Cambridge and Felixstowe, passing Ipswich along its western and southern edges. These strategic highways would form the spine of the primary transport routes to the onshore electrical transmission works, serving two Primary CCSs.

78. The western section of the onshore cable route (sections 8-11) and the substation would be served from a Primary CCS located along the B1113 and accessed via the A14. It has been agreed with the SCC that no HGV movements associated with the construction works should be routed through Sproughton, and this commitment would be contained within the Outline Traffic Management Plan.

79. The eastern section of the onshore cable route (sections 1-7) would be served from a Primary CCS located along Top Street and accessed from the A12 via a short section of the B1438 Ipswich Road.

80. The two Primary CCSs (sites B and E) located along the B1113 Paper Mill Lane and Top Street, are connected by the A14, the A12 and the B1078 to the north of the onshore electrical transmission works. The B1078 forms a Zone Distributor lorry route within the SCC Lorry Route Network, connecting with the A14 via a short section of the A140, passing through a number of villages and hamlets and the northern edge of Wickham Market before connecting to the A12. It has been agreed with SCC that no HGV movements associated with the construction works should be routed along the B1078 through Coddenham. This commitment would be contained within the Traffic Management Plan. It has further been agreed that due heed would be taken of the directional weight limits upon the B1078, B1079 and U3041 around Clopton.

81. The onshore electrical transmission works to the south of the B1078 are connected to the B1078 via the B1077 which forms a Local Access lorry route within the SCC Lorry Route Network, passing through Witnesham to the north of the onshore electrical transmission works and Westerfield to the south, before reaching Ipswich. The B1078 connects with the A12 to the east via the B1079, which passes Grundisburgh to the north of the onshore electrical transmission works before turning east towards Woodbridge and connecting with the A12 to the north of the Primary CCS at Top Street. A Secondary CCS (site C) would be located to the north of Lower Road at Westerfield.

82. From Grundisburgh to the north of the onshore electrical transmission works, minor roads leading south west out of the village provide a connection to Playford, providing a mid-way access point between the B1077 and the A12, at which a Secondary CCS (site D) would be located .

83. At Woodbridge to the east of the A12, the A1152 provides a link between the Primary CCS at Top Street via the A12 and the B1083, which leads south between the River Deben and the coastline to Alderton. The A1152 and the B1083 to Alderton

form a Zone Distributor and Local Access lorry route respectively. From Alderton, the B1083 continues to Bawdsey.

84. To the west of the River Deben and south of the Primary CCS at Top Street, a short length of the A1093 Newbourne Road and Ipswich Road provides a connection between the A12 and Waldringfield. To the west of Waldringfield, Newbourne Road connects with Ipswich Road at an existing road junction from which Newbourne Road heads south to Newbourne via Woodbridge Road. A Secondary CCS (site F) is located along Newbourne Road to the north of Newbourne.

85. Further to the south and to the north-west of Felixstowe, Kirton Road, together with Park Lane and other minor roads in the area, are served from the A14 (and the A12 via the A14), providing access to the southern part of onshore electrical transmission works west of the River Deben. A Secondary CCS (site G) is located along Park Lane.

27.5.2 Traffic Flow Data

86. Existing traffic flow data for all the key links (sections of road with similar characteristics and traffic flows) within the study area has been captured from a number of sources, namely:

- Traffic count data from the DfT for classified Annual Average Daily flows (available for all 'A' class roads); and
- Commissioned Automatic Traffic Counts (ATCs)(for all other links within the study area).

87. Data from the ATCs has been assessed to identify the network peak hours as 08:00 – 09:00 and 17:00 – 18:00.

88. Baseline traffic flow data including the date and type of survey for the Strategic Road Network and local highway network is summarised in *Table 27.10*.

Table 27.10 Existing Daily Traffic Flows and Associated Data Sources

Link ID number	Link description	Total Vehicles (24Hr AADT*)	Total HGVs (24Hr AADT*)	Data source, type and date
1	A14 between the J51 and J52	46,808	6,298	2014 DfT AADT
2	A14 between the J52 and J53	51,974	6,936	2014 DfT AADT
3	A1156 south from J53	18,561	668	2014 DfT AADT
4	A14 between the J53 and J55	49,075	6,239	2014 DfT AADT
5	A12 south from J55	45,704	5,162	2014 DfT AADT
6	Paper Mill Lane	2,116	93	June 2015 ATC

Link ID number	Link description	Total Vehicles (24Hr AADT*)	Total HGVs (24Hr AADT*)	Data source, type and date
7	B1113	4,669	575	March 2013 ATC
9	A14 between the J55 and J56	56,378	7,629	2014 DfT AADT
10	A14 between the J56 and J58	45,429	6,816	2014 DfT AADT
11	A14 south from J58	29,710	5,573	2014 DfT AADT
12	Trimley Road	3,585	79	June 2015 ATC
13	Newbourne Road / Ipswich Road	2,398	180	EA ONE AADT **
14	A12 between J58 and Top Street	40,893	1,769	2014 DfT AADT
15	Top Street / Main Road	7,522	189	June 2015 ATC
16	A12 between Top Street and the A1152	34,699	1,468	2014 DfT AADT
17	A12 north from the A1152	18,520	926	2014 DfT AADT
18	B1078 west from the A12	2,369	96	June 2015 ATC
19	B1079 from the A12 to Grundisburgh	6,697	203	June 2015 ATC
20	Ipswich Road south from Grundisburgh	6,697	203	June 2015 ATC
21	B1077 between the B1078 and A1156	4,237	129	June 2015 ATC
22	A1214 west from the A12	17,822	710	2014 DfT AADT
23	B1078 between the A140 and B1077	3,235	132	June 2015 ATC
24	A140 north-east of J51	16,805	1,697	2014 DfT AADT
25	A14 north of J51	40,586	6,109	2014 DfT AADT
26	A1152	8,004	470	2014 DfT AADT
27	B1083 south from the A1152 to south of Shottisham	2,161	87	June 2015 ATC
28	B1438	11,417	278	June 2015 ATC
29	B1083 south from Shottisham	1,199	49	June 2015 ATC
30	School Lane and Waldringfield Road	2,024	59	June 2015 ATC
31 – 42	No data have been captured for these smaller links recognising the very low baseline flows.			
** Annual Average Daily Traffic*				

27.5.3 Road Safety

89. The baseline highway safety conditions have been established by analysing collision data sourced from SCC. This review utilises historic STATS19[1] data to define where, when, how and why accidents have historically occurred. From this investigation consideration can be given to where accidents are most likely to occur in the future and, as such, where to potentially target remedial action. This approach seeks to targets sites and areas with known and higher than average accident rates, rather than sites with perceived issues and risks.

27.6 Potential Impacts

27.6.1 Trip Generation & Assignment- Construction

90. This Section outlines the vehicle trips generated by the proposed East Anglia THREE project and examines mode share and distribution in order to establish a basis for assessing the transport impacts.

91. Having established the construction scenarios to be assessed (section 27.3.2) this section establishes the realistic worst case construction traffic demand for both the Single Phase and Two Phased approaches.

92. The realistic worst case traffic demand scenarios 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.

93. The assumptions that underpin the worst case scenario are discussed below and have been developed with the input from a specialist construction consultant (AECOM) and are augmented with experience gained through the pre-application development and preliminary construction design process for East Anglia ONE.

[1] 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).

27.6.1.1 Construction programme

94. The construction programme provided in *Appendix 27.1* represents a realistic minimum duration for each construction activity and therefore the worst case in terms of traffic intensity. Any lengthening of construction duration would reduce the intensity of daily traffic and therefore the associated impacts.

95. The construction timeframe presented for assessment is provided in the format of week 1, week 2, etc. and is representative of the duration and dependency of each activity. It is considered that the earliest date that construction could commence would be 2020; as such a baseline year for background traffic of 2020 has been derived for the purpose of the assessment.

96. To derive the future year baseline traffic demand the observed traffic flows have been factored to 2020 start of construction. The traffic flows were factored with the use of the DfT Trip End Model Presentation Programme (TEMPro) Version 6.2, with data set 6.2 for the Ipswich area. Flows have then been scaled with factors from the National Transport Model. Background traffic flows for 2020 are presented in *Appendix 27.2*.

97. 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. Therefore, whilst employees would arrive prior to the am network peak hour (08:00 – 09:00) throughout the year, there is the possibility that there would be an overlap between construction employees departing and the network pm peak hour (17:00 – 18:00 observed from traffic counts).

98. Therefore, as a worst case it would be assumed that all employee trips would overlap with the pm network peak hour, recognising this scenario is only likely to occur during a two month period before and after the summer months.

99. The delivery of materials and plant to the Primary CCSs would be spread over a ten hour period, whilst onward deliveries to Secondary CCSs or points of access would be scheduled to avoid network peak hours.

27.6.1.2 Traffic distribution

100. At the time of application for development consent the supply chain for materials and the workforce cannot be informed by early contractor involvement. Therefore, for the purpose of the assessment, traffic distribution is based upon agreed HGV distributions derived for East Anglia ONE and refined socio economics data for employees.

