

**Norfolk Boreas Offshore Wind Farm**

# **Statement of Common Ground**

**Highways England**

Applicant: Norfolk Boreas Limited  
Document Reference: ExA.SoCG-8.D9.V2  
Deadline 9

Date: April 2020  
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Author: Royal HaskoningDHV

*Photo: Ormonde Offshore Wind Farm*

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
13/09/2019	01D	First draft for Highways England Review	CD	AR/JL	JL
03/12/2019	02D	Version 1 for submission at Deadline 2	CD	JL	JL
28/04/2020	01F	Version 2 for submission at Deadline 9. Reviewed by Highways England and no changes from positions agreed at Deadline 2. The Applicant will continue to engage with Highways England as the project progresses.	CD	JL	JL

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## Glossary of Acronyms

AMP	Access Management Plan
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
EPP	Evidence Plan Process
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
PEIR	Preliminary Environmental Information Report
SoCG	Statement of Common Ground
TMP	Traffic Management Plan
TP	Travel Plan

## Glossary of Terminology

National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines.
Necton National Grid substation	The existing 400kV substation near Necton, which will be the grid connection location for Norfolk Vanguard
Norfolk Vanguard	Norfolk Vanguard offshore wind farm, sister project of Norfolk Boreas.
Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Trenchless crossing zone	Areas within the onshore cable route which will house trenchless crossing entry and exit points.

## 1 INTRODUCTION

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1. This Statement of Common Ground (SoCG) has been prepared between Highways England and Norfolk Boreas Limited (hereafter the Applicant) to set out the areas of agreement, ongoing discussions and disagreement in relation to the Development Consent Order (DCO) application for the Norfolk Boreas Offshore Wind Farm (hereafter 'the project').
2. This SoCG comprises an agreement log which has been structured to reflect the topics of interest to Highways England with regard to the Norfolk Boreas DCO application (hereafter 'the Application'). The agreement logs (section 2) outline all topic specific matters agreed, not agreed and actions to resolve between Highways England and the Applicant.
3. The Applicant has had regard to the Guidance for the examination of applications for development consent (Department for Communities and Local Government, 2015) when compiling this SoCG. Matters that are not agreed will be the subject of ongoing discussion wherever possible to resolve or refine the extent of disagreement between the parties.

### 1.1 The Development

4. The Application is for the development of the Norfolk Boreas Offshore Wind Farm and associated infrastructure. A full description of the project can be found in Chapter 5 Project Description of the Environmental Statement (ES) (document reference 6.1.5 of the Application, APP-218).
5. The Application is seeking consent for the following two alternative development scenarios:
  - Scenario 1 – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
  - Scenario 2 – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.
6. Where a topic of agreement is specific to a scenario this is identified in the Agreement Logs for each subject area, otherwise the agreement applies to both scenarios.

## 1.2 Consultation with Highways England

7. This section briefly summarises the consultation that the Applicant has had with Highways England. For further information on the consultation process please see the Consultation Report (document reference 5.1 of the Application, APP-027).

### 1.2.1 Pre-Application

8. The Applicant has engaged with Highways England on the project during the pre-Application process, both in terms of informal non-statutory engagement and formal consultation carried out pursuant to Section 42 of the Planning Act 2008.
9. Highways England were consulted as part of the formal (Section 42) consultation and provided with the Preliminary Environmental Information Report (PEIR). Highways England produced a Briefing Note providing a review of the PEIR.
10. Further to the statutory Section 42 consultation, consultation was undertaken with Highways England through the Evidence Plan Process. For further details of this consultation see sections 12.5, 13.5, 18.5 and 21.6 of the Consultation Report (APP-027) and Appendix 9.18 (document reference 5.1.9.18 of the Application, APP-055) and Appendix 9.42 (document reference 5.1.9.42 of the Application, APP-079).
11. Table 1 summarises the key consultation undertaken between the parties during the pre-application phase.

**Table 1 Summary of Consultation with Highways England regarding traffic and transport**

Date	Contact Type	Topic
<b>Pre-Application</b>		
15 December 2017	Email from the Applicant	Update on EPP consultation including date for issue of Method Statement and requesting availability for ETG meeting.
29 January 2018	Email from the Applicant	Issue of Traffic and Transport Method Statement (Appendix 9.18 of the Consultation Report, APP-055) and Agreement Log.
28 February 2018	Briefing Note from Highways England	Providing comments on the method statement in the form of Briefing Note 01 'EIA Traffic & Transport Method Statement Review', produced by AECOM (see Appendix 1) and returned completed agreement log.
21 May 2018	ETG Meeting	Meeting for agreement on method statement and traffic parameters for the scenarios (minutes in Consultation Report Appendix 9.42, APP-079).
17 October 2018	Email from the Applicant	Providing early sight of PEIR chapters (1, 5 and 24).



Date	Contact Type	Topic
5 December 2018	Briefing Note from Highways England	Providing comments on the PEIR in the form on Briefing Note 02 'PEIR Review', produced by AECOM (see Appendix 1).
30 January 2019	Email from the Applicant	Confirming that all stakeholder responses will be addressed as part of the DCO application therefore not proposing to have an ETG meeting. However, can be arranged if parties feel it is necessary.

12. Consultation was also undertaken with Highways England on matters relevant to both projects by Norfolk Vanguard Limited. This included discussions regarding the strategy for accessing the works from the A47 and the production of an A47 Substation Access Clarifications Technical Note (SACTN) (see ES Appendix 24.33, document reference 6.3.24.33 of the Application, APP-648) and an A47 Cable Crossing Access Technical Note (CCATN) (see Appendix 2). Following which agreement was reached with Highways England on the strategies for accessing the works from the A47 and the same strategies have been adopted by Norfolk Boreas. Details are included in the Norfolk Vanguard Statement of Common Ground – Highways England (Norfolk Vanguard document reference REP8-083).

### 1.2.2 Post-Application

13. There has been continued engagement between the Applicant and Highways England, confirming the content of this Statement of Common Ground which is the document for submission at Deadline 1. This is a live document that is being updated as the project progresses.

14. A meeting was held in August 2019 to provide a project update and agree the approach to the SoCG. Prior to the meeting Highways England provided a copy of Briefing Note 03, (a review of the Environmental Statement, produced by AECOM). This briefing note was reviewed during the meeting and an updated Briefing Note 03 Addendum (see Appendix 1) was produced, dated 27<sup>th</sup> August 2019.

15. Table 2 summarises the key consultation undertaken between the parties during the post-application phase.

**Table 2 Summary of Key post-application Consultation with Highway England**

Date	Contact Type	Topic
<b>Post-Application</b>		
8 August 2019	Briefing Note from Highways England	Providing review of Environmental Statement in form of Briefing Note 03 'Environmental Statement Review' produced by AECOM



Date	Contact Type	Topic
9 August 2019	Meeting	Meeting to provide project update, review Briefing Note 03 and agree approach to SoCG.
14 October 2019	Briefing Note 03 Addendum from Highways England	Providing updated review of Environmental Statement to include agreement made in the August meeting (Appendix 1)
26 November 2019	Email from Applicant	Providing SoCG for review.
6 December 2019	Email from Highways England	Approving SoCG for submission at Deadline 2.
28 April 2020	Call Applicant and Highways England	Call to discuss SoCG and confirm no changes to positions as presented at Deadline 2.

## 2 STATEMENT OF COMMON GROUND

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16. Within the section and table below the different topics for agreement between Highways England and the Applicant are set out.

### 2.1 Traffic and Transport

17. The project has the potential to impact upon traffic and transport. Chapter 24 of the Environmental Statement (ES), (document reference 6.1.24 of the Application, APP-237), provides an assessment of the significance of these impacts.

18. Details on the Evidence Plan for traffic and transport can be found in Consultation Report Appendices 9.18 (APP-055) and 9.42 (APP-079).

19. Table 3 provides areas of agreement, ongoing discussion and disagreement regarding traffic and transport. In order to easily identify whether a matter is “agreed”, “under discussion” or “not agreed”, a colour coding system of green, yellow and orange, respectively, is used in the “final position” column to represent the respective status of discussions.

**Table 3 Statement of Common Ground - Traffic and Transport**

Topic	Norfolk Boreas Limited position	Highways England position	Final position
<b>Policy and Legislation</b>			
Legislation	The legislation adopted for Norfolk Boreas is relevant and interpreted appropriately.	Agreed	It is agreed by both parties that the legislation is relevant and has been interpreted appropriately.
Renewable Energy	The principle of offshore wind is supported, as Norfolk Boreas accords with national renewable energy targets and objectives.	Agreed	It is agreed by both parties that Norfolk Boreas accords with national renewable energy targets and objectives
<b>Environmental Impact Assessment</b>			
Existing Environment	Sufficient survey data (extent/duration) has been collected to inform the characterisation of the baseline environment.	Agreed	It is agreed by both parties that with the additional data contained in the CCATN and SACTN referred to in paragraph 12 above, sufficient survey data has been collected to inform the assessment
Assessment methodology	The impact assessment methodologies used for the assessment represent an appropriate approach to assessing potential impacts. Agreed as part of the Evidence Plan Process.	Agreed	It is agreed by both parties that the transport impact assessment methodologies are appropriate.
	The methodology adopted for the Great Yarmouth port assessment (onshore construction traffic derived from the port) is acceptable. Agreed as part of the Evidence Plan Process.	Agreed	Both parties agree the assessment of onshore construction traffic derived from Great Yarmouth port is acceptable.

Topic	Norfolk Boreas Limited position	Highways England position	Final position
	The assessment adequately defines the realistic worst case scenario (RWCS) for traffic demand for Scenario 1 (S1-WCS) and Scenario 2 (S2-WCS). Agreed as part of the Evidence Plan Process.	Agreed	It is agreed by both parties that the RWCS in the ES is appropriate.
	The assessment adequately defines the realistic worst case scenario for employee distribution for Scenario 1 (S1-WCS) and Scenario 2 (S2-WCS). Agreed as part of the Evidence Plan Process.	Agreed	It is agreed by both parties that the employee distribution in the ES is appropriate.
	The assessment adequately characterises the baseline environment in terms of traffic and transport.	Agreed	It is agreed by both parties that following the provision of the CCATN and SACTN, the assessment adequately characterises the traffic and transport environment.
Assessment findings	The assessment of impacts of both scenarios for construction, operation and decommissioning presented are appropriate and adhere to the agreed assessment methodology.	Agreed	It is agreed by both parties that the assessment of impacts for construction, operation and decommissioning presented adhere to the agreed assessment methodology.

Topic	Norfolk Boreas Limited position	Highways England position	Final position
Approach to mitigation	The commitment to produce final a Traffic Management Plan (TMP), Travel Plan (TP) and Access Management Plan (AMP) (based on the outline documents submitted with the DCO application, document references 8.8, 8.9 and 8.10 of the Application (APP-699, APP-700, AP701)), which will require approval by the relevant planning authority in consultation with the highway authority, provides a sufficient control mechanism to mitigate for potential impacts of traffic and transport on the Strategic Road Network. This is secured through draft DCO Requirement 21.	Agreed	It is agreed by both parties that the production of a final TMP, TP and AMP will provide sufficient mitigation.
A47 sensitive junctions 1 - 4 in the Great Yarmouth and Acle areas.	<p>AECOM, on behalf of Highways England, reviewed the Applicant's Environmental Statement (ES Chapter 24, APP-237). The findings of this review are set out in AECOM's Briefing Note 03 Addendum (see Appendix 1).</p> <p>An assessment of potential impacts on A47 junctions 'sensitive to increase in traffic' has been completed and the controls agreed for Norfolk Vanguard have been included in the Norfolk Boreas Application.</p> <p>The Applicant has agreed to deliver the recommendation for variable message signage at the A47 /A1064 Acle junction, which will be delivered through the final TMP secured through draft DCO Requirement 21.</p>	Agreed	Both parties agree with the proposed controls for A47 junctions. This will include variable message signage at the A47 Acle junction, which will be delivered through the final TMP to be produced post-consent.

Topic	Norfolk Boreas Limited position	Highways England position	Final position
A47 Substation access at Necton	<p>The approaches related to the substation access off the A47 are set out in the SACTN and have been agreed for Norfolk Vanguard (Highways England Norfolk Vanguard Briefing Note BN07, see Appendix 3). The same approaches have been brought forward and included in the Norfolk Boreas Application (see section 24.7.6.3 of ES Chapter 24 (APP-237) and SACTN in ES Appendix 24.33 (APP-648).</p> <p>Requirement 22 of the draft DCO ensures that the siting, design, layout and any access management measures for any new, permanent or temporary means of access to a highway must be approved by the relevant planning authority in consultation with the highway authority. In the case of the A47(T) the relevant authority will be Highways England.</p> <p>Following agreement of the SACTN (and on the understanding that the work outlined within the document is delivered to the satisfaction of Highways England), and with the inclusion of Requirement 22, this will ensure that that any final junction design will be fit for purpose with regard to safety, driver delay and will not obstruct any future plans for dualling the A47(T).</p>	Agreed	The approaches set out in the SACTN related to the substation access off the A47 are agreed to the satisfaction of Highways England.
A47 Cable Crossing access at Scarning	<p>The approach to the access strategy for the A47 cable crossing north west of Scarning, is set out in the CCATN (see Appendix 2) has been agreed for Norfolk Vanguard (Highways England Norfolk Vanguard Briefing Note BN08, see Appendix 4). The same approach is included in the Norfolk Boreas Application (see outline AMP (APP-701).</p> <p>The Applicant will provide the necessary Geotechnical Risk Report and Preliminary Sources Study for each crossing, likely as an appendix to the detailed crossing method statements which will be developed in consultation with HE post-consent.</p>	<p>Agreed.</p> <p>Detailed proposals should be submitted at least six months prior to the anticipated start-of-works at HDD locations to allow a Section 50 Licence (New Roads And Street Works Act 1991) to be entered into and a Geotechnical Certificate to be issued by Highways England.</p>	The approaches set out in the CCATN are agreed to the satisfaction of Highways England.

Topic	Norfolk Boreas Limited position	Highways England position	Final position
Abnormal loads	<p>The impact of abnormal loads on traffic and transport receptors has been adequately assessed. The management measures detailed in Outline TMP (document reference 8.8 of the Application, APP-699) for abnormal loads are appropriate in principle. Further detail and site-specific measures will be developed in the final TMP secured under Requirement 21 of the draft DCO.</p> <p>The Applicant highlights that it intends, through the development of the Outline TMP (APP-699), to continue to monitor and consider the impact of Abnormal Indivisible Loads associated with the delivery of cable drums to both the main construction compound and to secondary compounds, as well as direct to the onshore cable corridor.</p> <p>In this regard, the Applicant will give due consideration to transformer abnormal loads to demonstrate feasibility of access to the onshore project substation and the details of any specific link works to accommodate the movement of abnormal loads will be confirmed in the final TMP secured under Requirement 21 of the draft DCO.</p>	<p>At this stage it is not possible to understand fully the impacts of abnormal loads on the SRN, as the applicant has not provided the port location to be used for this project and consequently abnormal load routeings have not yet been identified. The routeings will be reviewed once further information on routeing is provided. Any approval will be provided by the Highways England's (HE) Abnormal Loads team. HE will require agreement to be reached prior to any onshore site construction takes place. Any approval will include where necessary site-specific measures to accommodate the abnormal loads along the specified routeings. HE is content that the commitment made by the Applicant to undertake this work is sufficient for this issue to be agreed.</p>	Agreed.



Topic	Norfolk Boreas Limited position	Highways England position	Final position
<b>Cumulative Impact Assessment (CIA)</b>			
Methodology	<p>The methodology adopted for the CIA and projects assessed for cumulative impacts with Norfolk Boreas is appropriate. Agreed as part of the Evidence Plan Process.</p> <p>The final Traffic Management Plan will confirm cumulative traffic impacts with the A47 Corridor Improvement Programme Road Improvement Schemes and set out the measures to ensure that the cumulative environmental impacts are managed to non-significant levels.</p>	Agreed	The CIA methodology and projects identified are appropriate.
Construction co-ordination	<p>A communication plan will be adopted as part of the final Code of Construction Practice (CoCP) and mirrored within the final TMP.</p> <p>The communication plan will set out the process of continued engagement between the Applicant, the Local Highway Authority and other major projects (namely: Hornsea Project Three and Great Yarmouth Third River Crossing). This will ensure that as construction programmes are refined post-consent and that this information is regularly shared between parties, particularly traffic demand on shared road links. This will ensure that commitments to manage cumulative construction traffic demand are fully delivered; for example, on a given road the two projects may have committed to programme works that ensure each scheme's peak traffic does not overlap. Regularly programmed sharing of information will ensure that the final approved TMPs accurately reflect the expected construction traffic demand of both projects and provide certainty to the Local Highway Authority that commitments remain feasible and deliverable.</p>	Agreed	Both parties agree that this detail will form part of the final CoCP (and mirrored within the final TMP) to be produced post-consent.