101. Bulk materials such as aggregate would make up the majority of the total HGV movements for the project. The economics of transporting large quantities of bulk materials from outside of the local area are likely to be prohibitive and as such it is envisaged that these materials would be sourced locally to the area and link to the Primary CCSs via the major 'A' class roads within the study area namely the A12 and A14.

102. Therefore, for the purpose of this assessment bulk materials and specialist items are assumed to have an origin of A12 south (60%), A14 north (30%) and A14 south (10%).

103. East Anglia ONE considered that 60% of the workforce would be assumed to reside in Ipswich, 10% in Woodbridge, 10% in Felixstowe and 20% to the south of Ipswich along the A12, including towns such as Colchester. However, during scoping discussions with SCC for the proposed East Anglia THREE project, SCC advised that this assumption should be refined for the proposed East Anglia THREE project. Therefore, to inform the potential distribution of construction employees for the proposed East Anglia THREE project, the availability of local labour and rented accommodation has been reviewed as part of the socio economics study to inform the potential employee distribution.

104. The types of specialist skills required for projects such as the proposed East Anglia THREE project means that construction personnel often have to be drawn from across the country and not necessarily from local labour sources. This is addressed within Chapter 28 Socio Economics which estimates that 34% of the workforce would be drawn from the local area (resident) and 66% would be beyond a daily commute (in-migrant).

105. Those personnel who are not local (in-migrant labour) i.e. beyond a reasonable daily commute (up to a 45 minute drive of the two Primary CCSs) are likely to base themselves within local rented accommodation. To inform the distribution of in-migrant labour the availability of local rented accommodation within commuting distances of the project has been captured.

106. The following table (*Table 27.11*) provides a summary of likely distribution, point of entry onto the study area and origin for in-migrants to the two Primary CCSs. The distribution set out in *Table 27.11* includes for 'distance decay' i.e. those areas closest to the works are likely to be most attractive, even though areas further away may have a greater provision of accommodation. To reflect this, a weighting has been applied of 1 to potential workforce with journey origins within 30 minutes and a weighting of 0.5 to those between 30 and 45 minutes.

107. Further details of the distribution of local rented accommodation are provided within *Appendix 27.3*.

Table 27.11 Distribution of In-Migrant Labour

Point of entry to study area	% distribution (in-migrants) to CCS E	% distribution (in-migrants) to CCS B	Incorporating the towns of
A12 south (Link 5)	8.5%	34.4%	Clacton on Sea, Harwich, Walton on the Naze
B1113 south (Link 7)	0.0%	2.2%	Hadleigh
A14 south (Link 11)	10.6%	14.0%	Felixstowe
A12 north (Link 17)	47.9%	0.0%	Aldeburgh, Beccles, Leiston, Lowerstoft, Saxmundham, and Southwold
B1078 east (Link 18)	0.0%	4.3%	Saxmundham
A1214 (Link 22)	25.5%	34.4%	Ipswich
A14 north (Link 25)	0.0%	6.5%	Stowmarket
B1438 (Link 28)	7.4%	4.3%	Woodbridge

108. To inform the distribution of the 34% of employees who could potentially be drawn from the local area (resident workers), the socio economics study has examined the distribution of residents within the local area (a 60 minute drive of the two Primary CCSs) with the relevant skill sets.

109. The following table (*Table 27.12*) provides a summary of likely distribution, point of entry onto the study area and origin for resident workers. Further detail of the distribution of resident workers is provided within *Appendix 27.4*.

Table 27.12 Distribution of Resident Workers

Point of entry to study area	% distribution (residents) to CCS E	% distribution (residents) to CCS B	Incorporating the towns of
A12 south (Link 5)	43.6%	40.3%	Clacton on Sea, Harwich, Manningtree, Colchester, Sudbury, Chelmsford and Witham
B1113 south (Link 7)	0.0%	5.0%	Sudbury
A14 south (Link 11)	2.0%	3.0%	Felixstowe
A12 north (Link 17)	8.9%	0.0%	Aldeburgh, Leiston, Saxmundham, Southwold, Halesworth, Harleston, Lowestoft, Beccles and Bungay

Point of entry to study area	% distribution (residents) to CCS E	% distribution (residents) to CCS B	Incorporating the towns of
B1078 east (Link 18)	0.0%	1.0%	Saxmundham
A1214 (Link 22)	21.8%	17.0%	Ipswich
A14 north (Link 25)	19.8%	28.7%	Stowmarket, Diss, Eye and Bury St Edmunds
B1438 (Link 28)	4.0%	5.0%	Woodbridge

110. SCC requested that a 'sensitivity test' of local worker origins was undertaken to determine if a 90 minute drive time scenario for local work force and an associated larger proportion of local workers, would materially change traffic distribution. The purpose of sensitivity test was primarily to ascertain if the changes may induce congestion (Driver Delay) on the highway network that was identified for 60 minute drive time. Further discussion of the outputs is contained under the impact assessment for Driver Delay.

27.6.1.3 Material and Personnel demand

111. When assessing transport impacts it is typical that the traffic demand would be informed by the derivation of vehicle trip rates (i.e. to assist with quantifying the proposed project's predicted traffic attraction) from interrogation of established trip rate databases such as TRICS. However, there is no such data in the existing trip rate databases that could confidently quantify the trip attraction associated with the construction of a substation and onshore cable route.

112. Therefore, the traffic generation that will inform this assessment will be derived and undertaken by way of a 'first principles' approach. The first principles approach generates traffic volumes from an understanding of material quantities and personnel numbers.

113. Further to similar work undertaken for East Anglia ONE to quantify likely vehicle demand, construction consultants (AECOM) were commissioned to provide additional industry expertise to further develop the methodologies and quantities that underpin the assessment for the proposed East Anglia THREE project. This advice has been augmented with experience gained through the pre-application development and preliminary construction design process for East Anglia ONE.

114. *Appendix 27.5* and 27.6 detail the expected quantity of materials, plant movements and HGV type that could be expected for each of the construction activities, per

section, for Single Phase and Two Phased approaches respectively.

115. *Appendix 27.7* and *27.8* detail the expected quantity of materials, plant movements and HGV type that could be expected for the construction of the substation for the Single Phase and Two Phased approaches respectively.

116. The construction consultant has advised that car sharing of up to five employees per vehicle would realistically be achievable for blue collar workers on similar construction projects. However, it is recognised that a high percentage of the employees would be white collar workers and as such the propensity to car share is substantially less (staff transport not provided, less likely to be local, requirement to have a car to travel around site, etc.). Therefore, an average car share ratio of 2.5 employees per vehicle has been assumed.

117. The 2.5 employees per vehicle ratio is considered a worst case scenario when considering:

- The established industry exemplar of Heathrow Terminal 5 (BAA 2003, Terminal 5 Construction Workers Public Transport Strategy 2003/04) established that a car share ratio of 3 employees per vehicle was achievable;
- The ratio does not take into account the propensity for employees to walk, cycle or use public transport or the limitation of car parking on site.

118. Therefore, this assessment assumes all employee trips have been reduced by a factor of 2.5 at entry point to the study area (as shown in *Appendix 27.9* and *27.10*). This approach simulates multi pick up of employees prior to entering the study area typically by mini-bus or car share syndicates.

119. The assessment approach is sustained by the Outline Travel Plan which sets the standards for how construction personnel traffic would be managed and controlled at journey destination on site. Typical measures would include the control of site access for single occupancy vehicles, constrained parking with designated spaces for multi-occupancy vehicles and employee pick up. The optimum package of measures to deliver the vehicle share ratio would be proposed by the principal contractor (following establishment of the workforce demographic) to be agreed by the relevant authorities and included in the finalised Travel Plan.

27.6.1.4 Peak Construction Demand

120. For the Single Phase approach *Appendix 27.9* disaggregates project traffic demand (contained *within Appendix 27.5* and *27.7*) by activity over time per cable route

section to provide total one-way (deliveries) and two-way HGV and LCV movements per day.

121. For the Two Phased approach *Appendix 27.10* disaggregates project traffic demand (contained *within Appendix 27.6* and *27.8*) by activity over time per cable route section to provide total one-way (deliveries) and two-way HGV and LCV movements per day.

122. Construction traffic demand fluctuates according to the intensity of activities that are occurring at any point in the programme. In general a shorter programme would lead to intensification of labour and material requirements and in turn an increase in traffic generation.

123. The construction programme has used industry guidance for productivity to forecast the shortest realistic construction duration for individual activities within the onshore cable route sections. The route sections have then been assigned to the overarching construction programme for East Anglia THREE informed by understanding which sections (and associated activities) can realistically be implemented concurrently.

124. This approach results in approximately seven cable sections being close to or at peak activity at any one time for the duration of the project. This means that for any particular week the combined onshore cable route sections would display different peak demand with associated traffic assignments and impacts on discrete parts of the highway network. Therefore, it would be incorrect to select the peak project demand week as being representative of the peak impact on the entire highway network.

125. For example; for the Single Phase approach the maximum project demand is projected to occur during week 13; a total 292 and 140 (two-way) HGV and LCV vehicle movements is registered respectively. However, during week 13, sections 1, 3, 5, 8 and 9 are not projected at peak activity, and the assessment period could underestimate the impact on the links directly serving these sections.

126. To address this issue and develop a worst case impact upon the highway network, the peak traffic demand for each section has been added together to create a theoretical 'in-combination worst case' week whereby the peak construction activity for all sections would occur concurrently. This method has the advantage of assessing the peak impact on all links and is therefore appropriate for applying GEART (rule 1 and 2) screening. However, there is a drawback in that the potential combined traffic flows on the 'A' class road network are over estimated by assigning

traffic flows for 11 sections of peak activity when in essence the programme indicates seven sections of peak activity would be optimum.

127. To place the in-combination approach in context for the impact assessment, it has been established that the Single Phase approach has a peak programme demand of 432 (two-way) vehicle movements per day (i.e. 216 arrive and 216 depart) all of which would have an origin on the 'A' class road network. The in-combination peak demand would assign a total of 1,054 (two-way) movements per day to the highway network, thereby representing a robust forecast of the potential traffic impact.

27.6.1.5 Construction Traffic Assignment

128. Having derived an in-combination worst case week it is necessary to consider how this construction traffic would be assigned to the highway network. The strategy outlined below is common to both the Single Phase and Two Phased approaches.

129. All HGV traffic would be required to report in to either Primary CCS B or E before travelling to the appropriate access point to the onshore cable route to make a delivery.

130. Once the HGVs have made their deliveries they would then return to the original origin of their journey rather than back to the Primary CCSs.

131. Utilising the worst case construction traffic demand per week for each section contained within *Appendix 27.9 (for the Single Phase approach)*, *Appendix 27.11* then follows four steps to assign HGV traffic to the highway network:

- **Step 1** assign the peak construction HGV traffic traveling to the Primary CCSs onto the highway network according to their assumed origin (60% A12 south, 30% A14 north and 10% A14 south);
- **Step 2** assign the HGV traffic from the Primary CCSs to the nearest link to the appropriate access point;
- **Step 3** assign the HGV traffic from the appropriate access point back to their original destinations; and
- **Step 4** provides a cumulative summation of the movement of all HGV traffic per link.

132. *Appendix 27.12* undertakes a similar exercise for the Two Phased approach utilising the worst case construction traffic demand per week for each section contained in *Appendix 27.10*.

133. All employees working at on sections 8 and 11 and the substation would travel to direct to site (assuming a car-share ratio of 2.5).

134. Employees working on section 9 and 10 would first report to Primary CCS B and employees working on section 1 to 7 first report to Primary CCS E (again assuming a car-share ratio of 2.5) before being transferred to their associated point of access by minibus (assuming 12 employees to a minibus).

135. Utilising the worst case employee numbers per week for each section contained within *Appendix 27.9 (for the Single Phase approach)*, *Appendix 27.11* follows three steps to assign traffic to the highway network:

- **Step 1** assign the peak employee traffic to their respective CCSs according to their assumed origin (Refer to *Table 27.11* and *Table 27.12*);
- **Step 2** assign those employees working on section 1 to 7 and 9 and 10 to the highway network based upon a 12 seat minibus; and
- **Step 3** provides a cumulative summation of the movement to all employee traffic movements, including minibus transfer.

136. *Appendix 27.12* undertakes a similar exercise for the Two Phased approach utilising the worst case construction traffic demand per week contained in *Appendix 27.10*.

27.6.2 Operational Traffic Demand

137. During the operational phase, traffic movements would be limited to those generated by the daily operation and periodic maintenance at the substation and at junction bays and kiosks along the onshore cable route.

138. Along the onshore cable route, periodic testing of the cable oversheath would be required every two to five years, although as a worst case annual testing has been assumed. This maintenance requires up to three vehicles to visit the jointing bay. The vehicles would be 4 x 4 type vehicles and access would be via existing farm tracks.

139. It is anticipated that the substation would be staffed 24 hours a day by a minimal workforce (up to five full time personnel). This would result in a worst case impact of 20 (two-way) vehicle movements per day. In addition to the operational staff there would be the occasional maintenance visits.

140. It is proposed that operational personnel and maintenance vehicles would access the substation location from an access off Bullen Lane, created during construction and retained upon completion. The access would be designed to accommodate

permanent use including occasional use by HGVs for the replacement of equipment etc.

27.6.3 Traffic Impact Screening

141. In accordance with the GEART (Rule 1 and Rule 2), a screening process has been undertaken for the study area to identify routes that are likely to have sufficient changes in traffic flows and therefore require further impact assessment.

142. This screening process has been applied to links 1 – 30. Links 31 – 42 (Local Routes) have not been screened as it is considered that the addition of relatively modest increases in traffic on the low existing baseline flows would be likely to manifest in high magnitude of change leading to potentially significant adverse impacts. These routes and associated impacts are therefore considered in more detail under section 27.6.4.1.

143. *Table 27.13* and *Table 27.14* summarise the total daily peak two-way vehicle movements (i.e. arrivals and departures) of all materials, personnel and plant during the peak in-combination week when distributed across the highway network, *Appendix 27.13* and *27.14* graphically depict this demand on the highway network.

144. The tables also provide a comparison of the peak daily construction flows with the forecast background daily traffic flows in 2020 (assumed worst case realistic start of construction).

Table 27.13 Existing and Proposed Daily Traffic Flows for Single Phase

Link	Link description	Link sensitivity	Background 2020 flows (24hr AADT *)		Single Phase – two-way construction vehicle movements		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1	A14 between the J51 and J52	Low	51751	6963	231	216	0.4%	3.1%
2	A14 between the J52 and J53	Low	57462	7668	489	355	0.9%	4.6%
3	A1156 south from J53	Medium	20521	739	146	82	0.7%	11.1%
4	A14 between the J53 and J55	Low	54257	6898	425	331	0.8%	4.8%
5	A12 south from J55	Low	50530	5707	547	432	1.1%	7.6%
6	Paper Mill Lane	Low	2322	102	367	309	15.8%	304.2%
7	B1113	Medium	5202	641	316	206	6.1%	32.1%
9	A14 between the J55 and J56	Low	62332	8435	495	417	0.8%	4.9%
10	A14 between the J56 and J58	Low	50226	7536	495	417	1.0%	5.5%
11	A14 south from J58	Low	32847	6162	186	124	0.6%	2.0%
12	Trimley Road	High	3934	86	64	54	1.6%	62.5%
13	Newbourne Road / Ipswich Road	High	2632	198	76	66	2.9%	33.4%
14	A12 between J58 and Top Street	Low	45211	1956	630	463	1.4%	23.7%
15	Top Street / Main Road	Low	8254	207	716	430	8.7%	207.7%
16	A12 between Top Street and	Medium	38363	1623	271	154	0.7%	9.5%

Link	Link description	Link sensitivity	Background 2020 flows (24hr AADT *)		Single Phase – two-way construction vehicle movements		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
	the A1152							
17	A12 north from the A1152	Low	20476	1024	84	0	0.4%	0.0%
18	B1078 west from the A12	Medium	2600	106	6	0	0.2%	0.0%
19	B1079 from the A12 to Grundisburgh	Medium	7349	223	137	110	1.9%	49.3%
20	Ipswich Road south from Grundisburgh	High	7349	223	82	74	1.1%	33.2%
21	B1077 between the B1078 and A1156	Medium	4649	141	115	82	2.5%	58.0%
22	A1214 west from the A12	High	19556	779	125	0	0.6%	0.0%
23	B1078 between the A140 and B1077	High	3604	147	22	0	0.6%	0.0%
24	A140 north-east of J51	Low	18580	1876	22	0	0.1%	0.0%
25	A14 north of J51	Low	44872	6754	237	211	0.5%	3.1%
26	A1152	High	8849	520	50	44	0.6%	8.5%
27	B1083 south from the A1152 to south of Shottisham	High	2371	96	50	44	2.1%	45.9%
28	B1438	High	12528	306	83	44	0.7%	14.4%
29	B1083 south from Shottisham	High	1316	54	50	44	3.8%	81.1%

Link	Link description	Link sensitivity	Background 2020 flows (24hr AADT *)		Single Phase – two-way construction vehicle movements		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
30	School Lane and Waldringfield Road	High	2221	65	121	112	5.4%	173.0%
*	AADT – Annual Average Daily Traffic							
%	Exceeds GEART screening thresholds							

Table 27.14 Existing and Proposed Traffic Flows for Two Phased

Link	Link description	Link sensitivity	Background 2020 flows (24hr AADT *)		Two Phased – two-way construction vehicle movements		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1	A14 between the J51 and J52	Low	51751	6963	212	202	0.4%	2.9%
2	A14 between the J52 and J53	Low	57462	7668	427	336	0.7%	4.4%
3	A1156 south from J53	Medium	20521	739	128	82	0.6%	11.1%
4	A14 between the J53 and J55	Low	54257	6898	377	312	0.7%	4.5%
5	A12 south from J55	Low	50530	5707	489	404	1.0%	7.1%
6	Paper Mill Lane	Low	2322	102	337	288	14.5%	283.5%
7	B1113	Medium	5202	641	259	192	5.0%	29.9%
9	A14 between the J55 and J56	Low	62332	8435	444	387	0.7%	4.6%
10	A14 between the J56 and J58	Low	50226	7536	444	387	0.9%	5.1%