Topic	Norfolk Boreas Limited position	Highways England position	Final position
<b>Draft Development Consent Order (DCO)</b>			
Wording of Requirement(s)	The wording of Requirements 21 and 22 provided within Part 3 and Schedule 5 of the draft DCO (and supporting certified documents) for the mitigation of impacts to traffic and transport are considered appropriate and adequate.	Agreed on the understanding that the measures captured in the outline traffic plans will be delivered through the final plans referred to under Requirements 21 and 22	Both parties agree that the measures captured in the outline traffic plans will be delivered through the final plans referred to under Requirement 21 and 22

**The undersigned agree to the provisions within this SOCG**

Name	Eric Cooper
Position	Spatial Planning Manager
On behalf of	Highways England
Date	4 December 2019

Name	Jake Laws
Position	Norfolk Boreas Consents Manager
On behalf of	Norfolk Boreas Limited (the Applicant)
Date	3 <sup>rd</sup> December 2019

# Norfolk Boreas Offshore Wind Farm Statement of Common Ground

Highways England

## Appendices

Applicant: Norfolk Boreas Limited  
Document Reference: ExA.SoCG-8.D9.V2  
Deadline 9

Date: April 2020  
Revision: Version 2  
Author: Royal HaskoningDHV

*Photo: Ormonde Offshore Wind Farm*

# Norfolk Boreas Offshore Wind Farm

## Appendix 1 Highways England Norfolk Boreas Briefing Notes BN01 to BN03 Addendum

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Project:	<b>Highways England Spatial Planning Arrangement 2016-2020</b>	Job No:	<b>60506522 / DN053.002</b>
Subject:	<b>Norfolk Boreas Offshore Wind Farm – EIA Traffic &amp; Transport Method Statement Review</b>		
Prepared by:	<b>Kelly Davis</b>	Date:	<b>16<sup>th</sup> February 2018</b>
Checked by:	<b>Andrew Cuthbert</b>	Date:	<b>21<sup>st</sup> February 2018</b>
Verified by:	<b>Liz Judson</b>	Date:	<b>22<sup>nd</sup> February 2018</b>
Approved by:	<b>Andrew Cuthbert</b>	Date:	<b>22<sup>nd</sup> February 2018</b>

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## Introduction

1. Highways England have asked AECOM to review the the Traffic & Transport Method Statement (TTMS) outlining the onshore construction activities relating to the Norfolk Boreas offshore wind farm. The TTMS, dated January 2018 has been prepared by Royal HaskoningDHV (RHDHV) on behalf of Vattenfall Wind Power Ltd who are promoting the wind farm through the Development Consent Order (DCO) process. AECOM have previously assisted Highways England with their response to scoping consultation documents relating to the Norfolk Boreas project which were issued for comment in May 2017.
2. The TTMS provides further information on the potential highway impacts of the onshore construction activities and draws on much of the information presented as part of the TTMS and Preliminary Environmental Information Report (PEIR) for its sister project Norfolk Vanguard. It is currently proposed that the onshore infrastructure required for the Norfolk Vanguard project will incorporate that required for Norfolk Boreas. Therefore many of the potential highway impacts of the construction are already under consideration. However, the Norfolk Boreas consultation documents (including the TTMS) need to be reviewed as the project will be subject to its own standalone DCO application. The Norfolk Boreas DCO application will need to account for a scenario in which Norfolk Vanguard is not consented, therefore Highways England have been consulted separately on each project.
3. The TTMS confirms that stakeholder comments raised in response to the Norfolk Vanguard PEIR consultation have been incorporated into the Norfolk Boreas TTMS. This Briefing Note together with the accompanying Agreement Log in Appendix A provides an initial response to the TTMS.

## Scoping Comments

4. Highways England's letter response to the May 2017 scoping consultation acknowledged that the development has the potential to have a significant effect over a wide area and noted a number of locations on the Strategic Road Network (SRN) where the impact of the development required more detailed investigation. Most significantly, these included:
  - The impact on the A47 at Necton from the construction of a new substation and the extension of an existing National Grid station adjacent to the SRN;
  - The impact of heavy goods vehicle traffic carrying materials between the Base Port (the location of which was, at that stage, and is still currently not identified) and the work sites; and
  - The impact of the construction of a cable crossing of the A47 to the west of Dereham.

## TTMS Review

5. The Norfolk Boreas project allows for the possibility that the Norfolk Vanguard project is not consented. The TTMS therefore presents two scenarios for assessment, with Scenario 2 being the worst case in terms of highways impacts:

Scenario 1: Norfolk Vanguard is consented and therefore constructs onshore infrastructure for Boreas (including cable ducts, access routes to jointing pit locations, extension of the Necton National Grid substation (and overhead line modification). Scenario 1 will therefore only seek consent for *“the Horizontal Directional Drilling (HDD<sup>1</sup>) at landfall<sup>2</sup>, the creation of jointing<sup>3</sup> and transition pits<sup>4</sup>, cable relay station (if required)<sup>5</sup> and installation of cables in the ducts through a process of cable pulling<sup>6</sup>.”*

Scenario 2: Norfolk Vanguard is not consented and therefore the DCO application will seek consent for all project infrastructure.

6. Taking each of these possible scenarios into account, AECOM provide the following comments regarding the TTMS. Many of these are comments provided as part of Highways England's consultation on the Norfolk Vanguard project. For ease of reference they have been repeated in the following sections, key recommendations are in bold and underlined text.

## Impact Assessment Methodology

7. The TTMS proposes use of the standard Guidance on the Environmental Assessment of Road Traffic (GEART) impact categories, to screen for impacts of potential significance. Categories requiring assessment are:
  - Highway links with an increase in flow (or an increase in HGV flow) of more than 30%; and
  - In specifically sensitive areas, highway links with an increase in flow (or an increase in HGV flow) of more than 10%.
8. AECOM have previously acknowledged that this is the 'industry standard' approach for the sort of impacts considered in an EIA. However, we also highlighted that DfT Circular 02/2013 can require detailed scrutiny of traffic capacity and road safety impacts at significantly lower thresholds. RHDHV have previously acknowledged this.
9. AECOM/ Highways England have previously identified key SRN junctions at which traffic capacity and road safety issues may need to be assessed as follows (these are listed in Table 5.2 of the TTMS):
  - A47/ A149 Acle New Road (Vauxhall roundabout);
  - A12/ Gapton Hall Road (Gapton roundabout); and
  - A47/ A1064 (Acle roundabout).
10. The A47 Vauxhall and Gapton roundabouts are currently the subject of possible future improvement schemes being developed by Highways England through the Roads Investment Strategy (RIS) process. As part of the Norfolk Vanguard consultation, Highways England are currently trying to find out if up to date traffic data used in the RIS assessment of the Vauxhall and Gapton roundabouts can be made available to Vattenfall for use in both the Norfolk Vanguard and Boreas EIAs along with scale drawings of the proposed RIS schemes. At the time of writing a response had not been received from Highways England's RIS team.

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<sup>1</sup> A trenchless technique where the cable route crosses a feature (i.e. river, railway or road) where open cut trenching is not suitable.

<sup>2</sup> Where the offshore cables come ashore. In the case of Boreas and Vanguard the landfall site is south of Happisburgh.

<sup>3</sup> Underground structures constructed at regular intervals along the cable route to join sections of cable and facilitate installation of the cables into the buried ducts.

<sup>4</sup> Underground structures that house the joints between the offshore export cables and the onshore cables.

<sup>5</sup> Only required for a High Voltage Alternating Current (HVAC) electrical solution, both HVAC and High Voltage Direct Current (HVDC) are currently being explored for Norfolk Boreas.

<sup>6</sup> Cable pulling: cables pulled through the preinstalled ducts between the jointing pits located along the onshore cable route. Access to and from the jointing pits would be required to facilitate the works during this phase of the project.



11. Notwithstanding this, an assessment of the impact at the above junctions will need to be made without the RIS schemes in place as a worst case scenario. This will give an understanding of the impact of the Norfolk Boreas traffic at these junctions in the event that the RIS schemes are delayed or do not go ahead (the RIS schemes are also subject to DCO application).
12. In Scenario 2, the substation construction will take place at the same time as the construction of the onshore cable route. The onshore cable route will be constructed using 15 sites (referred to as work fronts), each of which will be serviced by a Primary Mobilisation Area (i.e. a contractor's compound). These are located away from the SRN.
13. HGV and employee traffic demand has been derived using a first principles approach. Assumptions have been made regarding the distribution of these trips to the road network (i.e. the routing of traffic to and from the work fronts, where this will assign to the A47 and how much will pass the substation site on its route). The trip generation and assignment assumptions, together with a cumulative impact assessment (of the traffic generated by the substation construction in combination with traffic generated by the onshore cable route work fronts) have been reviewed by AECOM as part of the Norfolk Vanguard PEIR consultation and are considered to be sound.
14. The TTMS states that supplementary documentation will be provided as part of the DCO application including:
  - Outline Construction Management Plan: to include a number of control measures with regards to HGV routing, timings and traffic generation and also details of monitoring, enforcement and corrective measures.
  - Outline Access Management Plan: to provide proposals for access to onshore infrastructure and to include details of access design and traffic management measures.

## Impact on A47 at Necton

15. Under Scenario 2 the enabling works for the onshore project substation, including extension to the existing National Grid substation would need to be constructed by Norfolk Boreas. The existing substation is located at Necton, adjacent to the A47 between Swaffham and Dereham. This section of the A47 is an older-style single carriageway with direct access to roadside premises.
16. The construction activities relating to the sub-station in Scenario 2, in terms of their impact on the A47 at Necton are as follows (this information has become available through the Norfolk Vanguard consultation, rather than in the TTMS itself):
  - Construction of a new junction with the A47 (to the south) providing access to the Norfolk Boreas sub-station;
  - Increased use of the existing National Grid sub-station access off the A47, which appears to be sub-standard; and
  - Construction of a new junction with the A47 (to the north) providing access to the overhead line and tower (pylon) which will need to be modified.
17. AECOM are currently in the process of commenting on these proposals as part of the Norfolk Vanguard proposals and acknowledge that more information will be made available in the Norfolk Boreas PEIR. Highways England's primary concerns relating to the sub-station construction activities at Necton can be summarised as follows.
18. The safety implications of increased use of the existing National Grid sub-station access and provision of new junctions with the A47 potentially creating a hazard where there is not currently one. This particularly relates to visibility from the accesses and slow moving HGV's with abnormal loads emerging from/ turning into these junctions. As previously discussed with RHDHV, Policy set out in DfT Circular 02//2013 would not prohibit a new access point being created on a Trunk Road like the A47, but that the preference would be to use an existing access, or an existing junction with

the Local Road Network, where one was available. **Justification for the new direct access junctions off the A47 will need to be provided.**

19. This will need to be managed and the PEIR will need to show how these potential safety issues can be mitigated. **AECOM recommend that a DMRB compliance review of the new access proposals should be carried out.** This should take into account existing historic collision data, especially for any collisions during the construction of the existing National Grid substation.
20. As for Norfolk Vanguard, the traffic generation figures (both HGV and workforce trips) relating to the substation construction would need to be quantified and substantiated. This will be taken into consideration in the review of the proposed junction layouts.

## **Impact of heavy goods vehicle traffic carrying materials to and from the Ports**

21. The base port has not yet been identified and is likely to be one of three ports: Great Yarmouth, Lowestoft or King's Lynn. RHDHV have previously confirmed that, by the time the DCO is submitted, a single option will have been selected.
22. The assessment of construction traffic assumes the utilisation of two port locations – King's Lynn to the west and either Lowestoft or Great Yarmouth to the east. Traffic to/from a base port location to/from the substation site and the work fronts would be likely to impact several junctions on the A47. Of primary concern to Highways England (as identified in the Norfolk Vanguard consultation) would be the A12 Gapton, A47 Vauxhall, A47 Acle roundabouts (nearest to Great Yarmouth and Lowestoft) and A47/A148 Saddlebow or A47/A149 Hardwick roundabouts (nearest to King's Lynn)
23. AECOM will continue to assist Highways England to assess the impacts of the base port location once further information is known.

## **Impact of a proposed cable crossing of the A47 to the west of Dereham**

24. The route adopted for the onshore cables crosses the A47 at a location to the west of Dereham. From the mapping supplied, this appears to be in the vicinity of Dale Road/ Gate House Farm, Scarning (some 5km to the west of Dereham).
25. No specific reference appears to be made in the TTMS of the issues connected with making a cable crossing of the A47 in this location.
26. In Scenario 1, this cable crossing will be completed as part of the Norfolk Vanguard onshore infrastructure. In the event that Scenario 2 proceeds, AECOM have repeated our previous recommendations relating to the cable crossing of the A47 below.
27. AECOM recommend that a formal commitment should be sought at this stage to the use of Horizontal Directional Drilling (HDD) to get the cables under the A47. Once details of the proposed cable crossing are available, AECOM would be able to advise Highways England on the specifics of the method proposed to protect the A47 from the risks associated with its construction.
28. An HDD crossing will require work sites to be created immediately adjacent to, and on either side of the A47. Access arrangements to these work sites will need to be agreed with Highways England. It has previously been mentioned by RHDHV that the intention was to use existing junctions with the local road network for this purpose, rather than seek to create new direct accesses on the Trunk Road. In principle, this is to be welcomed.
29. AECOM note that the section of A47 in question is a high speed single carriageway, with a long, straight alignment. The junction at Dale Road/ Gate House Farm is a staggered simple priority junction. There is no central right turning lane. The minor arm on the north side is a small country

lane, which rapidly decreases in width to a single lane. Examination of Google Street View imagery suggests that visibility out of the minor arms is sub-standard.

30. AECOM therefore have a number of concerns about the use of this junction for significant amounts of site traffic, some of which will comprise abnormal loads, and recommend that RHDHV undertake a detailed review of its geometry, capacity and collision record and, if necessary, make provision for it to be improved.
31. AECOM note that a number of other minor roads and farm accesses in the vicinity have been bridged where they cross the A47. Given the limitations of the Dale Road/ Gate House Farm junction, AECOM recommend that consideration be given to one of the following:
  - Provision of a temporary bridge across the A47 in this location for site traffic, to facilitate movements across the A47 and avoid the need to make right turns into/ out of the minor arms of this junction;
  - Use of one of the existing bridges across the A47 to achieve the same effect (with site traffic being banned from making right turns at the junction itself).
32. Once further information on this crossing is available, it should be made available to Highways England for scrutiny.

## Cumulative Impact Assessment

33. Section 2.3.6 of the TTMS discusses the cumulative impact scenarios of both the Norfolk Vanguard and Boreas projects and also other projects that are existing, consented or at the application stage which would have significant cumulative impact.
34. Table 2.5 indicates that the A47 improvement corridor programme (RIS) does not have the potential for a cumulative impact with the Norfolk Boreas project due to the differing timescales. AECOM acknowledge that the expected completion date of 2022 for the RIS schemes would not necessarily align with the highest traffic demand for the Norfolk Boreas assessment years (2024 in Scenario 2 and 2026 in Scenario 1), however it is worth pointing out that this is a forecast completion date and the RIS schemes are not guaranteed to be delivered by 2022. AECOM/ Highways England will continue to work with RHDHV to provide updates on the A47 RIS schemes when they are available.

## Conclusion

35. This Briefing Note gives an initial response to the Norfolk Boreas TTMS and provides some comments as to the areas of work likely to be of interest to Highways England and to the further work that will be required to address them.
36. AECOM acknowledge that a lot of this work has already been carried out as part of the Norfolk Vanguard PEIR, however, as the Norfolk Boreas project will be subject to a separate DCO application and consultation, some of our previous comments provided as part of the Norfolk Vanguard consultation response have been repeated in this note for completeness.
37. This Briefing Note should be read in conjunction with the RHDHV agreement log in Appendix A, which AECOM have completed on behalf of Highways England.
38. AECOM look forward to working collaboratively with Highways England, RHDHV and Vattenfall to reach a position where we can advise Highways England that all relevant impacts have been assessed and, if necessary, mitigated in an appropriate way.

## Royal Haskoning DHV Traffic & Transport Agreement Log

ID	Issue on which VWPL seek agreement	AECOM (on behalf of Highways England)
1	DCO requirements will have commitments to agreeing a final CTMP with the highway authority therefore management measures will be secured. The CTMP will be submitted in outline then completed when the contractor is on-board.	This approach has been agreed as part of the Norfolk Vanguard proposals and will also apply to Norfolk Boreas.
2	Requests agreement on which and how junctions are to be assessed for the A47 upgrades, including the infrastructure that will be in place.	As a worst case scenario junctions need to be assessed without the RIS improvements schemes in the event that there is a delay in these being delivered or they do not go ahead at all. As a result of recent Norfolk Vanguard discussions, Davina Galloway (of Highways England) has requested a copy of the traffic flows used in the RIS assessments of the Vauxhall and Gapton roundabouts along with scale plans showing the proposed layouts. It is currently unclear as to whether Highways England's RIS team are able to share this information. Davina is awaiting a reply. Junctions to be assessed include: <ul style="list-style-type: none"> <li>• A47 Vauxhall Roundabout;</li> <li>• A47 Gapton Roundabout; and</li> <li>• A47 Acle Roundabout (no RIS scheme affecting this junction).</li> </ul>
3	Construction impacts from the Northern Distributor missing link (A1067 to A47) works don't need considering.	AECOM do not have sufficient information on the NNDR construction impacts to comment on whether they need to be considered and cannot find explicit reference to this in the TTMS.
4	<b>Scenario 1:</b> All 15 cable sections have been assigned based on them simultaneously working together when in reality there will be 11/12 working at any one time.  This will be taken into account during the EIA where any significant impacts are identified, to make sure no over-estimation has occurred, but it will ensure that each route is assessed at maximum potential.	AECOM/ Highways England consider this approach to be reasonable.
5	<b>Scenario 2:</b> All 16 cable sections have been assigned based on them simultaneously working together.  This will be taken into account during the EIA where any significant impacts are identified, to make sure no over-estimation has occurred, but it will ensure that each route is assessed at maximum potential.	AECOM/ Highways England consider this approach to be reasonable.
6	The methodology adopted for the Port assignments is acceptable.	Previously agreed as acceptable as part of the Norfolk Vanguard PEIR review.

ID	Issue on which VWPL seek agreement	AECOM (on behalf of Highways England)
7	Employee Distribution approach.	Previously agreed as acceptable as part of the Norfolk Vanguard PEIR review.
8	Scenario 2: No double counting of HDD traffic, as realistically only one HDD will be constructed at any one time. The assignment ensures all routes to a HDD site will be included and assessed.	AECOM/ Highways England consider this approach to be reasonable.
9	A 20% contingency has been applied but based on sound theory to ensure that there is not an over estimation of traffic demand.	Highways England consider this approach to be reasonable.
10	Agreement that no more traffic flow data is required for the study area.	As mentioned in ID 2, Davina Galloway is currently awaiting a response from HE's RIS team to see if up to date traffic flows for the A47 Vauxhall and Gapton roundabouts can be provided. RHDHV have previously advised that traffic surveys would be undertaken at the A47 Acle junction. It is unclear whether traffic flow data will be required for the SRN junctions nearest to King's Lynn to assess the junctions (A47/A148 Saddlebow or A47/A149 Hardwick junctions), should King's Lynn be selected as a Base Port. HGV and employment traffic should first be quantified at these junctions, if the impact is significant, assessment of these junctions may be required (in which case there may be a requirement for traffic data to be collected if it is not already available from Highways England or NCC).