Link	Link description	Link sensitivity	Background 2020 flows (24hr AADT *)		Two Phased – two-way construction vehicle movements		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
11	A14 south from J58	Low	32847	6162	163	119	0.5%	1.9%
12	Trimley Road	High	3934	86	60	54	1.5%	62.5%
13	Newbourne Road / Ipswich Road	High	2632	198	56	50	2.1%	25.3%
14	A12 between J58 and Top Street	Low	45211	1956	551	425	1.2%	21.7%
15	Top Street / Main Road	Low	8254	207	619	400	7.5%	193.2%
16	A12 between Top Street and the A1152	Medium	38363	1623	273	180	0.7%	11.1%
17	A12 north from the A1152	Low	20476	1024	65	0	0.3%	0.0%
18	B1078 west from the A12	Medium	2600	106	4	0	0.2%	0.0%
19	B1079 from the A12 to Grundisburgh	Medium	7349	223	160	136	2.2%	61.0%
20	Ipswich Road south from Grundisburgh	High	7349	223	80	74	1.1%	33.2%
21	B1077 between the B1078 and A1156	Medium	4649	141	110	82	2.4%	58.0%
22	A1214 west from the A12	High	19556	779	93	0	0.5%	0.0%
23	B1078 between the A140 and B1077	High	3604	147	16	0	0.4%	0.0%

Link	Link description	Link sensitivity	Background 2020 flows (24hr AADT *)		Two Phased – two-way construction vehicle movements		Percentage increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
24	A140 north-east of J51	Low	18580	1876	16	0	0.1%	0.0%
25	A14 north of J51	Low	44872	6754	216	197	0.5%	2.9%
26	A1152	High	8849	520	49	44	0.6%	8.5%
27	B1083 south from the A1152 to south of Shottisham	High	2371	96	49	44	2.1%	45.9%
28	B1438	High	12528	306	73	44	0.6%	14.4%
29	B1083 south from Shottisham	High	1316	54	49	44	3.7%	81.1%
30	School Lane and Waldringfield Road	High	2221	65	77	72	3.5%	111.2%
*	AADT – Annual Average Daily Traffic							
%	Exceeds GEART screening thresholds							

27.6.4 Potential Impacts during Construction

27.6.4.1 Local Route mitigation strategy

145. The introduction of additional points of access to facilitate a reduction in haul road necessitates the use of local routes that are too narrow for a HGV to pass another vehicle or that have limited forward visibility for HGV manoeuvres (e.g. when turning out of a point of access). Without mitigation the use of these routes has the potential for significant amenity, road safety and road safety impacts.

146. A number of solutions are viable when presented with these constraints and these are set out in the accompanying Traffic Management Plan. As a general principal a traffic management hierarchy of measures has been developed with the least intrusive measures preferred and 'hard engineering' solutions only pursued where

traffic conditions dictate absolute requirement. Measures would be applied on a route by route assessment basis in the following order of preference:

1. Temporary speed limits.
2. Temporary traffic signal control.
3. Mobile Traffic Management - employing a pilot vehicle to run ahead of the HGVs to make sure the road is clear or to temporary hold back opposing traffic, allowing HGVs to convey to an access point or to a point in the network where vehicles can pass.
4. Introduction of visibility splays appropriate for low vehicle speeds.
5. Carriageway widening.

27.6.4.2 Construction Traffic Impacts

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

148. It is noted from *Table 27.13* and *27.14* that for both approaches links 6, 7, 12, 13, 15, 19, 20, 21, 27, 28, 29 and 30 are above the screening thresholds. The remaining links all fall below the GEART screening thresholds and are therefore not considered further in the impact assessment.

149. The following paragraphs summarise the assessment construction traffic impacts on the effects identified as being susceptible to changes in flow.

27.6.4.3 Impact 1: Severance

27.6.4.3.1 Single Phase

150. The peak daily change in total traffic flow for all screened links is less than the 30% change in total traffic threshold and therefore the magnitude of effect is assessed as very low on low to high sensitivity links giving a maximum impact of **minor adverse** to **negligible**.

27.6.4.3.2 Two Phased

151. The peak daily change in total traffic flow for all screened links is less than the 30% change in total traffic threshold and therefore the magnitude of effect is assessed as

very low on low to high sensitivity links giving a maximum impact of **minor adverse** to **negligible**.

27.6.4.4 Impact 2: Pedestrian Amenity

27.6.4.4.1 Single Phase

152. The peak daily change in total flows or HGV component for links 6, 15 and 30 is greater than the 100% GEART impact threshold whereby GEART suggests negative impacts may be experienced.

153. Links 6 and 15 are assessed as low value sensitivity and are subject to an increase in HGV flow of 304% and 208% respectively suggesting a **moderate** significance of impact. However, it should be noted that both these links serve the Primary CCSs which have been located specifically to avoid impacting on human receptors (i.e. located outside settlement envelopes). This in turn ensures that HGV traffic can access the Primary CCSs from the HGV distributor network with minimum effect on pedestrian activity. Therefore the magnitude of effect is assessed as low to medium and the impact is assessed as **minor adverse**.

154. Link 30 is assessed as high value sensitivity and the magnitude of effect is assessed as high and therefore the impact is assessed as **major adverse**.

155. Link 30 is a narrow county lane with only sporadic footways and forms part of the Regional Cycle Route, number 41 and additionally, the Waldringfield section of the road is a designated 'Quiet Lane'. In developing the transport strategy a haul road is included to run parallel to Waldringfield Road to reduce the numbers of HGVs driving all the way along the link; this option results in a peak 112 two-way HGV movements at the northern end of the link but no HGVs along the southern sections of the link. It is this peak demand that is leading to the significant adverse impacts.

156. A second option of using the existing highway with no haul road has been considered; this option would reduce the total numbers of peak HGV movements going to the link from 112 to 55 two-way movements per day but result in more HGVs passing along the link.

157. The following *Table 27.15* provides a summary of the impacts along the link for both options.

Table 27.15 Pedestrian Amenity impacts along link 30

	Cumulative two-way HGV movements				
Option	**Access P**	**Access O**	**Access N**	**Access M**	**Access L**
Haul road	112	0	0	0	0
No haul road	55	21	16	11	5

158. It is considered that as the 'no haul road' option greatly reduces the total numbers of HGVs along the link this option would be most appropriate, however, recognising the sensitivity of the link it is considered that embedded mitigation measures to safely control HGV movements along the link should be employed (i.e. mobile traffic management).

159. With the adoption of the no haul road option and the embedded mitigation measures in place the residual impact is assessed as very low on a high value receptor resulting in a **minor adverse** residual impact.

27.6.4.4.2 Two Phased

160. The peak daily change in total flows or HGV component flows links 6, 15 and 30 is greater than the 100% GEART impact threshold whereby GEART suggests negative impacts may be experienced.

161. Links 6 and 15 are assessed as low value sensitivity and are subject to an increase in HGV flow of 284% and 193% respectively suggesting a **moderate** significance of impact. However, it should be noted that both these links serve the Primary CCSs which have been located specifically to avoid impacting on human receptors (i.e. located outside settlement envelopes). This in turn ensures that HGV traffic can access the Primary CCSs from the HGV distributor network with minimum effect on pedestrian activity. Therefore the magnitude of effect is assessed as low to medium and the impact is assessed as **minor adverse**.

162. Link 30 is assessed as high value sensitivity and the magnitude of effect is assessed as high and therefore the impact is assessed as **major adverse**.

163. Similar to the assessment of Pedestrian Amenity for the Single Phase approach the Two Phased approach has been assessed on the basis of providing a haul road parallel to link 30. This option results in 72 two-way HGV movements per day whilst the no haul road option reduces this to 44 two-way HGV movements per day.

164. With the adoption of the no haul road option and proposed mitigation measures in place the residual impact is assessed as very low on a high value receptor resulting in a **minor adverse** residual impact.

27.6.4.5 Impact 3: Road Safety

27.6.4.5.1 Single Phase and Two Phased

165. In order to understand if the changes in traffic associated with the project could have an adverse impact upon road safety, a review of the baseline highway safety conditions has been undertaken for all links exceeding GEART rule 2 screening thresholds.

166. In consultation with SCC it has been agreed that the review of road safety should examine the baseline collision data to identify the links potentially sensitive to changes in traffic. This has been achieved by identifying rate of collisions per length of road (known as collision rates). In addition SCC have also expressed a wish that the review considers collision trends involving vulnerable road users, namely, cyclists, pedestrians and motorcyclist and further analysis is presented accordingly.