Project:	<b>Highways England Spatial Planning Arrangement 2016-2020</b>	Job No:	<b>60506522 / DN053.004</b>
Subject:	<b>Norfolk Boreas Wind Farm – PEIR Review</b>		
Prepared by:	<b>Andrew Cuthbert</b>	Date:	<b>27<sup>th</sup> November 2018</b>
Checked by:	<b>John Alderman</b>	Date:	<b>28<sup>th</sup> November 2018</b>
Verified by:	<b>Liz Judson</b>	Date:	<b>30<sup>th</sup> November 2018</b>
Approved by:	<b>Andrew Cuthbert</b>	Date:	<b>5<sup>th</sup> December 2018</b>

## Introduction

1. This Briefing Note provides a response to the Norfolk Boreas Preliminary Environmental Information Report (PEIR) produced by Royal Haskoning DHV (RHDHV) on behalf of Vattenfall Wind Power Ltd, dated October 2018, which relates to the Norfolk Boreas Offshore Windfarm project.
2. The PEIR has been produced in support of the Section 42 consultation, which runs until 9<sup>th</sup> December 2018.
3. This Briefing Note follows AECOM's previous reviews of the Traffic and Transport Method Statement, which is documented in Briefing Note 01 (February 2018); and AECOM's review of the Environmental Impact Assessment Scoping Report, which was documented in a letter to the Planning Inspectorate prepared on behalf of Highways England towards the end of May 2017.
4. The Wind Farm itself will be located off the Norfolk Coast. However, electricity generated will access the National Grid at a substation adjacent to the A47 Trunk Road at Necton, to the west of Dereham.
5. Norfolk Boreas is the second of two proposed wind farms being promoted by Vattenfall, the other being Norfolk Vanguard. The intention is that, if Norfolk Vanguard proceeds to construction, it will provide the onshore infrastructure required to serve Norfolk Boreas and the impact on the highway network of Norfolk Boreas will be relatively limited. In the PEIR this is known as Scenario 1. Should Norfolk Vanguard not proceed, Norfolk Boreas will provide, in its own right, the infrastructure that Norfolk Vanguard would otherwise have provided. In the PEIR this is known as Scenario 2.
6. Norfolk Vanguard is significantly further ahead in the planning process than Norfolk Boreas and RHDHV have done a significant amount of work in support of Norfolk Vanguard. Much of the material in the Norfolk Boreas PEIR is based on similar material prepared on behalf of Norfolk Vanguard, in fact some of it is identical.
7. AECOM have reviewed and commented on a number of documents submitted by Norfolk Vanguard and reported in a series of Briefing Notes, as follows:
  - BN 01 dated 14<sup>th</sup> March 2017 responded to the EIA Traffic & transport Method Statement;
  - BN 02 dated 4<sup>th</sup> December 2017 responded to the PEIR Traffic & Transport chapter; and

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- BN 03 dated 17<sup>th</sup> May 2018 responded to a RHDHV Technical Note (dated 23<sup>rd</sup> March 2018) on the subject of access from the A47 to the proposed substation at Necton.
8. These BNs identified a number of issues related to the impact of Norfolk Vanguard on the Strategic Road Network, which can be grouped under the following broad headings:
    - The impact on the A47 at Necton from the construction of a new substation and the extension of an existing National Grid station adjacent to the SRN;
    - The impact of heavy goods vehicle traffic carrying materials between the Base Port (the location of which is currently not identified) and the work sites; and
    - The impact of the construction of a cable crossing of the A47 to the west of Dereham.
  9. Subsequently, an Environmental Statement Traffic & Transport Chapter has been submitted in respect of Norfolk Vanguard, together with supporting documents such as an Outline Traffic Management Plan (OTMP) and an Outline Access Management Plan (OAMP). AECOM are currently in the process of reviewing these documents.
  10. A significant amount of progress has been made by RHDHV to acknowledge and address concerns raised by Highways England in respect of Norfolk Vanguard, although not all issues have been closed out and Highways England is still awaiting a response from RHDHV to AECOM BN03 and, to some extent to the issues raised in BN02.
  11. Rather than review the whole of the Norfolk Boreas PEIR from scratch, this BN02 attempts to identify the extent to which the Norfolk Boreas PEIR mirrors the approach taken by Norfolk Vanguard; which issues raised in connection with Norfolk Vanguard have effectively been addressed in the Norfolk Boreas PEIR and which remain outstanding; and to identify an appropriate response for Highways England to make to the Section 42 consultation.
  12. Appendix A below sets out a number of key differences between the material presented in the PEIRs for Norfolk Vanguard and Norfolk Boreas, and the extent to which matters have moved on since AECOM provided BN 01 in respect of Norfolk Boreas and BNs 02 and 03 in respect of Norfolk Vanguard.

### ***Issues Remaining Outstanding:***

13. The conclusion of this review is that the following issues, whether identified previously, or during the course of this review, remain outstanding:

### ***General Issues***

- 1) An assessment should be made of the impact of the Norfolk Boreas Wind Farm on the capacity of the A47 Vauxhall and A47 Gapton junctions in Great Yarmouth, in the event that construction of the wind farm onshore infrastructure proceeds ahead of the RIS schemes for those junctions (Norfolk Boreas BN01 para 11). AECOM acknowledge that such an assessment has been made in respect of the Norfolk Vanguard wind farm - this is currently under review. The anticipated construction programme for the wind farm is stated in Appendix A of this Briefing Note;
- 2) An assessment should be made of the impact of the Norfolk Boreas Wind Farm on the capacity of the A47/ A1064 Acle junction (Norfolk Boreas BN01 para 11) - AECOM acknowledge that such an assessment has been made in respect of the Norfolk Vanguard wind farm - this is currently under review;
- 3) Definitive proposals should be brought forward to mitigate the road safety impact of the Norfolk Boreas Wind Farm at the A12/ Horn Hill roundabout in Lowestoft and, if construction



of the wind farm proceeds ahead of the A47 Blofield to North Burlingham scheme, at the A47/B1140 junction at North Burlingham (PEIR paras 313 - 317 & Table 24.40);

- 4) An Outline Construction Management Plan and an Outline Access Management Plan should be provided (Norfolk Boreas BN01 para 14);
- 5) Further work will need to be undertaken in respect of the cumulative impact of the wind farm and the RIS schemes, should their construction periods overlap. The rationale for not including the proposed Great Yarmouth Third River Crossing in this cumulative impact assessment should be clarified (not previously referenced).

### ***In respect of the proposed Substation access at Necton:***

- 6) Justification should be provided for the provision of a new direct access junction off the A47 where an existing access is available (Norfolk Boreas BN01, para 18);
- 7) A DMRB compliance review of the new access proposals should be carried out (Norfolk Boreas BN01, para 19);
- 8) Traffic generation figures for the substation access should be quantified and substantiated (Norfolk Boreas BN01, para 20);
- 9) Scale plans of the proposed access junction layouts with dimensions and visibility splays should be provided before Highways England agree to the proposals in principle: any such agreement should be subject to acceptance by NCC and a Stage 1 Road Safety Audit (Norfolk Vanguard BN03, para 18) - AECOM acknowledge receipt of a scale plan of the proposed layout of access option B as part of the package of material submitted on behalf of Norfolk Vanguard wind farm: however, the other access options have not been provided;
- 10) These layout plans should be provided with HGV swept path plots (not previously referenced);
- 11) If access option A (which does not provide a ghost-island central right turn lane for traffic waiting to enter the site) is selected, a traffic management strategy banning right turns into and out of the site should be deployed: this strategy should be made available to Highways England to review and an assessment should be made of the impact of the resulting U-turning traffic at the A47/ A1075 junction at Dereham (Norfolk Vanguard BN03, paras 11 & 19);
- 12) Access to the pylon in the field opposite the substation (on the north side of the A47) would also require the provision of scale plans, the agreement of NCC, a Stage 1 Road Safety Audit and scrutiny of the temporary traffic management strategy before Highways England could agree it in principle (Norfolk Vanguard BN03, paras 25 & 26);

### ***In respect of the proposed Cable crossing of the A47 to the west of Dereham:***

- 13) Details of the proposed HDD crossing should be agreed with Highways England (Norfolk Boreas BN01, para 27);
- 14) If new accesses are proposed, justification should be provided for the provision of a new direct access junction off the A47 where an existing access is available (not previously referenced);
- 15) If the existing Dale Road/ Gate House Farm staggered priority junction is to be used to access the construction sites associated with this crossing, a detailed review of its geometry, capacity and collision record should be undertaken and, if necessary, provision should be made for it to be improved (Norfolk Boreas BN01, para 30);

- 16) Layout plans of this junction should be provided with HGV swept path plots (not previously referenced);
  - 17) Consideration should be given to restricting this junction to left-in, left-out only operation for the duration of the works (Norfolk Boreas BN01, para 31).
-

**Norfolk Boreas & Norfolk Vanguard PEIR Comparison**

Ref	Issue	Norfolk Vanguard PEIR	Norfolk Boreas PEIR
24.1/ para5	Scenarios Tested	One scenario is tested.	Two Scenarios are assessed, with and without Norfolk Vanguard
Table 24.3/ para 350	Substation access to A47	A Technical Note is to be produced	The Technical Note has been produced and is included as Appendix 24.33. The TN is identical to that provided in respect of Norfolk Vanguard and dated 23 <sup>rd</sup> March 2018, which AECOM BN03 reports on. It should be noted that the issues raised in BN03 have not yet been addressed.
Table 24.3	Use of Great Yarmouth as a base port relative to RIS schemes in the A47 corridor	Assessments would need to take account of RIS schemes in the A47 corridor and consider the impact of the wind farm on the A47 if Great Yarmouth is selected as a base port and the RIS schemes do not proceed.	Section 24.7.6.4.1 acknowledges that the impact of construction traffic on the Gapton Hall, Vauxhall, Fullers Hill and Acle junctions would need to be assessed. AECOM note that these assessments have now been provided in respect of Norfolk Vanguard wind farm.
Table 24.3	HGV access to HDD site on the A47 to the west of Dereham.	No specific proposals were made in respect of managing HGV access to the HDD sites where the cable corridor crosses the A47 to the west of Dereham.	The DCO application will contain an Outline Code of Construction Practice (OCCP) and an Outline Access Management Plan (OAMP) which will commit to trenchless crossing locations and access arrangements respectively. It is noted that these documents are promised but have not yet been produced in respect of Norfolk Boreas. They already exist in respect of Norfolk Vanguard and AECOM are in the process of reviewing them.
Table 24.3 & paras 304-317	Collision Cluster Site 12 (A47/B1140 junction to the west of Acle)	A minor adverse impact is acknowledged at this location should the wind farm proceed to construction ahead of the A47 Blofield to North Burlingham RIS scheme.	Section 24.7 (paras 313 - 317) discusses the need for a road safety remedial scheme at this junction should the wind farm proceed to construction ahead of the RIS scheme. A scheme based on a 'queueing ahead' sign is proposed. AECOM welcome this proposal and recommend that it is developed further if it becomes necessary.
Table 24.3	Use of Lowestoft as a base port: impact on highway links 64 & 65 (A12 south and A47 north of the Bascule Bridge)	A minor adverse impact is acknowledged on link 64 (south of the Bascule bridge) but not on link 65 (north of the Bascule Bridge) which forms part of the SRN through Lowestoft town centre.	In Table 24.26, both links 64 and 65 are acknowledged as being of 'medium sensitivity'. Tables 24.30 & 24.36 acknowledge a 'minor adverse' impact on pedestrian amenity on link 65 and Table 24.40 acknowledges a 'minor adverse' impact on collision cluster 19 on link 64, with mitigation in the form of an enhanced Traffic Management Plan (TMP) proposed.
24.4.1.5/ para 50	Abnormal Indivisible Loads (AILs)	Para 48 states that an AIL access study will be undertaken.	Para 50 states that an AIL access study has already been undertaken for Norfolk Vanguard and submitted with the Norfolk Vanguard DCO submission. This would be equally applicable to Norfolk Boreas. AECOM are in the process of reviewing this document.

Ref	Issue	Norfolk Vanguard PEIR	Norfolk Boreas PEIR
24.4.4/ para 55; 24.6.5/ Table 24.11	Sensitive junctions for further more detailed assessment.	<p>Para 46 acknowledges that sensitive junctions have been identified Table 24.11 lists seven junctions as follows:</p> <ul style="list-style-type: none"> <li>• A12 (now A47) Gapton Roundabout, Great Yarmouth;</li> <li>• A47 Vauxhall Roundabout, Great Yarmouth;</li> <li>• A149 Fullers Hill Roundabout, Great Yarmouth;</li> <li>• A47/ A10/ A149 Hardwick Roundabout, Kings Lynn;</li> <li>• A47/ Constitution Hill Roundabout, Kings Lynn;</li> <li>• A47/ A1065 junctions, Swaffham; and</li> <li>• A47/ A1064 Roundabout, Acle.</li> </ul>	<p>Para 55 identifies four junctions on or close to the SRN that are acknowledged as highly sensitive to changes in traffic:</p> <ul style="list-style-type: none"> <li>• A12 (now A47) Gapton Roundabout;</li> <li>• A47 Vauxhall Roundabout;</li> <li>• A149 Fullers Hill Roundabout; and</li> <li>• A47/ A1064 Acle Roundabout.</li> </ul> <p>The Kings Lynn and Swaffham junctions are now excluded following an assessment of the magnitude of traffic flow increases reported in Table 24.24 of the Norfolk Vanguard PEIR and accepted as reasonable by AECOM.</p>
24.5.1.1/ para 73	Number of highway links assessed	A total of 65 highway links are assessed.	A total of 108 highway links are assessed - the additional links mostly relate to local access routes to construction sites, although Link 1 (the A47 between Swaffham and Dereham) has been subdivided into Links 1a and 1b.
24.5.1.2/ para 78	Norwich Northern Distributor Road (NNDR)	Para 67 acknowledges the NNDR as a future scheme. Table 24.7 acknowledges the impact that the NNDR will have on traffic flows on a number of links, including link 5 (A47 Postwick to Acle).	Para 78 acknowledges that the NNDR opened to traffic during May 2018. Table 24.7 acknowledges the impact that the NNDR will have on traffic flows on a number of links, including link 5 (A47 Postwick to Acle).
24.7.2/ Tables 24.14 & 24.20	Anticipated programme of works	Table 24.12 sets out a construction programme with both the onshore cable route and the substation being constructed between 2020 & 2026.	Table 24.14 sets out a construction programme for <u>Scenario 1</u> with the onshore cable route being constructed in 2026 & 2027, with the substation between 2022 & 2027; Table 24.20 sets out a construction programme for <u>Scenario 2</u> with both the onshore cable route and the substation being constructed between 2021 & 2026.
24.7.3/ Tables 24.16 & 24.22	'Worst Case' traffic demand assumptions	Table 24.13 sets out key assumptions behind the derivation of traffic demand.	Tables 24.16 & 24.20 set out the assumptions used to derive the traffic demand for Scenarios 1 & 2 respectively.
24.7.5	Monitoring	No commitment to monitoring and enforcement is made.	Section 24.7.5 sets out a commitment to undertake monitoring and enforcement measures through the OTMP to ensure that out-turn traffic is contained within the worst case traffic forecasts adopted.
24.7.6.2/ Para 247 & Table 24.31	Enhanced TMP measures	No reference to enhanced TMP measures	Para 247 makes a commitment to implementing a number of enhanced Traffic Management Plan (TMP) measures, which are listed in table 24.31. The measures concerned are based on driver education. These are to be deployed where 'moderate adverse' impacts are predicted, with a view to reducing them to 'minor adverse'.

Ref	Issue	Norfolk Vanguard PEIR	Norfolk Boreas PEIR
			<p>None of the links concerned are on the SRN. Link 65 (the A47 to the north of the Bascule bridge in Lowestoft) is rated in Table 24.30 as having a 'minor adverse' impact not requiring mitigation. AECOM note that in our Norfolk Vanguard BN02, we expressed the view that link 65 should be rated 'moderate adverse' given the increase in HGV flows predicted along it.</p> <p>It is noted that link 64 (collision cluster 19), which is identified at para 347 as having a moderate adverse impact requiring mitigation through the use of enhanced TMP measures, is not listed in para 250 as being the subject of enhanced TMP measures.</p>
24.7.6.3	Road Safety	<p>Cluster sites 12 and 19 - see above.</p> <p>Para 318 - 323 identify the A47/ A146 junction at Trowse as a collision cluster site (cluster 13). Para 323 concludes that there will be a 'minor adverse' impact on road safety at this junction. AECOM agreed with this conclusion in respect of Norfolk Vanguard.</p>	<p>Cluster sites 12 and 19 - see above.</p> <p>Para 318 - 323 identify the A47/ A146 junction at Trowse as a collision cluster site (cluster 13). Para 323 concludes that there will be a 'minor adverse' impact on road safety at this junction. AECOM agreed with this conclusion in respect of Norfolk Vanguard.</p>
24.7.6.3/ Para 350	Site access		<p>Para 350 refers to the A47 Site Access Technical Note prepared on behalf of Norfolk Vanguard and included in the Norfolk Boreas PEIR as Appendix 24.33. AECOM have reviewed this document and our comments are contained in BN03.</p>
Paras 354 - 358	Other points of access	<p>Paras 265 - 268 refer to other points of access on the road network. A commitment is made to develop and agree their design with NCC and Highways England and to be subject to an Access Management Plan.</p>	<p>Paras 354 - 358 refer to other points of access on the road network. A commitment is made to develop and agree their design with NCC and Highways England and to be subject to the OAMP and an independent Road Safety Audit.</p> <p>No specific proposals are included in respect of access to the HDD crossing of the A47 to the west of Dereham which, apart from the substation, is the construction site closest to, and most dependent upon, the A47 for access via the Local Road Network.</p> <p>AECOM's comments on the suitability of the proposed access contained in BN01 therefore still apply.</p>
24.7.6.4.1/ Table 24.41	Significance of traffic flow increases at sensitive junctions.	<p>Table 24.24 summarises the peak hourly traffic flow increases anticipated at the seven junctions identified at 24.4.4 above. It concludes that an assessment in terms of junction capacity modelling may be required at Junctions 1, 2 &amp; 3 (Great Yarmouth) and 7 (Acle).</p> <p>The impact at the other junctions (in Kings Lynn and Swaffham) is found to be 'minor adverse' and no need for junction capacity modelling is acknowledged. AECOM accepted this position.</p>	<p>Table 24.41 repeats this assessment for the four junctions concerned and re-states the commitment to junction capacity modelling. In the case of the Junctions 1 and 2 (Gapton and Vauxhall) this would only be necessary should the wind farm construction proceed ahead of the A47 RIS schemes for those junctions. AECOM agree with this conclusion.</p>

Ref	Issue	Norfolk Vanguard PEIR	Norfolk Boreas PEIR
24.8.1.3/ Paras 417-424	Cumulative impact with A47 RIS schemes	Para 313 commits Norfolk Vanguard to engage with Highways England to identify a suitable reference case.	<p>This section acknowledges the need for a cumulative impact assessment with both Norfolk Boreas and the A47 RIS schemes. Para 420 states that the construction of the RIS schemes is due to take place between 2020 and 2022. This would put them ahead of the construction phase of Norfolk Boreas in Scenario 1 but for Scenario 2, para 420 acknowledges the potential for an overlap between the schemes.</p> <p>Para 422 proposes a Reference Case in which, when the wind farm proceeds to construction, none of the A47 improvements are in place. This is a robust assumption, given that the RIS schemes would, when they are open to traffic, mitigate problems at two of the locations identified as problematic in the PEIR.</p> <p>Para 423-424 states that there is insufficient information available relating to the RIS schemes to make a cumulative impact assessment possible at present. A commitment is therefore made for Norfolk Boreas to engage with Highways England and co-ordinate activities should the schemes overlap. This would appear satisfactory to AECOM.</p>
Table 24.33	Cumulative impact with Great Yarmouth Third River Crossing	n/a	Table 24.33 refers to the Great Yarmouth Third River Crossing, concludes that it will not be included in the Cumulative Impact Assessment but provides no rationale for not doing so. AECOM recommend that clarification be sought on this point.

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Project:	<b>Highways England Spatial Planning Arrangement 2016-2020</b>	Job No:	<b>60572359 / DN053.004</b>
Subject:	<b>Norfolk Boreas Offshore Wind Farm – Environmental Statement Review</b>		
Prepared by:	<b>Kelly Davis</b>	Date:	<b>19<sup>th</sup> August 2019</b>
Checked by:	<b>Andrew Cuthbert</b>	Date:	<b>22<sup>nd</sup> August 2019</b>
Verified by:	<b>John Alderman</b>	Date:	<b>27<sup>th</sup> August 2019</b>
Approved by:	<b>John Alderman</b>	Date:	<b>27<sup>th</sup> August 2019</b>

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## ***Briefing Note 03\_Addendum***

Following a meeting held on 9<sup>th</sup> August between Highways England, AECOM, Vattenfall and Royal Haskoning DHV it was agreed that AECOM would re-issue this Briefing Note 03 as an Addendum to capture some of the recommendations which were resolved during the meeting discussions and which recommendations are proposed to be resolved when the ES is updated.

For ease of reference, Appendix C provides the Addendum to this note and highlights the points that have now been agreed / clarified. The other parts of this Briefing Note remain the same.

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## ***Executive Summary***

Following a review of the Environmental Statement and supporting documents, dated June 2019 prepared by Royal Haskoning DHV (RHDHV), in support of the Norfolk Vanguard Wind Farm DCO application, AECOM make the following recommendations.

### *Recommendations regarded as critical to the acceptability of the DCO application:*

None

### *Recommendations regarded as important but not critical to the acceptability of the DCO application:*

1. Appendix 24.32 and Figure 24.6 should be amended to refer to all the clusters identified in Table 24.12 of ES Chapter 24; Table 24.12 should be updated to reflect the description of the collisions contained in Appendix 24.32. Figure 24.6 would be more useful if it distinguished between locations where potential clusters were identified; locations where actual clusters or patterns were identified; and those where remedial measures are proposed (para 20);
2. Para 119 of ES Chapter 24 should be updated to reflect the fatal collision identified in Appendix 24.32 (Collision Ref 13) (para 21); and
3. The description of the upgrade to the existing A47 / Bushey Common Road bell mouth in para 3.3.2.1 of the OAMP should be corrected to match drawing number TP-PB5640-DR010/F1.0 (para 45).

With the exception of the omissions and typographical errors highlighted in paras 20, 21 and 45 of this BN03 (as summarised above), all outstanding issues raised with regards to the Norfolk Boreas Preliminary Environmental Impact Review have been addressed. Furthermore, the comments raised as part of the Norfolk Vanguard consultation have been brought forward and addressed in the Norfolk Boreas ES. This BN03 serves to summarise the matters that have been agreed in principle by Highways England with a view to forming the basis of a Statement of Common Ground between Highways England and Royal Haskoning DHV on behalf of Vattenfall Wind Power Ltd.

## Introduction

4. This Briefing Note (BN) provides a response to the Norfolk Boreas Environmental Statement (ES) produced by Royal Haskoning DHV (RHDHV) on behalf of Vattenfall Wind Power Ltd, dated June 2019, which relates to the Norfolk Boreas Offshore Wind Farm project.
5. The ES forms part of the Development Consent Order (DCO) application for the wind farm. The DCO application has recently been accepted by the planning inspectorate and is now under Section 56 consultation. The period in which statutory consultees can make representations runs until 11.59pm on 1<sup>st</sup> September 2019.
6. This BN03 reports on the results of a review of the following documents submitted as part of the DCO application for the Norfolk Boreas project (the DCO document references are shown below):
  - 6.1.24: Environmental Statement, Volume 1, Chapter 24: Traffic & Transport
  - 8.8: Outline Traffic Management Plan (OTMP)
  - 8.9: Outline Travel Plan (OTP)
  - 8:10: Outline Access Management Plan (OAMP)
7. This BN03 follows AECOM's previous reviews of documents relating to the Norfolk Boreas project as summarised below:

RHDHV Document (Norfolk Boreas)	AECOM Review
Environmental Impact Assessment Scoping Report (May 2017)	Letter to the Planning Inspectorate, on behalf of Highways England (May 2017)
Traffic and Transport Method Statement (January 2018)	Briefing Note 01 (February 2018)
Preliminary Environmental Impact Report (October 2018)	Briefing Note 02 (December 2018)

8. The wind farm itself will be located off the Norfolk coast. However, electricity generated will access the National Grid at a substation adjacent to the A47 trunk road at Necton, to the west of Dereham.
9. Norfolk Boreas is the second of two proposed wind farms being promoted by Vattenfall, the other being Norfolk Vanguard. Each wind farm has a separate DCO application. The intention is that, if Norfolk Vanguard proceeds to construction, it will provide the onshore infrastructure required to serve Norfolk Boreas and the impact on the highway network of Norfolk Boreas will be relatively limited. In the ES this is known as Scenario 1. Should Norfolk Vanguard not proceed, Norfolk Boreas will provide, in its own right, the infrastructure that Norfolk Vanguard would otherwise have provided. In the ES this is known as Scenario 2.
10. Norfolk Vanguard is significantly further ahead in the planning process than Norfolk Boreas and RHDHV have undertaken a substantial amount of work in support of the Norfolk Vanguard DCO application. Much of the material in the Norfolk Boreas ES is based on similar/the same material prepared on behalf of Norfolk Vanguard.
11. AECOM have reviewed and commented on a number of documents relating to the Norfolk Vanguard project and reported in a series of Briefing Notes, in the following table.

RHDHV Document (Norfolk Vanguard)	AECOM Review
Traffic & Transport Method Statement (January 2017)	Briefing Note 01 (March 2017)
Preliminary Environmental Impact Report (October 2017)	Briefing Note 02 (December 2017)
A47 Substation Access Technical Note (March 2018)	Briefing Note 03 (May 2018)
A47 Substation Access B Drawings (October 2018)	Briefing Note 04 (January 2019)
Environmental Statement: Traffic & Transport Chapter (June 2018)	Briefing Note 05 (February 2019)
A47 Substation Access A and D1 Drawings (October 2018)	Briefing Note 06 (January 2019)
Substations Access Clarifications Technical Note (March 2019)	Briefing Note 07 (April 2019)
Cable Crossing Access Technical Note (April 2019)	Briefing Note 08 (May 2019)

12. These BNs identified a number of issues relating to the impact of the Norfolk Vanguard project on the Strategic Road Network (SRN), which have been acknowledged and addressed by RHDHV to the extent that Highways England and RHDHV have agreed a Statement of Common Ground in respect of Norfolk Vanguard.
13. Rather than review the whole of the Norfolk Boreas ES from scratch, this BN03 attempts to identify the extent to which the Norfolk Boreas ES mirrors the approach taken by Norfolk Vanguard; which issues raised in connection with Norfolk Vanguard have effectively been addressed in the Norfolk Boreas ES and which remain outstanding; and to identify an appropriate response for Highways England to make to the Section 56 consultation for Norfolk Boreas, with a view to progressing a Statement of Common Ground in due course.
14. Appendix A sets out the outstanding issues highlighted in AECOM's previous review of the Norfolk Boreas Preliminary Environmental Impact Report (PEIR) (BN02, December 2018) and comments on whether these issues have now been addressed in the Norfolk Boreas ES.
15. For ease of reference, AECOM's main comments and recommendations are presented in bold and underlined text throughout the note. Recommendations regarded as critical to the acceptability of this DCO application are coloured **red**. Recommendations regarded as important but not critical to the acceptability in principle of this DCO application are highlighted in **amber**.
16. The following paragraphs summarise the review of each of the ES documents.

#### ***Environmental Statement, Volume 1, Chapter 24: Traffic & Transport***

17. Chapter 24 of the ES considers the overall traffic impacts of the onshore project area of the Norfolk Boreas project for both scenarios and has been reviewed together with the OTMP, OTP and OAMP.
18. AECOM have not reviewed the assessment methodology as this has been agreed in previous iterations of both the Norfolk Vanguard and Boreas consultations. The following paragraphs summarise the changes that have been made to the ES since AECOM's previous review of the Norfolk Boreas PEIR.
19. Table 24.10 of Chapter 24 summarising existing daily traffic flows has been updated with 2017 AADT<sup>1</sup> flows since the PEIR.
20. Table 24.12 of Chapter 24 presenting collision cluster information has been updated with more recent collision data (up to 30th November 2018). This results in a notable difference in collisions along the A47 in particular locations. AECOM have noticed however, that the number of collisions shown in Table 24.12 (and Table 24.50) do not match those in Appendix 24.32 'Personal Injury Collision Cluster Summary' and that not all the clusters identified in Table 24.12 are listed in

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<sup>1</sup> Annual Average Daily Traffic

Appendix 24.32 or illustrated on Figure 24.6. AECOM have taken the clusters identified in Table 24.12 and the descriptions of the collisions in Appendix 24.32 as correct **and recommend that Appendix 24.32 and Figure 24.6 are amended to refer to all the clusters identified in Table 24.12 of ES Chapter 24; and that Table 24.12 is updated to reflect the description of the collisions contained in Appendix 24.32. Figure 24.6 would also be more useful if it distinguished between locations where potential clusters were identified; locations where actual clusters or patterns were identified; and those where remedial measures are proposed.**

21. **Para 119 should also be updated to reflect the fatal collision identified in Appendix 24.32 (Ref 13).**
22. Notwithstanding the above recommendations, AECOM acknowledge that the identified collision clusters and associated links have been appropriately assessed to investigate whether any road safety mitigation measures would be required to address the potential impact that increases in traffic flow (and HGV flows in particular) on the identified links could have on existing road safety issues.
23. On the A47 links, mitigation measures have been identified at cluster sites 10 (A47/ Cucumber Lane to the north of Brundall), 13 (A47/ A1064 roundabout to the east of Acle) and 17 (A47 Yare Bridge, Great Yarmouth). The proposed measures are summarised in Table 3.6 of the OTMP as follows:

Collision Site Ref	Location	Identified Pattern	Mitigation Proposed
10	A47/ Cucumber Lane roundabout (to the north of Brundall)	Rear end shunt collisions and poor positioning for vehicles approaching from the west.	High Friction Surfacing on the A47 eastern approach arm; advanced lane delineators on all approaches
13	A47/ A1064 roundabout (to the east of Acle)	Rear end shunt collisions on the eastern approach (existing vegetation overgrown restricting visibility)	Recommendation to HE to clear vegetation frequently. Commitment from Norfolk Boreas to maintain vegetation at this location through the construction period.
17	A47 Yare Bridge (Great Yarmouth)	Rear end shunt collisions.	'Queues likely' signage to be introduced,

24. The proposed road safety mitigation measures at the identified sites appear to be a proportionate response to the likely impact of Norfolk Boreas Wind Farm traffic on the clusters/ patterns identified and should therefore be welcomed.

**Outline Traffic Management Plan (OTMP)**

25. The OTMP considers traffic impacts during the construction phase of the Norfolk Boreas onshore infrastructure works. The traffic impact during the operational phase of the project is likely to be minimal.

A47 HGV Impact

26. Appendices 1 and 2 of the OTMP set out the forecast number of daily construction vehicle movements per link for the peak level of construction activity in each scenario. The impact on the SRN is summarised in the following table.

Link ID	Link Description	Scenario 1		Scenario 2	
		All Vehs	HGVs	All Vehs	HGVs
1a	A47 Swaffham - Necton	124	100	551	415
1b	A47 Necton - Dereham	172	100	785	415
2	A47 Dereham - Easton	181	70	691	291
3	A47 Easton – Trowse	121	70	525	291
4	A47 Trowse – Postwick	81	70	369	291
5	A47 Postwick - Acle	290	281	641	580
6	A47 Acle - Vauxhall	284	281	604	580
7	A47 Narborough - Swaffham	83	70	358	291
9	A47 Vauxhall – A143 (Gt Yarmouth)	326	323	648	637
10	A47 A143 (Gt Yarmouth) – Millennium Way (Lowestoft)	324	323	640	637
65	A47 Millennium Way – A12 (Lowestoft)	323	323	639	637
66	Wedling – Dereham Road (intersects with A47)	109	69	192	152

27. Table 3.2 of the OTMP details the daily two-way HGV movements for the peak level of construction activity at each access point on the cable route for each scenario. The HGV movements at the SRN access points are summarised below.

Access ID	Location Description	Scenario 1 <sup>2</sup>		Scenario 2 <sup>3</sup>	
		St 1	St 2	St2	St3
AC159	TC <sup>4</sup> point N of A47 (Scarning) West of Dereham	-	34	136	34
AC162	TC point S of A47 (Scarning) West of Dereham	-	34	112	34
AC178	Substation Access A	34	-	68	-
AC179	Substation Access D1	-	-	20	-
AC180	Substation Access B	46	34	134	34

### Cumulative Impacts

28. The cumulative impacts of construction of the Norfolk Boreas and other major infrastructure projects in the area are summarised in Appendix A of this BN03 (point 5).

### **Outline Travel Plan (OTP)**

29. The OTP sets out a strategy for encouraging more sustainable methods of travel for employees during the onshore construction phase of the project by promoting alternatives to single occupancy vehicle trips.

30. AECOM's previous reviews (for Norfolk Vanguard) include no specific recommendations relating to the OTP and we do not make any recommendations in relation to the OTP presented as part of this Norfolk Boreas DCO application. The content of the OTP is summarised below for information.

31. The OTP acknowledges that the potential sustainable mode offer is limited due to the remote location of the Mobilisation Areas (MA) and therefore focusses on the provision of private multi-occupancy vehicles that would be funded by the contractor for employee travel to/from each MA.

<sup>2</sup> Scenario 1, Stage 1: Landfall and onshore project substation primary works (including National Grid substation extension); Stage 2: Cable Pulling, jointing and commissioning.

<sup>3</sup> Scenario 2, Stage 1: Pre-construction works; Stage 2: Duct installation works, landfall and onshore project substation primary works (including National Grid substation extension); Stage 3: Cable Pulling, jointing and commissioning.

<sup>4</sup> Trenchless Crossing point. In previous iterations of the ES these sites have been referred to as the Horizontal Directional Drilling (HDD) sites.

32. The OTP provides a framework and outlines measures to be adopted post-consent along with a robust plan for monitoring and enforcement. The detail of the TP will be clearer post-consent as it will be dependent on where employees live; the proportion that are 'local' to the MA's and those that migrate into Norfolk from other areas in the country to work on the project.
33. Outline measures include the provision of crew vans and/or mini-buses and identification of pick up points to serve 'clusters' of employees. The OTP recognises that pick up points should avoid the sensitive junctions already identified in the ES.
34. In addition, private car share will be enabled and site transfer vehicles will transfer employees between the MA's and cable sections.
35. MA's are to have restricted parking with preference given to car sharing vehicles and employee transfer vehicles. A permit system is also suggested in the OTP.
36. Other supporting measures, such as travel information packs/information boards for employees, welfare facilities and visiting food delivery to avoid the need for trips off site are identified in the OTP.
37. The OTP states a commitment for the contractor to appoint a TP coordinator. The TP coordinator would be responsible for monitoring, which includes sign in logs to check how employees travelled to the MA's and monitoring of the surrounding area to check for overspill parking off site.
38. A corrective process has been outlined to address any breaches of the TP (i.e. workers driving direct to unauthorised access points or overspill parking on public highway).
39. Table 6.1 of the OTP presents an Action Plan to be implemented by the TP coordinator once appointed. AECOM agree that this is a proportionate and appropriate approach for the type of activity and workforce anticipated.

### ***Outline Access Management Plan (OAMP)***

40. The OAMP sets out details of points of access for the onshore substation and cable route. Section 3.3.2 of the OAMP provides details of accesses along the A47. Appendices 2 and 3 provide the A47 access designs and swept path analysis respectively.
41. The designs in Appendices 1, 2 and 3 of the OAMP are the same as those presented in the Norfolk Vanguard ES with the exception of the drawing numbers which have been changed for the Norfolk Boreas project. The Access ID's are listed in the following table along with a description of the corresponding drawing numbers.