167. The following formula has been applied to calculate the collision rate, where 1,826 is the sample size in number of days over which collision data has been sourced:

$$Collision\ Rate = \frac{Number\ of\ recorded\ PICs \times 1billion}{1{,}826 \times AADT\ flows \times length\ of\ link}$$

168. The collision rates for links have been calculated in billion vehicle miles to enable direct comparison with national road safety statistics, a summary of the results is provided in the following *Table 27.16*, whilst details of the derivation are included as *Appendix 27.15*.

Table 27.16 Baseline collision analysis

Link	Number of collisions				Vulnerable road users			Collision rates	
	Total	Fatal	Serious	Slight	P2W*	Pedal cycles	Peds **	National average	Calculated
3	136	0	19	117	24	29	11	1,535	1,199
6	2	0	1	1	1	0	0	809	401
7	5	1	0	4	2	0	0	809	263
12	9	0	0	9	0	2	2	809	839
13	3	0	0	3	0	0	0	809	460
14	113	0	12	101	18	2	1	894	300
15	4	0	0	3	0	1	0	1,405	587
16	40	1	5	34	10	3	1	894	332
19	10	1	1	8	3	0	0	809	330
20	5	0	0	5	1	1	0	809	165
21	19	0	1	18	2	1	1	809	476
27	19	1	4	14	2	4	0	809	1,011
28	5	0	1	4	0	2	0	1,405	220
29	2	0	2	0	0	1	0	809	230
30	2	0	0	2	0	0	0	809	248
*	Powered two wheelers, e.g. motorcycles and scooters								
**	Pedestrians								

169. It is evident from *Table 27.16* that links 12 and 27 have collision rates that are higher than national averages for comparable roads types and are particularly sensitive to changes in traffic flows. The impact of the construction traffic on these links and the less sensitive links is assessed further to identify any particular patterns or trends

(focussing especially on vulnerable road users) which could be exacerbated by the development proposals, the following text provides detail.

Link 3

170. There have been 136 collisions along link 3 within the last five years; the existing collision rate for link 3 is lower than national average for other comparable roads. However, when considering the types of collisions it can be observed that a large proportion (45%) involve vulnerable road users. It is therefore considered that from a road safety perspective the link is a high value receptor.

171. The increase in traffic of up to 0.7% and HGV traffic of 11.1% (for the worst case Single Phase approach) on link 3 would be unlikely to be discernible from day to day traffic fluctuations and therefore the magnitude of effect is considered to be very low resulting in an impact of **minor adverse**.

Link 6

172. There have been just two collisions within the last five years along link 6 resulting in a collision rate lower than national average for other comparable roads, of the two collisions one involving vulnerable road users was a single vehicle motorcycle loss of control collision. It is therefore considered that from a road safety perspective the link is a very low value receptor.

173. The increases in traffic of up to 15.8% and HGV traffic of 304.2% (for the worst case Single Phase approach) could be material and therefore the magnitude of effect is considered to be high resulting in an impact of **minor adverse**.

Link 7

174. There have been five collisions within the last five years along link 7 which results in a collision rate lower than the national average for other comparable roads. However, three of the collisions (including one fatal collision) are clustered at the junction with Pound Lane. It is therefore considered that the intensification of slow moving HGV traffic into accesses AH and AI (located close to the junction with Pound Lane) could lead to an adverse impact and therefore the magnitude of effect is assessed as medium on a high value receptor resulting in a **major adverse** impact.

Link 12

175. There have been nine collisions within the last five years along link 12 which results in a collision rate that is higher than the national average for other comparable roads. A review of the types of collisions along link 12 has not identified any clusters

or observable patterns to the collisions, but four out of the eight collisions involve vulnerable road users. It is therefore considered that from a road safety perspective the link is a high value receptor, and that an increase in HGV traffic of 62.5% (for the worst case Single Phase approach) could be material and therefore the magnitude of effect is considered to be medium resulting in an impact of **major adverse**.

Link 13

176. There have been just three collisions in the last five years along link 13 resulting in a collision rate lower than the national average for other comparable roads, in addition none of the collisions involves vulnerable road users. It is therefore considered that from a road safety perspective the link is a very low value receptor, and that increases in traffic of up to 2.9% and HGV traffic of 33.4% (for the worst case Single Phase approach) are not likely to be material and therefore the magnitude of effect is considered to be low resulting in a **negligible** impact.

Link 14

177. There have been 113 collisions along link 14 within the last five years which results in a collision rate lower than national average for other comparable roads. When considering the collisions involving vulnerable road users all but two of these comprise collisions involving motorcycles although there is no pattern to the location of these collisions that would indicate an existing issue with the highway network.

178. The two remaining collisions that involved vulnerable road users comprised a suspected intoxicated pedestrian pushing his bike along the A12 being struck by a vehicle and the second involved a cyclist failing to stop at a signalised crossing and colliding with a vehicle. It is therefore considered that from a road safety perspective the link is a low value receptor, and that increases in traffic of up to 1.4% and HGV traffic of 23.7% (for the worst case Single Phase approach) are not likely to be material and therefore the magnitude of effect is considered to be low resulting in a **negligible** impact.

Link 15

179. There have been four collisions along link 15 within the last five years resulting in a collision rate that is lower than the national average for other comparable roads. Three of the collisions are clustered at the junction with School Lane, of which one involved a cyclist being hit by a car turning into School Lane; however a review of the remaining collisions has not identified any pattern or trend to the collisions which would indicate an issue with the existing highway network. It is therefore considered that from a road safety perspective the link is a very low value receptor, however,

the increases in traffic of up to 8.7% and HGV traffic of 207.7% (for the worst case Single Phase approach) could be material and therefore the magnitude of effect is considered to be high resulting in an impact of **minor adverse**

Link 16

180. There have been 40 collisions along link 16 within the last five years which results in a collision rate lower than national average for other comparable roads. The majority (24 of 40) of the collisions are clusters around the three roundabout junctions on the A12; however, the numbers of collisions at these three roundabouts is lower than that of other similar sized roundabouts[2].

181. When considering the collisions involving vulnerable road users all 10 involve motorcycles, three involve cyclists and one involved a pedestrian however there is no pattern to the location of these collisions that would indicate an existing issue with the highway network. It is therefore considered that from a road safety perspective the link is a low value receptor, and that increases in traffic of up to 0.7% and HGV traffic of 11.1% (for the worst case Single Phase approach) are not likely to be material and therefore the magnitude of effect is considered to be low resulting in a **negligible** impact.

Link 19

182. There have been 10 collisions along link 19 within the last five years resulting in a collision rate that is lower than the national average for comparable roads. A review of these collisions has identified that six of the collisions involve single vehicles of which two were motorcycles.

183. It is therefore considered that there may be an issue with the highway network resulting in loss of control, as such from a road safety perspective the link is considered to be of high sensitivity and that an increase in HGV traffic of 61.0% (for the worst case Single Phase approach) could be material. Therefore the magnitude of effect is considered to be medium resulting in an impact of **major adverse**.

Link 20

184. There have been five collisions within the last five years resulting in a collision rate that is lower than the national average for comparable roads. A review of these collisions has not identified any patterns or trends to the collisions and of the

[2] Department for Transport (DfT), (2007). Design Manual for Roads and Bridges, TD16/07 Table 2/1.

collisions involving vulnerable road users - one involved a cyclist being struck by a car at a junction and the second involved a motorcycle being struck by a car at another junction. It is therefore considered that from a road safety perspective the link is a low value receptor, and that increases in traffic of up to 1.1% and HGV traffic of 33.2% (for the worst case Single Phase approach) are not likely to be material and therefore the magnitude of change is considered to be low resulting in a **negligible** impact.

Link 21

185. There have been 19 collisions along link 21 within the last five years resulting in a collision rate that is lower than the national average for comparable roads. However, a review of these collisions has identified that seven of the collisions involved single vehicles losing control, six involved collisions at junctions and three were rear end shunt type collisions. Of the collisions involving vulnerable road users one involved a motorcycle attempting to overtake a turning vehicle, a second involved a cyclist falling off their bike attempting to avoid a collision and a third involved a pedestrian being struck by a car leaving the road.

186. It is therefore considered that the intensification of slow moving HGV traffic into access AC (where there is a pattern of loss of control and rear end shunt type collisions) and access AD (where there is a cluster of five collisions) could have a material impact. Therefore the magnitude of effect is assessed as medium on a high value receptor resulting in a **major adverse** impact.

Link 27

187. There have been 19 collisions within the last five years along link 27 which results in a collision rate that is higher than the national average for other comparable roads. A review of the types of collisions along link 27 has identified that the majority (14 out of 19) were either single vehicle loss of control type collisions, poor manoeuvres at junctions or rear end shunt type collisions, however no particular location was identified. Three of the collisions involved cyclists, of which one was a cyclist falling on their own; a second involved a cycle being hit by a car leaving a driveway and the third a cycle falling whilst being passed.

188. It is therefore considered that from a road safety perspective the link is a high value receptor, and that an increase in HGV traffic of 45.9% (for the worst case Single Phase approach) could be material and therefore the magnitude of effect is considered to be medium resulting in an impact of **major adverse**.