Access ID	Access Description	Location	Boreas Drawing No.s	Vanguard Drawing No.s
AC159	TC point	North of A47 (Scarning) West of Dereham	TP-PB5640-DR010/F1.0	PB4476-DR025/D0.1
AC162	TC point	South of A47 (Scarning) West of Dereham	Standard detail: PN5640-DR-H1-D-0100	PB4476-DR025/D0.1
AC178	Substation Access A	South of A47 (North east of Necton)	TP-PB5640-DR001/F1.0	PB4476-DR012/F1.0
AC179	Substation Access D1	North of A47 (North east of Necton)	TP-PB5640-DR003/F1.0	PB4476-DR015/F1.0
AC180	Substation Access B	South of A47 (North east of Necton)	TP-PB5640-DR002/F1.0	PB4476-DR014/F1.0

42. The design access drawings remain unchanged from those presented as part of the Norfolk Vanguard DCO application. AECOM carried out a compliance review of the access designs against relevant DMRB<sup>5</sup> standards and made recommendations in Norfolk Vanguard BN's 04 and 06. These recommendations were addressed in RHDHVs 'Substation Access Clarifications Technical Note' (March 2019) and 'Cable Crossing Access Technical Note' (April 2019) for the Norfolk Vanguard project. As documented in AECOM's Norfolk Vanguard BN's 07 and 08, all outstanding issues in relation to DMRB compliance, that can be addressed at this stage, have been.
43. For completeness, AECOM's review of the layouts from Norfolk Vanguard Briefing Notes 07 and 08 are appended to this note (Appendix B) with the drawing numbers changed to reflect the Norfolk Boreas project.
44. There are some issues that will need to be addressed post-consent; these have been acknowledged in the ES. AECOM therefore agree with para 86 of the OAMP which states that Accesses AC159, AC178, AC179 and AC180 have all been agreed in principle with Highways England, subject to:
- Visibility splays being cleared of foliage;
  - Visibility being proven in the vertical plane;
  - The implementation of the traffic management measures proposed; and
  - The carrying out of Stage 1 and 2 Road Safety Audits.
45. There appears to be an error in the description of the upgrade to the existing A47 / Bushey Common Road bell mouth at access point AC159. Para 79 of section 3.3.2.1 of the OAMP states that this will be upgraded to a rural simple priority junction incorporating a minimum 15m corner radii and 1.8m tapers over a 30m distance, however the drawing (TP-PB5640-DR010/F1.0) shows 1:10 tapers over a 25m distance. The swept path plots confirm that these tapers are adequate. **This therefore appears to be a typographical error as the drawing is the same as that previously agreed for the Norfolk Vanguard project, however this should be corrected in the ES text.**
46. The final OAMP is to be drafted post-consent based on the adopted scenario to be taken forward to construction (Scenario 1 or 2).

<sup>5</sup> Design Manual for Roads and Bridges

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## **Conclusion**

47. With the exception of the omissions and typographical errors highlighted in paras 20, 21 and 45 of this BN03, all outstanding issues raised with regards to Norfolk Boreas PEIR have been addressed. Furthermore, the comments raised as part of the Norfolk Vanguard consultation have been brought forward and addressed in the Norfolk Boreas ES. This BN03 serves to summarise the matters that have been agreed in principle by Highways England with a view to forming the basis of a Statement of Common Ground between Highways England and RHDHV for Vattenfall Wind Power Ltd.

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**Norfolk Boreas Outstanding Issues from BN02**

Ref	Issue Raised in BN02	Addressed in the ES?
<b>General Issues</b>		
1	An assessment should be made of the impact of the Norfolk Boreas Wind Farm on the capacity of the A47 Vauxhall and A47 Gapton junctions in Great Yarmouth, in the event that construction of the wind farm onshore infrastructure proceeds ahead of the RIS schemes for those junctions (Norfolk Boreas BN01 para 11). AECOM acknowledge that such an assessment has been made in respect of the Norfolk Vanguard wind farm - this is currently under review.	This assessment has been carried out for the Norfolk Vanguard project. AECOM's Norfolk Vanguard BN05 refers. For A47 Gapton Hall and A47/ A149 Vauxhall junctions AECOM recommended that: The impact of wind farm construction on both junctions should be controlled through the Construction Traffic Management Plan (CTMP), which should aim to minimise the number of additional vehicles using this junction during peak periods, for example through the use of an hours of working restriction. In the event, after further consideration of the issues concerned, Highways England agreed to waiver this restriction.
2	An assessment should be made of the impact of the Norfolk Boreas Wind Farm on the capacity of the A47/ A1064 Acle junction (Norfolk Boreas BN01 para 11) - AECOM acknowledge that such an assessment has been made in respect of the Norfolk Vanguard wind farm - this is currently under review;	This assessment has been carried out for the Norfolk Vanguard project. AECOM's Norfolk Vanguard BN05 refers. For A47/ A1064 Acle Junction: Consideration should be given to the use of variable message signifying aimed at alerting westbound drivers on the A47 of the risk of excessive queues at this junction whilst they are still on the Acle Straight.
3	Definitive proposals should be brought forward to mitigate the road safety impact of the Norfolk Boreas Wind Farm at the A12/ Horn Hill roundabout in Lowestoft and, if construction of the wind farm proceeds ahead of the A47 Blofield to North Burlingham scheme, at the A47/ B1140 junction at North Burlingham (PEIR paras 313 - 317 & Table 24.40);	No reference has been made to road safety issues at the A12 / Horn Hill roundabout in the ES. This has not been identified as a cluster site in the ES. This site is not located on the SRN and AECOM do not consider it necessary to query its omission from the ES. Cluster site 12 refers to the A47/ B1140 junction at North Burlingham. The ES asserts that the construction of the proposed RIS scheme would be appropriate to mitigate the traffic impact of the project. However in the event that the programme is delayed, the ES considers the cluster site in detail to determine whether a plan for mitigation measures is required. The ES concludes that there is a pattern of collisions involving vehicles turning from the side roads onto the A47. The traffic generated during the construction phase of the Norfolk Boreas project is forecast to result in a 1.4% increase in total traffic on this link (Link 5) and a 28.1% increase in HGV traffic. However the ES asserts that the overall impact is likely to be 'minor adverse' as no wind farm construction traffic will turn onto or off the A47 on this link. AECOM consider this conclusion to be reasonable and this point can therefore be resolved.
4	An Outline Construction Management Plan and an Outline Access Management Plan should be provided (Norfolk Boreas BN01 para 14);	The OTMP and OAMP have been provided with the ES and are referred to in this BN03. These documents will be finalised post-consent following the appointment of a contractor and when the construction Scenario is known. The ES states a commitment to continue consultation with Highways England in the development of these plans.
5	Further work will need to be undertaken in respect of the cumulative impact of the wind farm and the RIS schemes, should their construction periods overlap. The rationale for not including the proposed Great Yarmouth Third River Crossing in this cumulative impact assessment should be clarified (not previously referenced).	The ES (Chapter 24) makes reference to cumulative impact assessment in Section 24.8. In Scenario 1, the cumulative impacts of the Norfolk Vanguard and Hornsea Project 3 wind farms have been assessed. In Scenario 2, the A47 RIS schemes, Hornsea Project 3 wind farm and Third River Crossing (Great Yarmouth) have been assessed. The peak construction periods for RIS schemes (construction 2020, completion 2022) are expected to finish prior to commencement of Boreas onshore works (2023-2024 – Scenario 2).

Ref	Issue Raised in BN02	Addressed in the ES?
		<p>The details of the RIS schemes are not yet in the public domain and the consultation process is ongoing. Because of this, a detailed highway capacity assessment of cumulative impacts is not possible at this stage.</p> <p>The OTMP therefore states a commitment to ongoing engagement with stakeholders, including Highways England, 'to establish opportunities to co-ordinate activities and avoid peak traffic impacts'.</p> <p>Highways England have previously agreed that management of potential cumulative impacts with the RIS can be addressed post consent in the final Traffic Management Plan.</p>
<b>Substation access at Necton</b>		
6	<p>Justification should be provided for the provision of a new direct access junction off the A47 where an existing access is available (Norfolk Boreas BN01, para 18);</p>	<p>This has not been included in the ES however this was discussed at the January 2018 Expert Topic Group for Norfolk Vanguard. Justification for the new direct access off the A47 was provided and is summarised here for completeness.</p> <p>Two access options were considered for the substation access (and to facilitate duct installation to the substation):</p> <ol style="list-style-type: none"> <li>1) to use the existing National Grid access and extend it to the new Vanguard/Boreas sub-stations or</li> <li>2) provide a new access (Access B) from Spicers Corner.</li> </ol> <p>The existing access is to be used and upgraded to provide continuous access to the National Grid substation. Access B is a new access to the Vanguard/Boreas sub-stations only.</p> <p>RHDHV stated a preference for option 2 to provide a new access (Access B) while maintaining Access A (and upgrading it to DMRB standards) for the following reasons:</p> <ul style="list-style-type: none"> <li>• Limits highways works and associated disruption to the A47 to one junction only;</li> <li>• Retains National Grid access open and undisturbed at all times for emergency access;</li> <li>• Avoids significant archaeology identified to the east of National Grid substation;</li> <li>• Avoids crossing of drainage channel to the east of National Grid substation;</li> <li>• Keeps vehicle movements further from sensitive receptors to the south at Necton and Ivy Todd;</li> <li>• Limits the level of elevation change from the A47 to the onshore substation, important consideration for ALL delivery;</li> </ul> <p>Based on the reasons stated above, AECOM consider the provision of the new access of the A47 to be justified.</p>
7	<p>A DMRB compliance review of the new access proposals should be carried out (Norfolk Boreas BN01, para 19);</p>	<p>AECOM Norfolk Vanguard BN's 04 and 06 document the DMRB compliance reviewed carried out for the Norfolk Vanguard project. AECOM Norfolk Vanguard BN's 07 and 08 confirm that all issues that can be addressed pre-consent have been. Para 44 of this BN03 details some outstanding issues that will be addressed by the appointed contractor for the Norfolk Boreas project post-consent.</p>
8	<p>Traffic generation figures for the substation access should be quantified and substantiated (Norfolk Boreas BN01, para 20);</p>	<p>Table 3.2 of the OTMP summarises the peak daily two-way HGV movements at both the substation and cable crossing accesses off the A47. These are summarised in this BN03. This point has therefore been addressed and these figures are summarised in para 27 of this BN03.</p>
9	<p>Scale plans of the proposed access junction layouts with dimensions and visibility splays should be provided before Highways England agree to the proposals in principle: any such agreement should be subject to acceptance by NCC and a Stage 1 Road Safety Audit (Norfolk Vanguard BN03, para 18) - AECOM acknowledge receipt of a scale plan of the proposed layout of access option B as part of the package of material submitted on behalf of Norfolk Vanguard wind farm: however, the other access options have not been provided;</p>	<p>Scale plans of the A47 accesses as referenced in para 41 of this BN03 have been provided in the OAMP. These are the same as those provided for the Norfolk Vanguard project which have already been agreed in principle by Highways England (see para 42 of this BN03).</p>

Ref	Issue Raised in BN02	Addressed in the ES?
10	These layout plans should be provided with HGV swept path plots (not previously referenced);	Swept path plots have been provided in the OAMP. These are the same as those provided for the Norfolk Vanguard project which have already been agreed in principle by Highways England (see para 42 of this BN03).
11	If access option A (which does not provide a ghost-island central right turn lane for traffic waiting to enter the site) is selected, a traffic management strategy banning right turns into and out of the site should be deployed: this strategy should be made available to Highways England to review and an assessment should be made of the impact of the resulting U-turning traffic at the A47/ A1075 junction at Dereham (Norfolk Vanguard BN03, paras 11 & 19);	The OTMP provides details of the proposal to ban right turns into and out of Access A, this is also the case for Access D1. An assessment of the impact of diverted traffic as a result of these banned turns was provided in the 'Substations Access Clarifications Technical Note' (April 2019) and was commented on in AECOM's Norfolk Vanguard BN07 where the impact of the additional diverted traffic at the 'McDonalds' roundabout at Swaffham and the Yaxham Road grade separated junction at Dereham were accepted as not 'severe'.
12	Access to the pylon in the field opposite the substation (on the north side of the A47) would also require the provision of scale plans, the agreement of NCC, a Stage 1 Road Safety Audit and scrutiny of the temporary traffic management strategy before Highways England could agree it in principle (Norfolk Vanguard BN03, paras 25 & 26);	Scale plans for the A47 accesses as referenced in para 41 of this BN03 have been provided in the OAMP. These are the same as those provided for the Norfolk Vanguard project which have already been agreed in principle by Highways England (see para 42 of this BN03). The ES acknowledges that a Stage 1 Road Safety Audit will be required.
<b>Cable Crossing</b>		
13	Details of the proposed HDD crossing should be agreed with Highways England (Norfolk Boreas BN01, para 27);	Details of the proposed cable crossing have been provided in the OAMP and OTMP including scale plans and swept path plots. These are the same as those provided for the Norfolk Vanguard project which have already been agreed in principle by Highways England (see para 42 of this BN03).
14	If new accesses are proposed, justification should be provided for the provision of a new direct access junction off the A47 where an existing access is available (not previously referenced);	No new access are proposed for the cable crossing sites off the A47. Existing junctions are being used and upgraded to be DMRB compliant where necessary.
15	If the existing Dale Road/ Gate House Farm staggered priority junction is to be used to access the construction sites associated with this crossing, a detailed review of its geometry, capacity and collision record should be undertaken and, if necessary, provision should be made for it to be improved (Norfolk Boreas BN01, para 30);	A detailed review of the existing access was carried out as part of the Norfolk Vanguard project. The resulting access proposals are provided in the OAMP. These are the same as those provided for the Norfolk Vanguard project which have already been agreed in principle by Highways England (see para 42 of this BN03).
16	Layout plans of this junction should be provided with HGV swept path plots (not previously referenced);	Scale plans and swept path plots for the A47 accesses as referenced in para 41 of this BN03 have been provided in the OAMP.
17	Consideration should be given to restricting this junction to left-in, left-out only operation for the duration of the works (Norfolk Boreas BN01, para 31).	The OTMP specifies that this junction (AC159) will be restricted to a left in/left out operation during the construction phase of the works. An assessment of the impact of diverted traffic as a result of these banned turns was provided in the 'A47 Cable Crossing Access Technical Note' (April 2019) and was commented on in AECOM's Norfolk Vanguard BN08 where the impact of the additional diverted traffic at the 'McDonalds' roundabout at Swaffham and the Yaxham Road grade separated junction at Dereham were accepted as not 'severe'.

AECOM Review of Access Layouts, taken from Norfolk Vanguard Briefing Notes 07 and 08.

<b>Briefing Note 07: Review of Norfolk Vanguard Substations Access Clarifications Technical Note</b>			
<b>Item</b>	<b>Access A (AC 178)</b>	<b>Access B (AC180)</b>	<b>Access D1 (AC179)</b>
Drawing numbers	TP-PB5640-DR001/F1.0 TP-PB5640-004/F1.0 TP-PB5640-DR005/F1.0	TP-PB5640-DR002/F1.0 TP-PB5640-DR006/F1.0 TP-PB5640-DR007/F1.0	TP-PB5640-DR003/F1.0 TP-PB5640-DR008/F1.0 TP-PB5640-DR009/F1.0
Junction type	Simple priority junction, to be limited to left-in, left-out operation	Ghost island priority junction	Simple priority junction, to be limited to left-in, left-out operation
Peak level of traffic use***	100 light vehs/day; 68 HGV/ day; 50 light vehs/ peak hr; 7 HGV/ peak hr.	180 light vehs /day; 150 HGV/ day; 90 light vehs / peak hr; 16 HGV/ peak hr.	4 light vehs /day; 20 HGV/ day; 50 light vehs / peak hr; 7 HGV/ peak hr.
Duration of use	86 weeks in total, of which 16 weeks at the peak level of use	At least 100 weeks in total, of which 24 weeks at peak level of use	2 individual weeks of use, separated by a gap of 4-6 months
Design speed of main road adopted	100 km/hr	100 km/hr	60 km/hr (*)
Corner radii	15m	15m	15m
Exit tapers	25m @ 1:10	30m @ 1:6	25m @ 1:10
Visibility splays** (assumes existing vegetation to be cleared/maintained as required)	4.5 x 215m	4.5 x 215m (L) 2.4 x 215m (R)	4.5 x 90m (*)
Swept path plots	These all show that HGVs can complete their turns without clipping kerb lines, and without encroaching on the wrong side of the A47		
	An HGV could enter the minor arm and stand clear of the A47 running lane whilst another HGV emerges from the minor arm	HGVs can enter and leave simultaneously without their swept paths conflicting.	An HGV could enter the minor arm and stand clear of the A47 running lane whilst another HGV emerges from the minor arm

\*to be operated under a temporary 30 mph speed limit

\*\*evidence still to be submitted that these can be proven in the vertical plane

\*\*\*note that these are Norfolk Vanguard (not Boreas) numbers

<b>Briefing Note 08: Review of Norfolk Vanguard Cable Crossing Access Technical Note</b>			
<b>Item</b>	<b>Site Access (AC159)</b>	<b>A47/ Bushy Common Rd</b>	<b>A47/ Dereham Road</b>
Drawing numbers	TP-PB5640-DR010/F1.0 TP-PB5640-DR011/F1.0 TP-PB5640-DR012/F1.0	TP-PB5640-DR010/F1.0 TP-PB5640-DR011/F1.0 TP-PB5640-DR012/F1.0	No drawing - Existing junction to be used
Junction type	Simple priority junction (assumed to be limited to left-in, right-out operation for site traffic)	Simple priority junction, to be limited to left-in, left-out operation for site traffic	Ghost island priority junction
Peak level of traffic use***	60 light vehs/ day; 144 HGV/ day; 30 light vehs/ peak hr; 15 HGV/ peak hr.	60 light vehs/ day; 144 HGV/ day; 30 light vehs / peak hr; 15 HGV/ peak hr.	60 light vehs/ day; 120 HGV/ day; 30 light vehs / peak hr 12 HGV/ peak hr.
Duration of use	Up to 58 weeks in total, of which up to 23 weeks at the peak level of use	Up to 58 weeks in total, of which up to 23 weeks at the peak level of use	Not explicitly stated - likely to be of similar duration
Design speed of main road adopted	Not stated	100 km/hr	100 km/hr
Corner radii	15m	15m	20m
Exit tapers	25m @1:10	25m @1:10	23m @1:5 (estimated)
Visibility splays** (assumes existing vegetation to be cleared/maintained as required)	2.4 x 22m to left; 2.4 x 45m to right (**)	4.5 x 215m	4.5 x 215m
Swept path plots	These all show that HGVs can complete their turns without clipping kerb lines, and without encroaching on the wrong side of the A47 or the minor road and that HGVs can enter and leave simultaneously without their swept paths conflicting.		

\*\*evidence still to be submitted that these can be proven in the vertical plane

\*\*\*note that these are Norfolk Vanguard (not Boreas) numbers

## **Addendum Details**

The Addendum to this Briefing Note 03 has been made to reflect the discussions held on 9<sup>th</sup> August 2019 between Vattenfall, Royal HaskoningDHV, Highways England and AECOM.