Link 28

189. There have been five collisions within the last five years resulting in a collision rate that is lower than the national average for comparable roads. A review of these collisions indicates no emerging patterns or trends to the collisions, of the collisions involving vulnerable road users cyclist one involved a cyclist losing control and not stopping in time and a second involved a car colliding with bicycle at a mini-roundabout.

190. It is therefore considered that from a road safety perspective the link is a low value receptor, and that increases in traffic of up to 0.7% and HGV traffic of 14.4% (for the worst case Single Phase approach) are not likely to be material and therefore the magnitude of effect is considered to be low resulting in a **negligible** impact.

Link 29

191. There have been just two collisions within the last five years along link 29 resulting in a collision rate lower than national average for other comparable roads, of the two collisions one involving vulnerable road users was a pedal cyclist losing control.

192. It is therefore considered that from a road safety perspective the link is a low value receptor, however, the increases in HGV traffic of 81.1% (for the worst case Single Phase approach) could be material and therefore the magnitude of effect is considered to be medium resulting in an impact of **minor adverse**.

Link 30

193. There have been just three collisions in the last five years along link 30 resulting in a collision rate that is lower than the national average for other comparable roads, in addition none of the collisions involved vulnerable road users.

194. It is therefore considered that from a road safety perspective the link is a very low value receptor, however, the increases in HGV traffic of 173.0% (for the worst case Single Phase approach with haul road to avoid the quiet lane) could be material and therefore the magnitude of effect is considered to be high resulting in an impact of **minor adverse**.

Mitigation

195. The cluster review identifies potentially significant impacts upon road safety for the users of links 7, 12, 19, 21 and 27.

196. A review of existing collisions along link 7 and 21 identified a pattern of collision types and clusters of collisions close to where new accesses (AC, AH and AI) are proposed as well as the junction leading to access AD. It is considered that the intensification of slow moving HGV traffic in these locations could potentially lead to an adverse impact. It is therefore proposed that whilst theses accesses are operational a temporary 30mph speed limit is provided and warning signs are erected to alert drivers to the potential for slow moving traffic. With the proposed mitigation in place it is considered that the magnitude of effect would be very low on a high value receptor resulting in a **minor adverse** residual impact.

197. A review of existing collisions along link 12 and 27 identified existing collisions involving vulnerable road users that potentially could be exacerbated by increases in HGV traffic. Embedded mitigation is proposed (see section 27.3.3) to limit HGV movements during network peak hours (8am – 9am) and (5pm – 6pm), it is also proposed that this is extended to include school finish times (typically 3pm – 4pm). With this mitigation in place it is considered that HGV traffic would be limited during the periods of highest pedestrian and bicycle activity and therefore the magnitude of effect would be very low on a high value receptor resulting in a **minor adverse** residual impact.

198. A review of the collisions along link 19 identified there may be an issue with the highway network resulting in loss of control type collisions. It is therefore proposed that as part of the delivery instructions issued to HGV and minibus drivers detailing the routes to use, the drivers would also be made aware of the road safety concerns with this link. With this mitigation in place it is considered the magnitude of effect would be very low on a high value receptor resulting in a **minor adverse** residual impact.

199. Consideration has also been given to new temporary points of access on to the highway network. It is considered that at these locations the intensification of slow moving construction traffic has the potential to lead to significant adverse road safety impacts.

200. Therefore, measures would be included within the Access Management Plan and Traffic Management Plan to mitigate the potential road safety concerns. The

measures are likely to include the provision of warning signs, improvements to junction visibility, and potential temporary speed limits.

201. Therefore, the magnitude of the effect is assessed as very low, resulting in a **minor adverse** residual impact.

27.6.4.6 Impact 4: Driver Delay

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

203. The most sensitive time for Driver Delay would be when the daytime construction shift finishes at the same time as the evening network peak. During this period construction employees would be departing their place of work and HGVs would be returning from making deliveries.

204. To assess if this has the potential for significant impact the pm peak construction traffic generation has been assigned to the junctions identified as sensitive by SCC (potentially being susceptible to increases in traffic flow). *Table 27.17* details the resultant traffic flows arriving at the junctions during the pm peak hour.

Table 27.17 Peak Hour Traffic Flows through Sensitive Junctions

Junction	Junction arm	Single Phase LFAC arrivals per arm		Two Phased LFAC arrivals per arm	
		Vehs	HGVs	Vehs	HGVs
Junction 1: Roundabout junction of the A14 and B1113. *	A14 north	0	5	0	5
	Ipswich Road	1	0	1	0
	A14 south	1	11	1	10
	Paper Mill Lane	27	0	23	0
	B1113	51	0	31	0
Total arrivals		96		71	
Junction 2: Double mini roundabout junction of the A1214 and	A1156 north	25	0	18	0
	A1214 north	8	0	7	0

Junction	Junction arm	Single Phase LFAC arrivals per arm		Two Phased LFAC arrivals per arm	
		Vehs	HGVs	Vehs	HGVs
A1156.	A1156 south	0	0	0	0
	A1214 south	0	0	0	0
Total arrivals		33		25	
Junction 3: Signalised priority junction of the A1214 and Henley Road.	Henley Road north	25	0	18	0
	A1214 east	8	0	7	0
	Henley Road south	0	0	0	0
	A1214 west	0	0	0	0
Total arrivals		33		25	
Junction 4: Roundabout junction of the A1214 and B1077.	B1077 north	17	0	13	0
	A1214 east	0	0	0	0
	B1077 south	0	0	0	0
	A1214 west	25	0	16	0
Total arrivals		42		29	
Junction 5: Roundabout junction of the A12 and A1214.	A12 north	65	0	50	0
	Main Road	0	0	0	0
	A12 south	10	22	6	20
	A1214	13	0	10	0
	Park & Ride	0	0	0	0

Junction	Junction arm	Single Phase LFAC arrivals per arm		Two Phased LFAC arrivals per arm	
		Vehs	HGVs	Vehs	HGVs
Total arrivals		110		86	
Junction 6: Roundabout junction of the A12 and Newbourne Road.	A12 north	38	0	29	0
	Newbourne Road	5	0	3	0
	A12 south	5	22	3	20
	Foxhall Road	0	0	0	0
Total arrivals		70		55	
Junction 7: Roundabout junction of the A12 and B1079.	A12 north	3	0	3	0
	Grundisburgh Road	0	0	0	0
	A12 south	51	0	40	0
	B1079	6	0	0	0
Total arrivals		60		49	
Junction 8: Priority junction of the B1079 and Manor Road.	B1079 west	4	0	4	0
	B1079 east	9	0	7	0
	Manor road	2	0	3	0
Total arrivals		15		14	
Junction 9: Roundabout junction of the	A12 north	0	0	0	0
	A1152	3	0	3	0

Junction	Junction arm	Single Phase LFAC arrivals per arm		Two Phased LFAC arrivals per arm	
		Vehs	HGVs	Vehs	HGVs
A12 and A1152.	A12 south	42	0	33	0
Total arrivals		45		36	
Junction 10: Signalised priority junction of the A1152 and B1438.	B1438 north	0	0	0	0
	A1152 east	3	0	3	0
	B1438 south	0	0	0	0
	A1152 west	0	0	0	0
Total arrivals		3		3	
Junction 11: Roundabout junction of the A12 and B1438.	A12 north	9	0	9	0
	B1438	115	0	88	2
	A12 south	10	22	6	0
Total arrivals		156		123	
* Turning movements only (does not include A14 through traffic)					

27.6.4.6.1 Single Phase

205. The peak hour increase in total flows through the sensitive junctions 1 to 11 is between 3 and 156 (one-way) vehicle movements.

206. It is considered that the increases in traffic flows through junctions 1, 5 and 11 are of a magnitude that could potentially lead to significant impacts. However, recognising the worst case assumptions that have informed the assessment, it is difficult to determine the likelihood of the impact being realised. It is therefore proposed that these junctions would be subject to detailed analysis through the development of the Traffic Management Plan, post-consent, when a contractor has been appointed and can inform outcomes.

207. Further analysis would seek to quantify the potential significance of these impacts and the scope of mitigation measures. Potential mitigation measures would focus on

enhanced travel planning, and restricting peak hour movements rather than physical junction improvements.

208. With this strategy in place it is considered the residual impact would be reduced to **minor** adverse.

27.6.4.6.2 Two phased

209. The peak daily increase in total flows through the sensitive junctions 1 to 11 is up to 123 (one-way) vehicle movements.

210. Similar to the assessment of Driver Delay for the Single Phase approach it is considered that the increases in traffic flows through junctions 1, 5 and 11 is potentially significant and therefore it is proposed that these junctions would be subject to detailed analysis through the Traffic Management Plan. This would lead to residual impacts of **minor** adverse.

27.6.4.6.3 Sensitivity test

211. Paragraph 0 notes a 'sensitivity test' of local worker origins has been undertaken to determine if a 90 minute drive time scenario for local work force and an associated larger proportion of local workers, would materially change traffic distribution. *Appendix 27.16* contains the full details of this sensitivity test and concludes that two extra junctions would have the potential for significant Driver Delay impacts for a 90 minute local worker drive time scenario (in addition to the three junctions identified for a 60 minute drive time scenario). These are:

- Junction 6, Roundabout junction of the A12 and Newbourne Road; and
- Junction 12, Roundabout junction of the A14 and A12 (south).

212. As per junctions 1, 5 and 11, further analysis would be undertaken by the appointed contractor to quantify the potential significance of these impacts and where appropriate measures would be identified to mitigate these impacts. The final package of measures would be agreed by the appropriate authorities following submission of a final Traffic Management Plan.

27.6.4.7 Impact 5: Local effects

213. The introduction of additional points of access to facilitate a reduction in haul road necessitates the use of local routes that are too narrow for a HGV to pass another vehicle or that have limited forward visibility for HGV manoeuvres (e.g. when turning

out of a point of access). Without mitigation the use of these routes has the potential for significant amenity, road safety and road safety impacts.

214. A number of solutions are viable when presented with these constraints and these are set out in the accompanying Traffic Management Plan. As a general principal a traffic management hierarchy of measures has been developed with the least intrusive measures preferred and 'hard engineering' solutions only pursued where traffic conditions dictate absolute requirement. Measures would be applied on a route by route assessment basis in the following order of preference:

- Temporary speed limits.
- Temporary traffic signal control or Stop/Go boards.
- Mobile Traffic Management - employing a pilot vehicle to run ahead of the HGVs to make sure the road is clear or to temporary hold back opposing traffic, allowing HGVs to convey to an access point or to a point in the network where vehicles can pass.
- Carriageway widening.

27.6.4.7.1 Single Phase and Two Phased

215. *Table 27.18* sets out the likely peak and average increases in daily traffic flows for each of the local links and a package of measures to reduce the potential impacts.

Table 27.18 Assessment of local effects

Link	Single Phase HGV movements (two-way) Daily peak	Hourly peak	Daily ave.	Two Phased HGV movements (two-way) Daily peak	Hourly peak	Daily ave.	Targeted mitigation
19 (part)	74	10	43	74	10	43	• Traffic management hierarchy (signals/stop-go boards to target a localised pinch point)
20	74	10	43	74	10	43	• Traffic management hierarchy
29	25	4	14	25	4	14	• Traffic management hierarchy
30	55	7	49	44	6	28	• Traffic management hierarchy
31	19	3	10	19	3	10	• Traffic management hierarchy • Highlighting crossings
32	23	4	14	23	4	14	• Avoid school start and finish times
33	31	5	18	31	5	18	• Traffic management hierarchy • Avoid school start and finish times
34	55	7	29	42	6	26	• Highlighting crossings
35	22	3	17	22	3	17	• Avoid school start and finish times
36	36	5	30	62	8	35	• Traffic management hierarchy
37	65	9	38	65	9	38	• Traffic management hierarchy
38	9	1	5	9	1	5	• Traffic management hierarchy
39	27	4	17	27	4	17	• No measures
40	19	3	11	12	2	10	• Avoid school start and finish times
41	52	7	35	52	7	31	• Traffic management

Link	Single Phase HGV movements (two-way) Daily peak	Hourly peak	Daily ave.	Two Phased HGV movements (two-way) Daily peak	Hourly peak	Daily ave.	Targeted mitigation
							hierarchy
42	112	14	21	112	14	17	• Traffic management hierarchy • Highlight crossings • Highway improvements to the B1113/Bullen Lane junction.

216. Measures to highlight crossings are proposed for those sections where the road is crossed by Public Rights of Way and Bridleways and drivers may not expect to encounter these users. The measures are likely to include temporary warning signs as well as providing information to drivers as part of their delivery instructions.

217. Where the links pass through built up areas, it is considered that as well as being restricted to avoiding network peak hours that school start and finish times should also be avoided.

218. In addition to the targeted mitigation measures further general mitigation measures would also be developed as part of the Traffic Management Plan, this would include establishing local liaison groups to deal with specific issues during harvest time or local events etc.

219. With the adoption of the proposed target mitigation measures and establishment of the local liaison groups the residual impact is assessed as very low on low to high value receptor resulting in residual impacts of **negligible** to **minor adverse**.

27.6.5 Potential Impacts during Operation

220. The construction approach used (i.e. Single Phase or Two Phased) does not affect the consideration of the operational and maintenance impacts as similar infrastructure would be in place.

221. The peak change in operational traffic flow is 20 (two-way) vehicle movements for the substation and six (two-way) vehicle movements per day to any of the jointing bays and is therefore assessed as **negligible**. If unplanned maintenance encompassing excavation of trenches is required during operation then there may be a requirement for the cables to be excavated to gain access. Notwithstanding, the

impacts are considered to be indiscernible from background fluctuations in traffic and therefore the impacts are considered to be **negligible**.

27.6.6 Potential Impacts during Decommissioning

222. This section describes the potential impacts of the decommissioning of the onshore electrical transmission works including access with regards to impacts on traffic and transport. The decommissioning of the project would be as required by the requirements in the DCO. The approach provided below provides a high level likely approach which could be taken, however the exact nature of any procedures would depend on regulatory requirements and best practice in place at the time of decommissioning.

223. It is anticipated that the onshore export cables would be decommissioned (de-energised) and the cables left in-situ. It has also been assumed that the jointing bays and ducts would be left in-situ. The 248 kiosks would be removed and the substation demolished.

224. Intuitively, the decommissioning of the onshore cable route works would require far less demand for HGV and personnel movements that that of the construction phase, whilst the decommissioning of the substation would potentially result in similar levels of HGV demand. Therefore, the overall magnitude of effects would be lower.

225. It is therefore expected that the traffic impacts are likely to be less than those presented for the construction phase approaches and similar mitigation strategies as presented would be valid for decommissioning.

226. Prior to decommissioning, a further traffic assessment would be carried out and traffic management procedures agreed with the appropriate highways authorities.

27.7 Cumulative Impacts

27.7.1 Introduction

227. This section describes the cumulative impact assessment for traffic and access, taking into consideration other plans, projects and activities.

27.7.1.1 Onshore Cable Route and Substation

27.7.1.1.1 Severance, Pedestrian Amenity and Road Safety

228. Agreement was reached with SCC at the Second Transport Meeting (18th June 2015) that the cumulative impact of other projects (committed developments) on the effects of Severance, Pedestrian Amenity and Road Safety can be adequately

assessed by the application of (TEMPro) growth factors to derive 2020 baseline traffic flows.

229. TEMPro is a national 'trip' calculation model that provides simple traffic growth factors based on localised forecast increases in housing, jobs and car ownership. It is adequate for the environmental effects that assess the percentage changes in traffic flow which utilise less precise daily traffic flows.

230. The relevant growth factors have been applied to future year baseline flows for daily traffic within the assessments contained in section 27.6.4 and therefore the assessment of effects has inherently considered cumulative impacts.

27.7.1.1.2 Driver Delay

231. For the effect of Driver Delay, a greater degree of accuracy is required to predict peak hour flows and therefore more detailed analysis of committed developments is required often involving a review of consented Transport Assessments.

232. It has been agreed with SCC that four consented developments have the potential to influence the effect of Driver Delay within the East Anglia THREE project study area, namely:

- Adastral Park;
- Garden Suburb;
- Paper Mill site; and
- Wood Lane housing development.

233. Section 27.6.4 contains the assessment of Driver Delay and includes the traffic generated by the identified consented developments. The mitigation for the effects of Driver Delay upon the potential sensitive junctions focuses on undertaking detailed analysis through the Traffic Management Plan and adjusting peak hour demand as necessary. The scope of the Traffic Management Plan analysis would include the latest information available from the consented developments.

234. With this strategy in place it is considered the cumulative Driver Delay impact would be **minor** adverse.

27.7.2 Base Port Assessment

235. The East Anglia ONE DCO application contained a high level assessment of the traffic impacts associated with the personnel travelling to a Base Port to be transferred offshore for construction and ongoing operational activities.

236. At the time of application EAOL had not identified a preferred port from three potential candidates namely, Great Yarmouth, Lowestoft and Harwich. Therefore Lowestoft was chosen as being representative of typical magnitude of effects that could potentially arise.

237. The position has not changed for the proposed East Anglia THREE project and therefore for the purpose of this ES the same high level assumptions (as used for East Anglia ONE) are presented and the assessment is updated with the latest 2014 traffic flows. *Table 27.19* contains the assumptions.

Table 27.19 Base Port personnel assumptions

Scenario	Employee numbers	Worst case assumptions
Construction traffic	Maximum number of personnel 100 (75 during the day, 25 at night)	All personnel travel individually direct to the base port. Arrivals for the night shift overlap with departures from the day shift.
Operational Traffic	Maximum number of direct jobs 70 full time equivalents for 600MW, assumed double for 1200MW	Highest number of jobs anticipated, based upon the socio economics assessment. All personnel travel individually direct to the base port.

27.7.2.1 Construction personnel

238. The Base Port during construction could accommodate EATL personnel 24 hours a day. Personnel could arrive and depart during peak hours, and comprise project managers, coordinators, administration, legal and health and safety personnel.