### Recommendations 1 - 3 of this BN

AECOM note that, at the meeting, RHDHV undertook to revise and update the text of the relevant sections of Chapter 24 of the ES, Figure 24.6 and the OAMP to address the issues raised by AECOM. The details of which are provided in the meeting minutes:

- RHDHV Figure 24.6 to be updated to show all locations in Table 24.12 of the ES;
- Paragraph 119 of the ES to be reworded; and
- Description of the bell mouth in paragraph 79 of the OAMP to be updated to match drawing number TP-PB5640-DR010/F1.0.

AECOM acknowledge that Table 24.12 is in fact correct and does not need to be updated.

AECOM understand that the relevant documents will be updated during the examination process once all other consultation responses have been received.

### Appendix A, Item 8:

**Issue raised in AECOM BN02:** Traffic generation figures for the substation access should be quantified and substantiated (Norfolk Boreas BN01, para 20);

**Response in BN03:** Table 3.2 of the OTMP summarises the peak daily two-way HGV movements at both the substation and cable crossing accesses off the A47. These are summarised in this BN03.

**Amended Response:** Table 3.2 of the OTMP summarises the peak daily two-way HGV movements at both the substation and cable crossing accesses off the A47. This point has therefore been addressed and these figures are summarised in para 27 of this BN03.

# Norfolk Boreas Offshore Wind Farm

## Appendix 2 Norfolk Vanguard A47

### Cable Crossing Access Technical Note

## Note / Memo

**HaskoningDHV UK Ltd.  
Transport & Planning**

To: Highways England  
From: Norfolk Vanguard Ltd  
Date: 17 April 2019

Our reference: T&PPB4476N008F1.0  
Classification: Project related

**Subject: Norfolk Vanguard, A47 Cable Crossing Access Technical Note**

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### 1 Introduction

This A47 Cable Crossing Access Clarification Technical Note (CCATN) has been prepared on behalf of Norfolk Vanguard Ltd in relation to the Norfolk Vanguard Offshore Windfarm Project ('the Project') and has been produced in accordance with the commitments outlined in the A47 Substation Access Briefing Note (SABN) (Royal HaskoningDHV, December 2018).

During the construction phase of the Project, Heavy Goods Vehicles (HGVs) and workforce traffic will require access to project infrastructure sites located north and south of the A47.

As part of the Environmental Impact Assessment (EIA) options appraisal process, a comprehensive review of the highway network was undertaken to determine the most suitable access points. As a result of the appraisal, a preference to access from the A47 for the following project infrastructure sites north-west of Scarning was identified:

- Mobilisation Area 2 (MA2) required for Cable Section 2; and
- Trenchless Crossing (TC) sites #1 (A47) and #2 (Wendling Carr) (TC#1 and TC#2)

**Figure 1** shows these project infrastructure sites and the associated access study area.

The SABN, (Royal HaskoningDHV, December 2018) was issued to Highways England in December 2018 and followed up with a meeting with Highways England with the objective of agreeing the scope of further technical work to satisfy Highways England's requirements. This CCATN provides the outputs of that agreed technical work and includes clarifications and updated project information.

Final technical approval would be secured post consent through the submission of a detailed Access Management Plan (in accordance with DCO Requirement 22).

### 2 Consultation

A summary of the recent engagement with Highways England specific to the A47 cable crossing accesses is contained within **Table 2.1**.



**Table 2.1 A47 Cable Crossing Consultation**

Date	Engagement Method	Summary
17.12.2018	Meeting	Agenda item to discuss technical requirements for A47 accesses.
15.01.2019	Statement of Common Ground, Highways England.	Acknowledgement of Norfolk Vanguard Limited's commitment to producing a SACTN in the first quarter of 2019.
13.03.2019	Statement of Common Ground – Highways England	Norfolk Vanguard Limited committed to providing the CCATN and a pre-commencement Geotechnical Risk Report and Preliminary Sources Study post consent.

### 3 Scope of this CCATN

The scope of this CCATN is as follows:

- 1) Present the existing baseline situation (traffic flows, speed and collision data);
- 2) Present the project traffic demand (extrapolated from the Environmental Statement Chapter 24 Traffic and Transport) for the relevant project infrastructure sites;
- 3) Clarify the traffic movements and the traffic management approach associated with the preferred access strategy; and
- 4) Provide preferred access design drawings for technical approval.

### 4 Baseline Situation

#### 4.1 Highway Environment

The A47 trunk road is identified in the Norfolk County Council (NCC) Local Transport Plan (Norfolk County Council, 2011) as one of Norfolk's key strategic connections and is part of the Strategic Road Network.

Within the A47 cable crossing study area, the A47 is a straight single carriageway road of typical road width and alignment for a trunk road and is subject to the national speed limit with no street lights present.

The A47 is bounded to the north and south by established hedgerows, woodland and agricultural land.

Approximately 200m to the east of the cable crossing location is a staggered junction with Dale road heading south and an 'unnamed road' heading to the north.

The unnamed road connects the A47 with Bushy Common to the north (henceforth known as 'Bushy Common Road'). The A47/Bushy Common Road junction is a metalled bellmouth junction leading to a single vehicle track. The junction design does not conform to Design Manual for Roads and Bridges (DMRB) standards. The Bushy Common Road is used to access farmland, residential properties and a number of farm buildings.

Dale Road connects the A47 to Dereham Road to the south and comprises of a metalled bellmouth junction leading to a single vehicle track. The junction design does not currently conform to DMRB standards. Dale Road is used to access farmland and a single agricultural complex.

#### 4.2 Background Traffic Data

Traffic Flow data obtained from the Department for Transport confirms a 24 hour Annual Average Daily Flows (AADF) of 15,380 total vehicles along the A47 (in the vicinity of the study area), including a 1,546 HGV component.

Speed surveys were undertaken within the access study area during October 2017. The location of the surveys are shown on **Figure 2**, the results of the speed surveys are detailed in **Table 4.1**.

**Table 4.1 A47 Speed Survey**

Speed Survey ID	Date	85th Percentile (mph) Westbound	85th Percentile (mph) Eastbound
SS1	06.10.17 to 12.10.17	62.6	58.8

The results of the speed surveys indicate that vehicle speeds passing the proposed sites are below the posted speed limit eastbound, however speeds in excess of the posted speed limit (60mph) were recorded for westbound traffic with a maximum 85<sup>th</sup> percentile of 62.6mph.

#### 4.3 Personal Injury Collision (PIC) Data

To assess whether there are any inherent road safety issues within the access study area, a high level review utilising open source data<sup>1</sup> has been undertaken covering the most recent five year period of 2014 – 2018.

**Figure 2** details the location of the PICs located within the access study area and **Appendix A** provides detailed data obtained from [www.crashmap.co.uk](http://www.crashmap.co.uk).

A review of the detailed report has identified a single collision occurring on the staggered junction of the A47 and Dale Road during this period. The collision (PIC1) involved a single motorcycle rider turning left at the junction resulting in a slight injury during daylight hours and a dry road surface. No further details on the collision were provided.

From the analysis of PIC data available it is concluded that there is no inherent pattern of collisions identified.

### 5 Norfolk Vanguard Traffic Demand

During the construction phase of the project, HGVs and workforce traffic will require access to project infrastructure sites north and south off the A47, namely the:

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<sup>1</sup> <http://www.crashmap.co.uk>

- Mobilisation Area 2 - MA2 – East (traffic serving the duct installation between the A47 and TC#3);
- TC#1 (A47); and
- TC#2 (Wending Carr Country Wildlife Site).

Forecast vehicle trips have been extrapolated from Environmental Statement Chapter 24 Traffic and Transport (Document 6.1) (and are reproduced within **Table 5.1.**)

**Table 5.1 Norfolk Vanguard Traffic Demand**

Norfolk Vanguard Work Activity	Peak Daily Movements		Peak Hour Movements	
	LCVs	HGVs	LCVs	HGVs
MA2-East	40	48	20	5
TC#1 (TC Team 1)*	20	96**	10	10
TC#2 (TC Team 1)*	20	96**	10	10
Totals	60	144	30	15
Total Vehicle Movements	204		45	
LCV = Light commercial Vehicle				
*	TC Team 1 would only work on one TC at any one time during the construction programme.			
**	75% (72 movements) of HGV traffic is associated with the launch compound. 25% (24 movements) of HGV traffic associated with the reception compound.			

**Table 5.2** details the peak daily HGV movements and the programmed length of duration. For comparison purposes, the average daily HGV movements (outside of the peak duration) have also been detailed within **Table 5.2.**

**Table 5.2 Norfolk Vanguard Daily Peak and Average HGV Movements and Durations**

Infrastructure	Peak Daily HGV Movements	Peak Duration	Average Daily HGV movements	Duration
MA2-E	48	19 weeks	18	23 weeks
TC#1 (TC Team 1)*	96**	<ul style="list-style-type: none"> <li>• 1 week for mobilisation</li> <li>• 1 week for demobilisation</li> </ul>	4	6 weeks
TC#2 (TC Team 1)*	96**	<ul style="list-style-type: none"> <li>• 1 week for mobilisation</li> <li>• 1 week for demobilisation</li> </ul>	4	6 weeks
Totals	192	n/a	22	n/a
*	TC team 1 would only work on one TC at any one time during the construction programme.			
**	75% (72 movements) of HGV traffic is associated with the launch compound. 25% (24 movements) of HGV traffic associated with the reception compound.			

## 6 Potential Access Strategy

**Table 6.1** details the potential access strategy for each of the relevant project infrastructure sites, the locations of the accesses are presented in **Figure 3**.

**Table 6.1: Potential Access Strategy**

Access to Infrastructure Sites	DCO Access ID	Access Strategy	Eastings	Northings
MA2-E TC#1 – North TC#2	AC160	Upgrade the existing A47 junction to a DMRB compliant rural simple junction with a 'no right turn' traffic management plan.  Road widening required north on Bushy Common Road for approximately 40m to AC160.  Creation of new AC160 access.	594860	312850
TC#1 South	AC161	Upgrade the existing A47 junction to a DMRB compliant rural simple junction with a 'no right turn' traffic management plan.  Road widening required south on Dale Road for approximately 110m to AC161.  Creation of new AC161 access.	594736	312680
	AC163	Traffic management plan utilising proposed MA1b-W access (AC 163) on Dereham Road.	594534	312263
<p><b>Notes</b> TC#1 requires access to both the north and south sides of the A47 for the launch / reception compounds. Both the launch / reception compounds for TC#2 can be accessed north off the A47.</p>				

## 7 Preferred Traffic Management Strategy and Access Design

A traffic management strategy and associated access designs have been developed for each point of access identified above which is proportional to the forecast traffic demand and the duration of the potential impact.

Highways England would require a Stage 1 Road Safety Audit to be carried out on the accesses. Following agreement of the proposed access, an audit would be conducted and the report (including designers response) would be appended to the Final Access Management Plan submission secured through DCO Requirement 22 post consent.

### 7.1 MA2-E and TC#1 North and TC#2 (AC 160)

#### *Existing Access*

AC160 is a field access located on Bushy Common Road approximately 50m north of its junction with the A47.

### *Infrastructure Requirements*

The following temporary infrastructure improvements would be required to enable the use of AC160:

- Removal of 60m of existing vegetation (trees and hedgerow) to allow for realignment and widening of Bushy Common Road to cater for a minimum 7.3m approach width allowing passing of two HGVs.
- Existing vegetation cutback/lowering to provide 215m visibility splays in both directions along the A47 in compliance with a 100A (60mph) design speed
- Construction of a new bellmouth (AC160) west off Bushy Common Road with a minimum 15m corner radii and 1:10 tapers over 25m distance for the entry into minor access allowing passing of two HGVs. Vegetation clearance in compliance with a 20mph Manual for Streets visibility splay of 22m.

All required changes would be contained within the highway boundaries or the DCO Order limits. Any hedgerow or tree removal would be subject to the ecological mitigation measures set out in the Outline Landscape and Ecological Management Strategy (OLEMS) (DCO document 8.7).

The access design can be found in **Appendix B** and corresponding swept path analysis is provided in **Appendix C**.

### *Traffic management*

A temporary traffic management strategy is proposed for AC160 at the A47/Bushy Common Road, to utilise a left turn in / left turn out only. This would entail any potential right turning construction vehicles either entering or exiting the junction to divert and perform the following 'u-turn' manoeuvres:

1. Westbound traffic to utilise the 'McDonalds Roundabout' located on the A47 / Norwich Road roundabout junction approximately 7.1 miles west of AC160 near Swaffham. **Figure 4** shows the construction vehicle diversion route.
2. Eastbound traffic to utilise the eastbound offramp off the A47 (approximately 2.9 miles west of AC160) and turning right onto Tavern Lane. At the traffic signal-controlled junction with the A1075 (Yaxham Road) at Dereham, construction vehicles would turn right and proceed south east under the A47 taking the westbound onramp back onto the A47. **Figure 5** shows the construction vehicle diversion route.

## **7.2 TC#1 – South (AC161/AC163)**

### *Existing Access (AC161)*

AC161 is an existing informal field access on Dale Road located approximately 140m to the south of the junction with the A47.

#### *Infrastructure Requirements for existing access (AC161)*

The following temporary infrastructure improvements would be required if AC161 were to be utilised as a construction access:

- Removal of approximately 130m of existing vegetation (trees and hedgerow) to allow widening of Dale Road to cater for a minimum 7.3m approach width allowing passing of two HGVs.
- Existing vegetation cutback/lowering to provide 215m visibility splays in both directions along the A47 in compliance with a 100A (60mph) design speed (60mph)
- Construction of a new bellmouth (AC161) west off Dale Road with a minimum 15m corner radii and 1:10 tapers over 25m distance for the entry into minor access allowing passing of two HGVs. Vegetation clearance in compliance with a 20mph Manual for Streets visibility splay of 22m.

All the required changes would be contained within the highway boundaries or the DCO Order limits.

#### *Traffic management*

It is proposed that vehicle demand associated with the TC#1 southern compound off the A47 / Dale Road / Bushy Common Road staggered junction is diverted to the MA1b compound (AC163) access on Dereham Road (Link 66). Once construction vehicles have arrived at MA1b, they would travel 450m north along the running track to the TC#1 southern compound.

This proportional approach to the access strategy provides three distinct benefits:

- Reduction of potential vehicle conflict at the existing A47 / Dale Road / Busy Common Road staggered junction; and
- Removes the need for substantial hard engineering along Dale Road; and
- Removes proposed junction improvements required to A47 / Dale Road / Busy Common Road.

The proposed diversion route is shown in **Figure 6**.

#### *Diversion Route Suitability*

As requested by Norfolk County Council during consultation, Swept Path Analysis was undertaken on the A47 / Dereham Road junction to ascertain if two way HGV passing was possible at the junction and at the sharp bend located approximately 30m to the south of the junction.

It is worth noting that the A47/Dereham Road junction and corresponding Dereham Road (Link 66) is a designated HGV route for the Bittering Quarry located north of Longham and thus already experiences HGV traffic along its length and at the junction.

**Appendix D** demonstrates the swept paths of the design vehicles do not overrun the kerb or the centre lines of the junction or the bend on Dereham Road allowing two way movements of HGV.

## 8 Traffic Distribution and Assignment

This sub-section quantifies the traffic that will be required to undertake the diversion manoeuvres for Access AC160 and AC163.

As detailed within the ES Chapter 24 Traffic and Transport materials would likely be arriving from ports local to the project. Kings Lynn Port to the west and Lowestoft/Great Yarmouth to the east are considered the most likely source for all materials. As further identified in Paragraph 178 of ES Chapter 24, it was assumed that up to a maximum of 70% of traffic could be generated from either port location. Thus, **Table 8.1** details the two traffic distribution scenarios which inform the potential traffic demand at each diversion junction.

**Table 8.1 Traffic Distribution Scenarios**

Scenario	Kings Lynn (west)	Great Yarmouth / Lowestoft (east)
Scenario 1	70%	30%
Scenario 2	30%	70%

**Appendix E** details the peak daily traffic demand generated from access AC160 and AC163 and the corresponding turning movements including the required u-turn movements for each traffic distribution scenario.

**Appendix F** shows the turning movements via a series of network flow diagrams detailing the am, pm and daily peak construction flows for both HGVs and employees for both traffic distribution scenarios. **Table 8.2** and **Table 8.3** detail a summary of the am and pm peak worst case u-turn movements at each identified junction for both traffic distribution scenarios.

**Table 8.2: Traffic Distribution Scenario 1 Summary**

	AM		PM	
	U-turn at McDonalds Roundabout	U-turn at Dereham	U-turn at McDonalds Roundabout	U-turn at Dereham
HGVs	2	5	2	5
Employees	26	0	0	4
Totals	28	5	2	9

**Table 8.3 Traffic Distribution Scenario 2 Summary**

	AM		PM	
	U-turn at McDonalds Roundabout	U-turn at Dereham	U-turn at McDonalds Roundabout	U-turn at Dereham
HGVs	5	2	5	2
Employees	26	0	0	4

Totals	31	2	5	6
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It can be noted from **Table 8.2** and **Table 8.3** that the worst case scenario for u-turning traffic movements at the McDonalds roundabout would be during Traffic Distribution Scenario 2 with 31 construction vehicles (including 5 HGVs) utilising this route during the am peak. Dereham would experience a worst case scenario of 9 construction vehicles (including 5 HGVs) during Traffic Distribution Scenario 1 pm peak.

An A47 Substation Access Clarification Technical Note (SACTN) (Royal HaskoningDHV, April 2019) was submitted to the Norfolk Vanguard examination at Deadline 4 (ExA; ISH1; 10.D5, 2019) . The SACTN detailed the traffic management plans and resultant construction vehicle u-turning movements for accesses AC181, AC182 and AC183 associated with the Norfolk Vanguard onshore substation and National Grid Substation Extension works.

To understand the worst case scenario that could occur for total u-turning movements, the flows presented in **Table 8.2** and **Table 8.3** have been added to the u-turning movements presented in Table 6.2 and Table 6.3 of the SACTN (Royal HaskoningDHV, April 2019). The resultant u turning movements are presented in **Table 8.4** and **Table 8.5**.

**Table 8.4: Total Traffic Distribution Scenario 1 Summary**

	AM		PM	
	U-turn at McDonalds Roundabout	U-turn at Dereham	U-turn at McDonalds Roundabout	U-turn at Dereham
HGVs	3	8	3	8
Employees	27	17	33	5
Totals	30	25	36	13

**Table 8.5 Total Traffic Distribution Scenario 2 Summary**

	AM		PM	
	U-turn at McDonalds Roundabout	U-turn at Dereham	U-turn at McDonalds Roundabout	U-turn at Dereham
HGVs	8	3	8	3
Employees	27	17	33	5
Totals	35	21	41	9

It can be noted from **Table 8.4** and **Table 8.5** that the worst case scenario for u-turning traffic movements at the McDonalds roundabout would be during Traffic Distribution Scenario 2 with 41 construction vehicles (including 8 HGVs) utilising this route during the pm peak. Dereham would experience a worst case scenario of 25 construction vehicles (including 8 HGVs) during Traffic Distribution Scenario 1 am peak.



The respective peak movements through both u-turn junctions would represent a maximum increase of 5 HGVs (Dereham) and 5 HGVs at the McDonald's Roundabout to the flows that were assessed for the SACTN. The SACTN flows were assessed as indiscernible from day to day traffic fluctuations and therefore a negligible impact on junction capacity and driver delay. This assessment has been agreed with Highways England (SOCG submitted at Deadline 4 (ExA; ISH1; 10.D5, 2019)) and Norfolk County Council (position statement submitted at Deadline 6 (ExA; ISH1; 10.D6.3, 2019).

Noting the minimum increase of the additional CCATN flows it is considered that the in-combination impacts of both SACTN and CCATN flows would remain negligible.

The total turning movements which include the SACTN accesses (AC181, AC182 and AC183) and AC160, AC163 are shown in **Appendix G** via a series of network flow diagrams detailing the am, pm and daily peak construction flows for both HGVs and employees for both traffic distribution scenarios.

## 9 Further Work Post Consent

Subject to DCO consent, it is the intention of Norfolk Vanguard Limited to undertake a series of further works in support of the AC160 access which will include the following work streams:

- Geotechnical Risk investigation and resultant report;
- Preliminary Sources Study;
- Road Safety Audit Stage 2; and
- Traffic Management Plans for the construction of AC160 and associated works.

## 10 Summary

A baseline review within the access study area has been undertaken determining traffic flows, speed and personal injury collisions.

Traffic demand, distribution and assignment has been presented for all relevant project infrastructure sites contained within the study area.

For the identified project infrastructure sites, a series of temporary highway improvements and traffic management plans would be implemented throughout the construction programme and include:

- MA2, TC#1 (north) and TC#2 traffic to access at AC160 implementing a 'no right turn' traffic management policy.
- A47 / Bushy Common Road junction to be upgraded to a fully DMRB compliant rural simple junction.
- TC#1 (south) traffic to access at AC163 on Dereham Road (Link 66).

The 'no right turn' traffic management plan has identified the 'McDonalds roundabout' and Dereham u-turn locations which follows the agreed traffic management strategy implemented for the substation accesses detailed in the A47 SACTN (Royal HaskoningDHV, April 2019).

The peak traffic movements have been identified incorporating the A47 SACTN flows and the resultant impact on both u-turn locations which would be indiscernible from day to day traffic fluctuations and therefore represents a negligible impact on junction capacity and driver delay.

Further works have been identified post-consent including commitments to provide Geotechnical Risk Report, Preliminary Sources Study and a Stage 2 Road Safety audit on all accesses.

Final technical approval would be secured post consent through the submission of a detailed Access Management Plan (in accordance with Requirement 22).

## 11 References

Norfolk Vanguard Limited (2019) Deadline 4 (ExA; ISH1; 10.D5) A47 Substation Access Clarification Technical Note

Norfolk Vanguard Limited (2019) Deadline 6 (ExA; ISH4; 10.D6.3) Norfolk County Council Position Statement.

Royal HaskoningDHV (March 2018) T&P-PB4476-N002-F2.0, A47 Substation Access Technical Note (SATN)

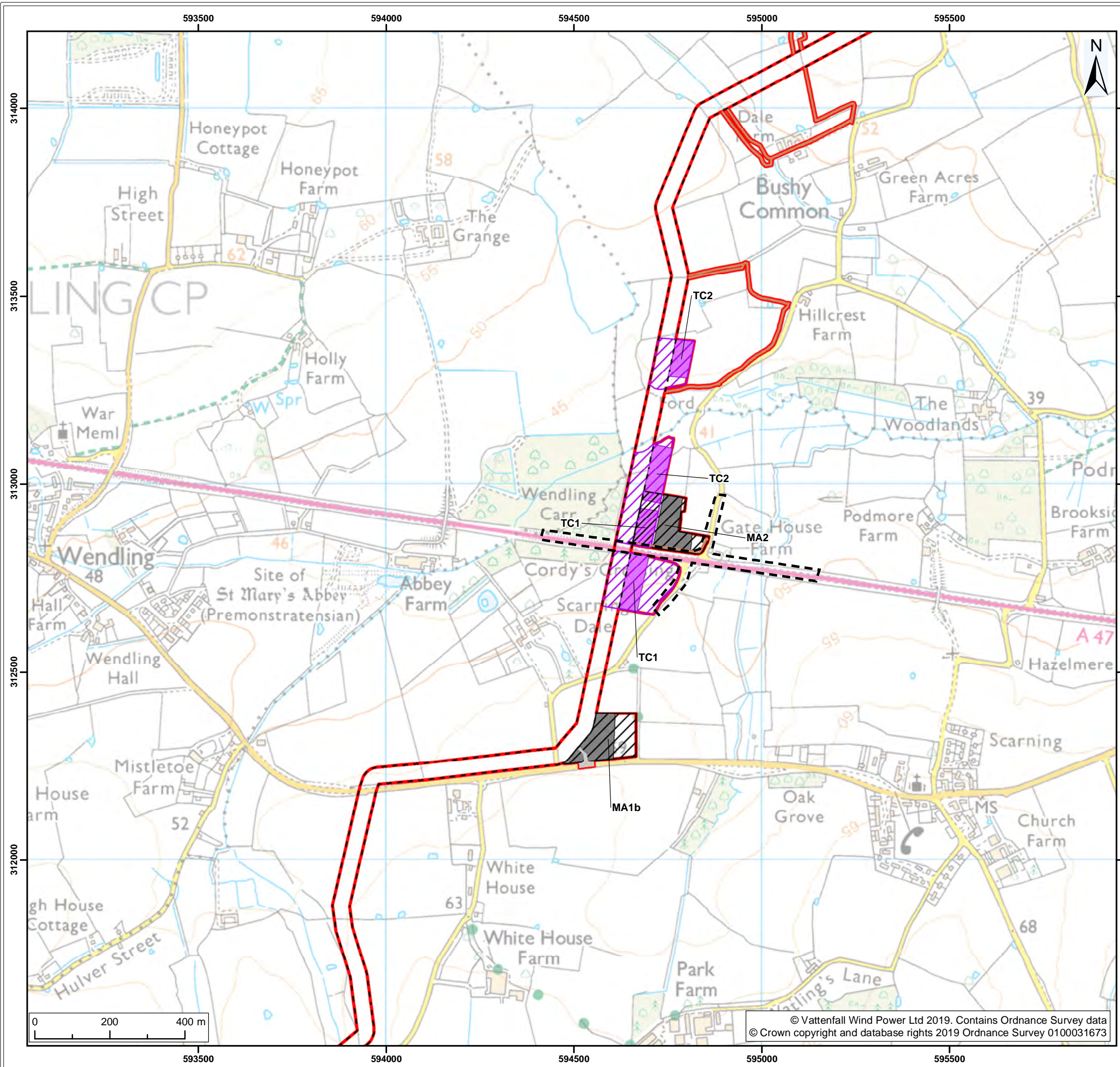
Royal HaskoningDHV (April 2019) T&P-PB4476-N007-D5.0, A47 Substation Access Clarification Technical Note (SACTN) (ExA; ISH1; 10.D5)

Royal HaskoningDHV (December 2018) T&P-PB4476-N006-F2.0, A47 Substation Access Briefing Note (SABN)

Royal HaskoningDHV (July 2018) Norfolk Vanguard Offshore Wind Farm Environmental Statement. Chapter 24 Traffic and Transport

## 12 Figures





**Legend:**

- Norfolk Vanguard onshore red line boundary
- A77 Cable Crossing Study Area
- Onshore cable route**
- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Access**
- Construction access
- Operation access

Project: Norfolk Vanguard	Report: A77 Cable Crossing Access Technical Note
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Title:  
  
Site Location Plan

Figure: 1	Drawing No: PB4476-008-006-013				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	10/04/2019	JT	JA	A3	1:10,000
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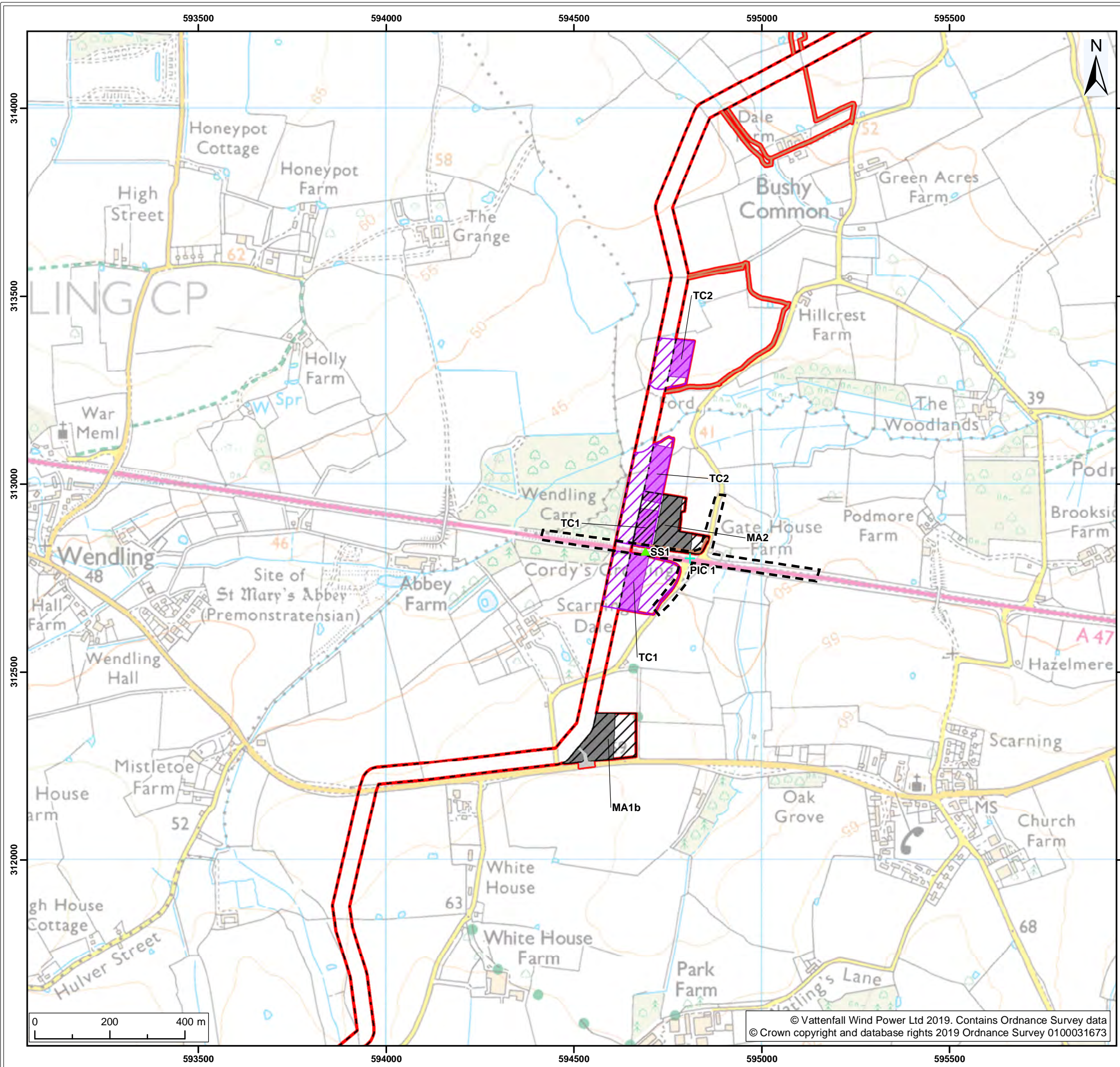
Co-ordinate system: British National Grid EPSG: 27700

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**Legend:**

- Norfolk Vanguard onshore red line boundary
- A47 Cable Crossing Study Area
- Onshore cable route**
- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Access**
- Construction access
- Operation access
- + Personal Injury Collision Locations
- ▲ Speed Survey Locations

Project: Norfolk Vanguard	Report: A47 Cable Crossing Access Technical Note
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Title:  
Speed Survey and Personal Injury Collision  
Location Plan

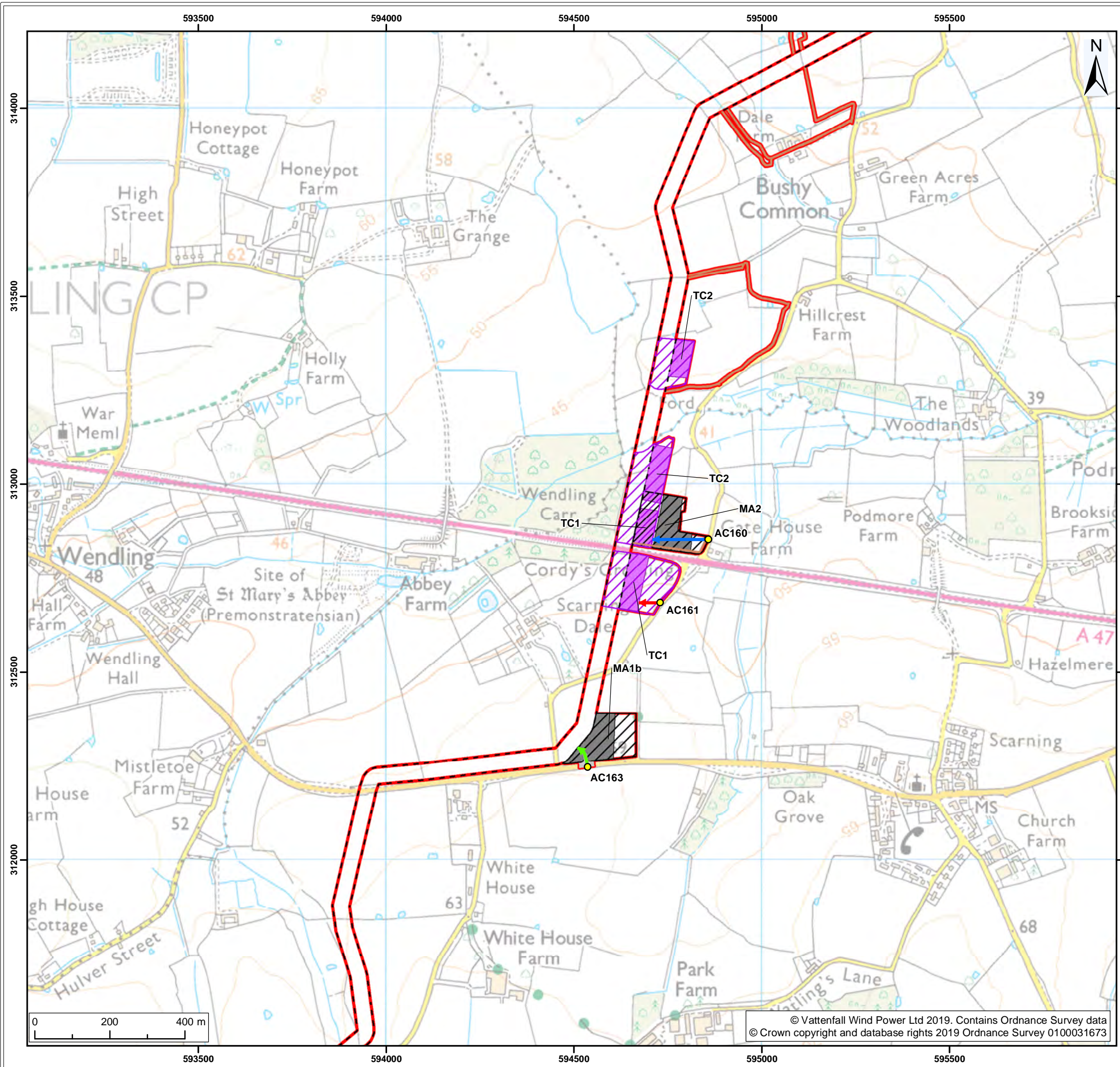
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Co-ordinate system: British National Grid EPSG: 27700

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**Legend:**

- Norfolk Vanguard onshore red line boundary
- Onshore cable route**
- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Access**
- Construction access
- Operation access
- Access to MA2, TC1 north and TC2
- Access to MA1b and TC1 (south)
- Access to TC1 (south)
- Access Point ID

Project: Norfolk Vanguard	Report: A47 Cable Crossing Access Technical Note
------------------------------	--------------------------------------------------------

Title:  
  