239. As outlined in *Table 27.18* up to 75 personnel would work during the day with up to 25 at night on any single day. As a worst case, this would result in 75 arrivals and 25 departures in the AM peak with 25 arrivals and 75 departures in the PM peak. These figures are based on the assumption that all personnel would travel to the Base Port individually in private vehicles, presenting a robust scenario.

240. The assessment (*Table 27.20*) is based on the assumption that 70% of the workforce would reside in Lowestoft (in-migrant and resident), 25% in Great Yarmouth and 5% in Beccles. Of those residing in Lowestoft, an even dispersal across the town would result in approximately 10% arriving via the A12 from the north, 25% via the A1144 from the west, 10% via the B1531 from the west and 25% via the A12 from the south.

Table 27.20 Base Port construction impacts

Link description	Background 2014 flows (24hr AADT*)	Construction base port traffic flows	Percentage increase
A12 north of Lowestoft	18,046	50	0.3%
A12 between the A1144 and A117	14,913	70	0.5%
A12 north of the Lowestoft Swing Bridge	14,595	120	0.8%
A12 Lowestoft Swing Bridge	17,228	80	0.5%
A12 between the A1145 and A146	15,575	60	0.4%
A12 south of Lowestoft	9,109	0	0.0%
A1145 Carton Colville	9,222	10	0.1%
A146 south west from Lowestoft	17,028	10	0.1%

241. It can be noted from *Table 27.20* that the links serving Lowestoft Port are subject to high traffic flows in keeping with the characteristics of the highway network around a typical Port (i.e. the links are generally able to accommodate high concentrations of traffic and HGV component).

242. It can also be noted that the percentage increase in traffic is below the GEART Rule 1 and Rule 2 screening thresholds of 30% and 10% (specifically sensitive areas) respectively whereby there is potential for significant traffic impacts. It is therefore considered that the potential impacts from the base port construction traffic attraction are likely to be **negligible**.

27.7.2.2 Operational Personnel

243. During the operation of the Base Port *Table 27.19* outlines that up to 70 full time equivalent employees could be required per 600MW, therefore as a worst case there could be double for up to 1200MW. These figures are based on the assumption that all personnel would travel to the Base Port individually in private vehicles, presenting a robust scenario.

244. The assessment (*Table 27.21*) is based on the same assumption as for construction that 70% of the workforce would reside in Lowestoft, 25% in Great Yarmouth and 5% in Beccles. Of those residing in Lowestoft, an even dispersal across the town would result in approximately 10% arriving via the A12 from the north, 25% via the A1144 from the west, 10% via the B1531 from the west and 25% via the A12 from the south.

Table 27.21 Base Port operational impacts

Link description	Background 2014 flows (24hr AADT*)	Operational base port traffic flows	Percentage increase
A12 north of Lowestoft	18,046	70	0.4%
A12 between the A1144 and A117	14,913	98	0.6%
A12 north of the Lowestoft Swing Bridge	14,595	168	1.2%
A12 Lowestoft Swing Bridge	17,228	112	0.7%
A12 between the A1145 and A146	15,575	84	0.5%
A12 south of Lowestoft	9,109	0	0.0%
A1145 Carton Colville	9,222	13	0.1%
A146 south west from Lowestoft	17,028	13	0.1%

245. It can be noted from *Table 27.21* that the links serving Lowestoft Port are subject to high traffic flows in keeping with the characteristics of the highway network around a typical Port (i.e. the links are generally able to accommodate high concentrations of traffic and HGV component).

246. It can also be noted that the percentage increase in traffic is below the GEART Rule 1 and Rule 2 screening thresholds of 30% and 10% (specifically sensitive areas) respectively whereby there is potential for significant traffic impacts. It is therefore considered that the potential impacts from the base port operational traffic attraction are likely to be **negligible**.

247. Regardless of the base port chosen EATL would work with the chosen port to ensure worker related traffic is minimised and consult with the relevant authorities with regard to their Travel Plan requirements.

27.8 Inter-relationships

248. In order to address the environmental impact of the proposed 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.

249. *Table 27.22* summarises the inter-relationships that are considered of relevance to traffic and transport and identifies where they have been considered within the PEIR.

Table 27.22 Chapter Topic Inter-relationships

Topic and description	Related Chapter	Where addressed in this Chapter
The relationship between traffic delay and traffic noise upon local residents.	Chapter 26 Noise and Vibration	Traffic data included in assessment presented Chapter 26 Noise and Vibration
The relationship between traffic delay and traffic related air quality upon local residents.	Chapter 20 Air Quality	Traffic data included in assessment presented Chapter 20 Air Quality

250. *Appendix 27.17* sets out a link by link analysis of the accumulation of effects and reviews the mitigation proposed.

27.9 Summary

251. This chapter of the ES has assessed the potential impacts of the onshore elements of the proposed East Anglia THREE project on the surrounding traffic sensitive receptors.

252. This chapter has been developed with regard to the legislative and policy framework outlined in section 27.4 and further informed by consultation with the local highway authority.

253. 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 a Traffic Management Plan and Travel Plan post planning determination.

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

255. This detailed assessment concluded that no residual moderate or major adverse impact would arise, with all impact being of either minor adverse or negligible levels as shown in *Table 27.23.*

Table 27.23 Potential Impacts Identified for Traffic and Transport

Potential Impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation	Residual Impact
Construction – Single Phase						
Impact 1: Pedestrian Severance	Links: 6, 7, 12, 13, 15, 19, 20, 21, 26, 27, 28, 29 and 30.	Low – High	Very low	Minor - Negligible	n/a	Minor - Negligible
Impact 2: Pedestrian Amenity	Links: 6, 7, 12, 13, 15, 19, 20, 21, 26, 27, 28, 29 and 30.	Low – High	Very Low - High	Negligible - Major	Use of Quiet Lane to minimise haul route	Minor adverse
Impact 3: Road Safety	Links: 3, 6, 7, 12, 13, 14, 15, 16, 19, 20, 21, 27, 28, 29 and 30.	Very Low – High	Very Low – High	Negligible - Major	Traffic management hierarchy, delivery restrictions and driver education.	Minor adverse
Impact 4: Driver Delay	Junctions 1, 5, 6, 11 & 12.	High	Medium to High	Major adverse	Further analysis in the Traffic Management Plan	Minor adverse
Impact 5: Local Routes	Links 19,20 and 30 to 42 inclusive	Low - High	High	Major - Moderate adverse	Traffic management hierarchy and community liaison.	Minor adverse
Construction – Two Phased						
Impact 1: Pedestrian severance	Links: 6, 7, 12, 13, 15, 19, 20, 21, 26, 27, 28, 29 and 30.	Low – High Low	Very low Low	Minor - Negligible	n/a n/a	Minor - Negligible
Impact 2: Pedestrian amenity	Links: 6, 7, 12, 13, 15, 19, 20, 21, 26, 27,	Low – High	Very Low - High	Negligible - Major	n/a n/a	Negligible Minor adverse

Potential Impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation	Residual Impact
	28, 29 and 30.					
Impact 3: Road safety	Links: 3, 6, 7, 12, 13, 14, 15, 16, 19, 20, 21, 27, 28, 29 and 30.	Very Low – High	Very Low – High	Negligible - Major	Traffic management hierarchy, delivery restrictions and driver education.	Minor adverse
Impact 4: Driver delay	Junctions 1, 5, 6, 11 & 12.	High	Medium to High	Major adverse	Travel Plan	Minor adverse
Impact 5: Local Routs	Links 19,20 and 30 to 42 inclusive	Low - High	High	Major - Moderate adverse	Traffic management hierarchy and community liaison.	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
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 substation (links 7 and 42) would be similar. 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.						

256. The potential for inter-relationship impacts on a link by link basis has been identified and is set out in *Appendix 27.17.*

257. A review of projects, activities and plans relevant to traffic and transport has been undertaken (including a high level assessment of base port traffic) and the likelihood for cumulative impacts assessed. This assessment concluded that there would not be a change to the residual impacts assessed for the proposed East Anglia THREE project.

27.10 References

Department for Communities and the Local Government (DfCLG) (2012). National Planning Policy Framework, London: DfLG.

Department for Transport (DfT), (2007). Design Manual for Roads and Bridges, Volume 6 Geometric Design of Roundabouts, London: DfT.

Department for Transport (DfT), (2009). Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen, London: (DfT).

Department for Transport (DfT) (2013). DfT Circular 02/2013, the Strategic Road Network and the Delivery of Sustainable Development, London: (DfT).

Department of Energy and Climate Change (DECC) (2011a). Overarching National Policy Statement for Energy (EN-1), London: (DECC).

Department of Energy and Climate Change (DECC) (2011b). National Policy Statement for Renewable Energy Infrastructure (EN-3), London: (DECC).

Department of Energy and Climate Change (DECC) (2011c). National Policy Statement for Electricity Network Infrastructure (EN-5), London: (DECC).

Institute of Environmental Assessment (IEA) (1993). Guidelines for the Environmental Assessment of Road Traffic, Horncastle: (IEA).

Chapter 27 Ends Here