Access Location Plan

Figure: 3	Drawing No: PB4476-008-006-014				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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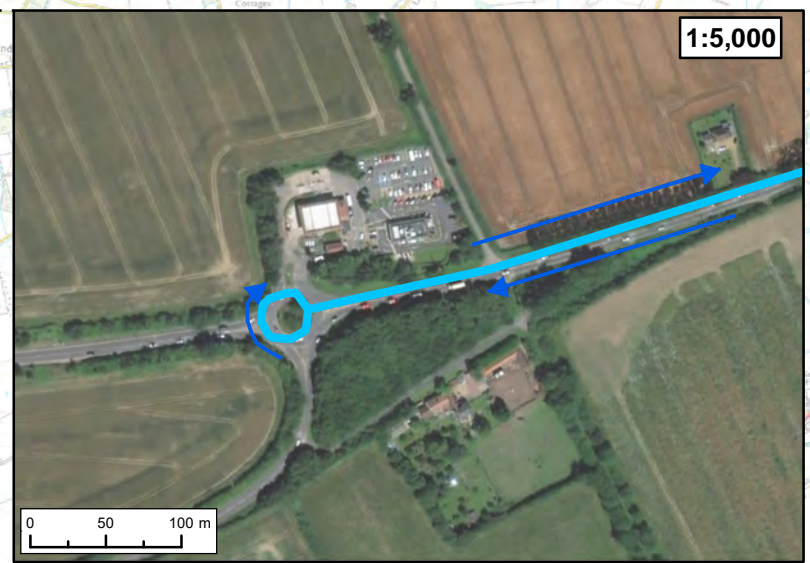
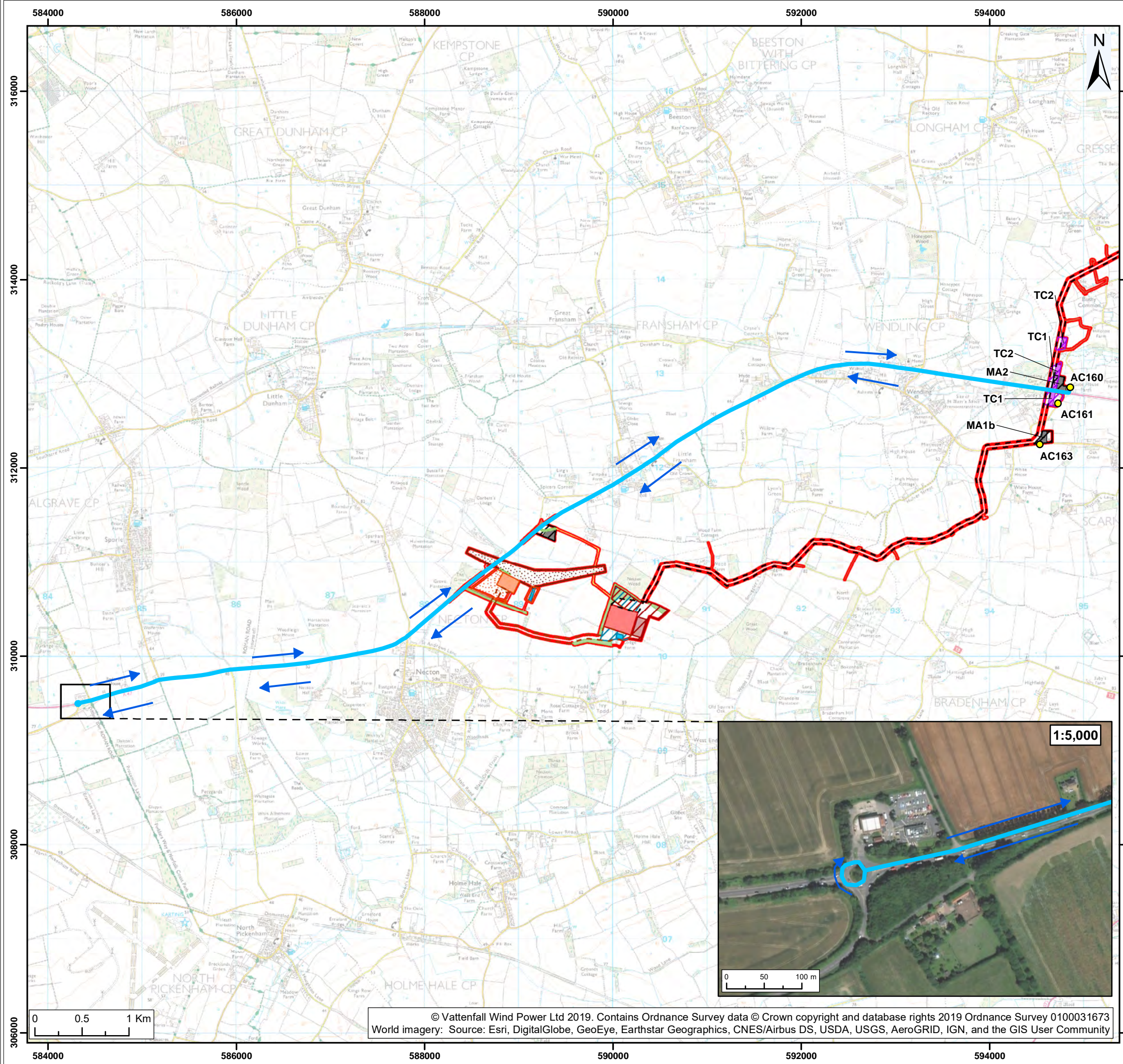
Co-ordinate system: British National Grid EPSG: 27700

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- Legend:**
- Norfolk Vanguard onshore red line boundary
  - Onshore cable route
  - Onshore 400kv cable route
  - Trenchless crossing zone (e.g. HDD)
  - Indicative trenchless crossing compound
  - Mobilisation zone
  - Indicative mobilisation area compound
  - Onshore project substation
  - Onshore project substation temporary construction compound zone
  - Indicative onshore project substation temporary construction compound
  - National Grid substation extension
  - National Grid temporary works
  - Overhead line temporary works
  - Mitigation areas
  - Attenuation pond zone
  - Indicative attenuation pond
  - Indicative mitigation planting
  - Access
  - Permanent access
  - Construction access
  - Operation access
  - Construction vehicle u-turn route
  - Total 14.2 mile diversion
  - Access Point ID
  - Direction of travel

Project: Norfolk Vanguard      Report: A47 Cable Crossing Access Technical Note

Title: Diversion utilising the 'McDonalds Roundabout' u-turn route

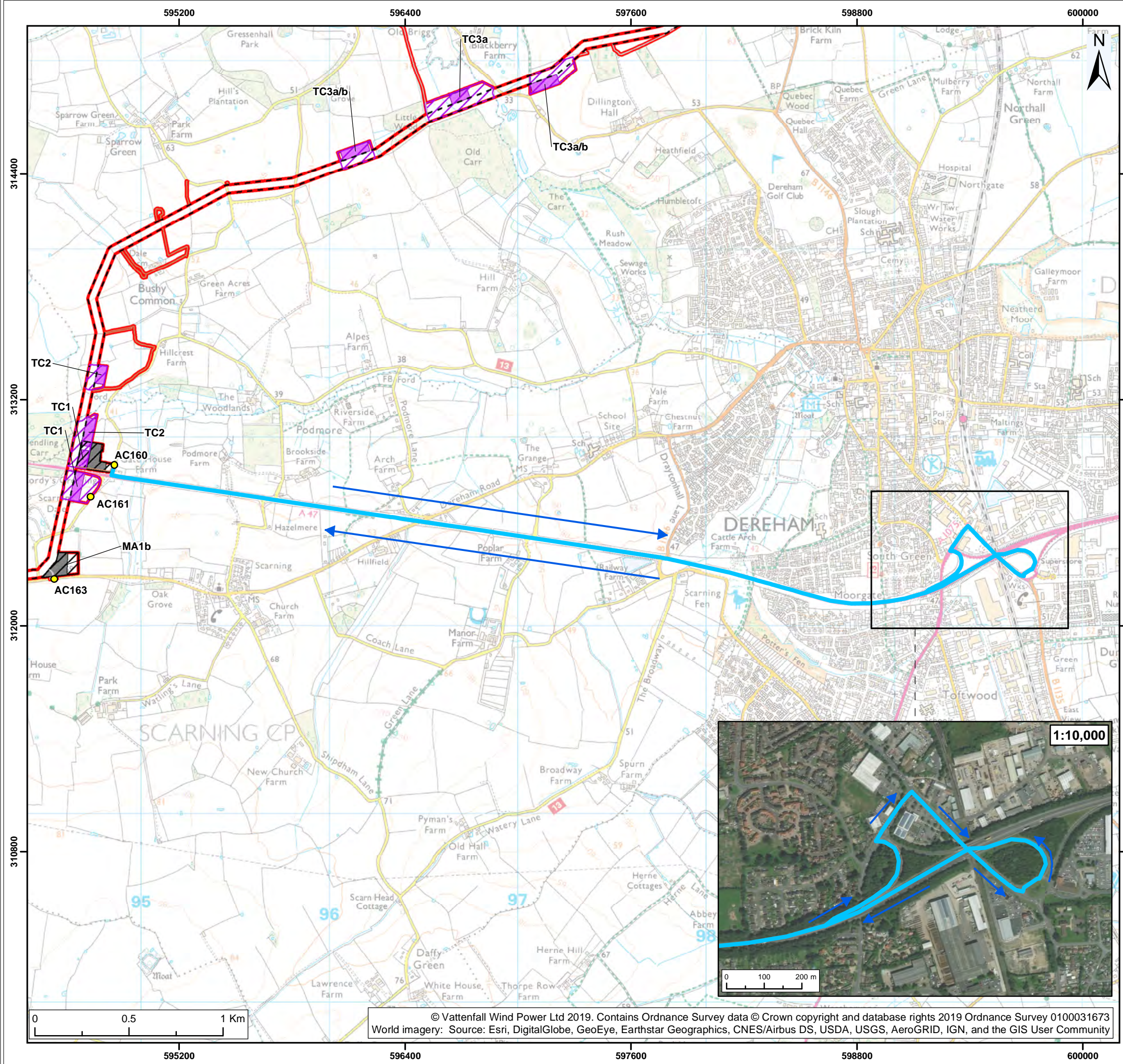
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01	09/04/2019	JT	JA	A3	1:40,000

Co-ordinate system: British National Grid      EPSG: 27700







**Legend:**

- Norfolk Vanguard onshore red line boundary
- Onshore cable route**
- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Access**
- Construction access
- Operation access
- Construction vehicle u-turn route  
Total 5.8 mile diversion
- Access Point ID
- Direction of travel

Project: Norfolk Vanguard	Report: A47 Cable Crossing Access Technical Note
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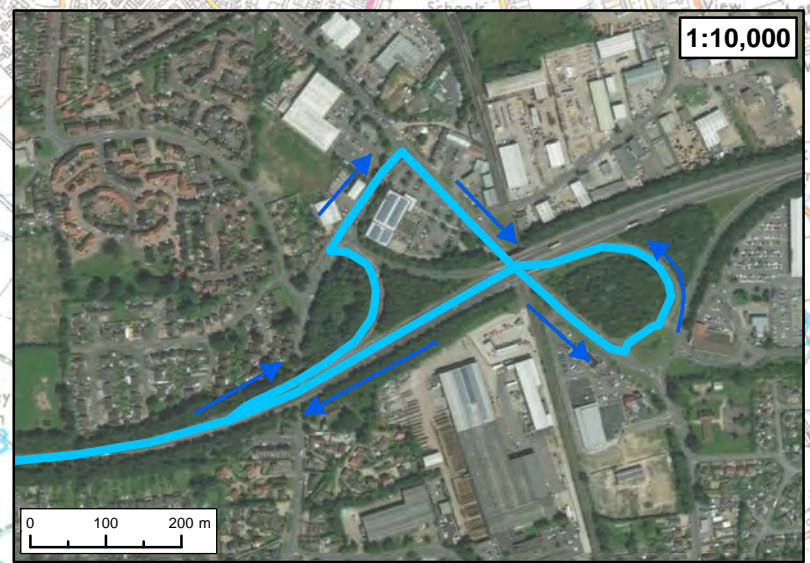
Title:  
Diversion utilising Dereham u-turn route

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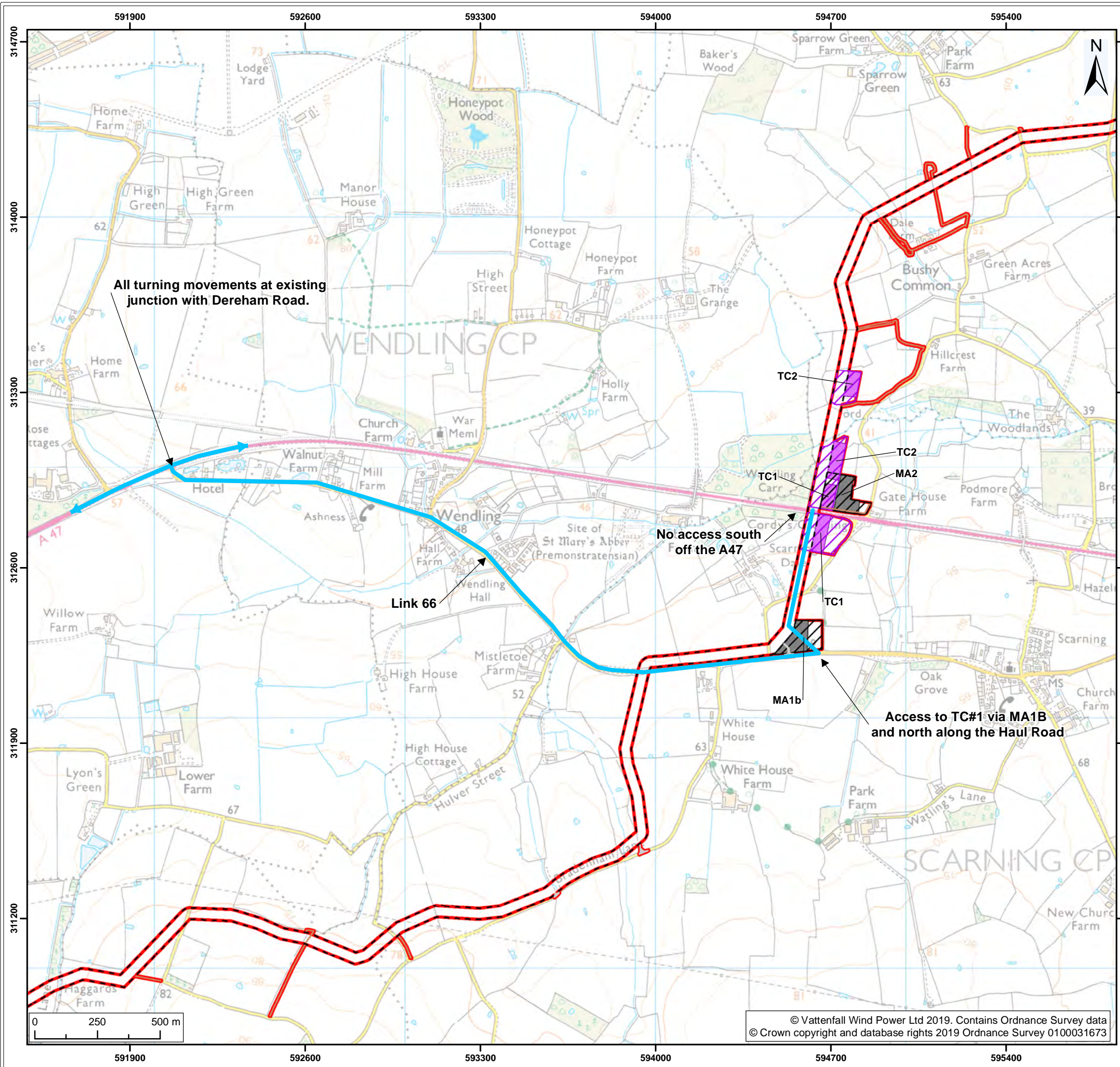
Co-ordinate system: British National Grid EPSG: 27700

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**Legend:**

- Norfolk Vanguard onshore red line boundary
- Onshore cable route**
- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Access**
- Construction access
- Operation access
- TC1 south construction vehicle access route

Project: Norfolk Vanguard	Report: A47 Cable Crossing Access Technical Note
------------------------------	--------------------------------------------------------

Title:  
Proposed construction vehicle access  
route to TC1 south

Figure: 6	Drawing No: PB4476-008-006-018				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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01	09/04/2019	JT	JA	A3	1:15,000

Co-ordinate system: British National Grid EPSG: 27700





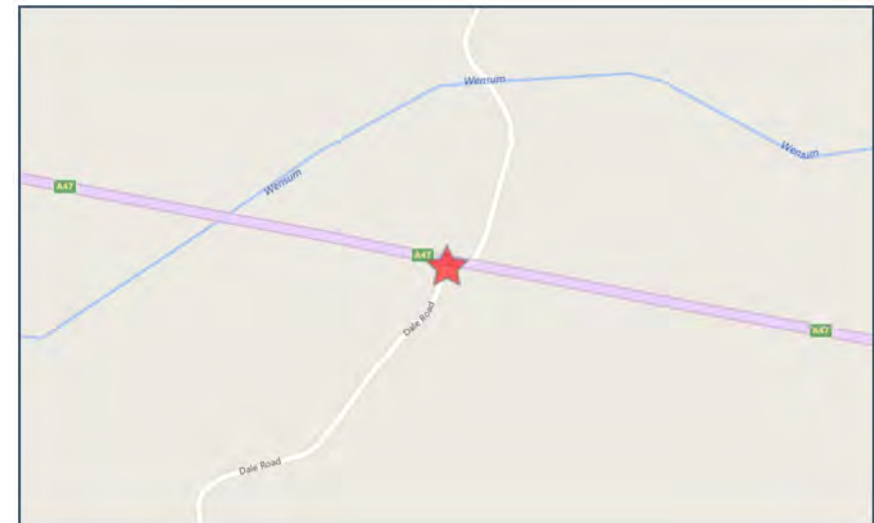
## Appendix A – Personal Injury Collision Data



**Crash Date:** Tuesday, April 28, 2015      **Time of Crash:** 9:05:00 AM      **Crash Reference:** 201536T150061

**Highest Injury Severity:** Slight  
**Highway Authority:** Norfolk  
**Local Authority:** Breckland District  
**Weather Description:** Fine without high winds  
**Road Surface Description:** Dry  
**Speed Limit:** 60  
**Light Conditions:** Daylight: regardless of presence of streetlights  
**Carriageway Hazards:** None  
**Junction Detail:** T or staggered junction  
**Junction Pedestrian Crossing:** No physical crossing facility within 50 metres  
**Road Type:** Single carriageway  
**Junction Control:** Give way or uncontrolled

**Road Number:** A47      **Number of Casualties:** 1  
**Number of Vehicles:** 1  
**OS Grid Reference:** 594806 312796



For more information about the data please visit: [www.crashmap.co.uk/home/aboutthedata](http://www.crashmap.co.uk/home/aboutthedata) and [www.crashmap.co.uk/home/definitions](http://www.crashmap.co.uk/home/definitions)



### Vehicles involved


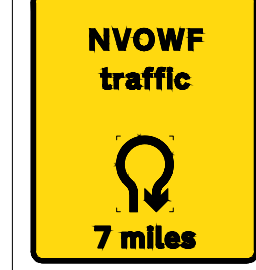




Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Maneouvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Motorcycle over 50cc and up to 125cc	-1	Male	36 - 45	Vehicle is in the act of turning left	Nearside	Commuting to/from work	None	None

### Casualties

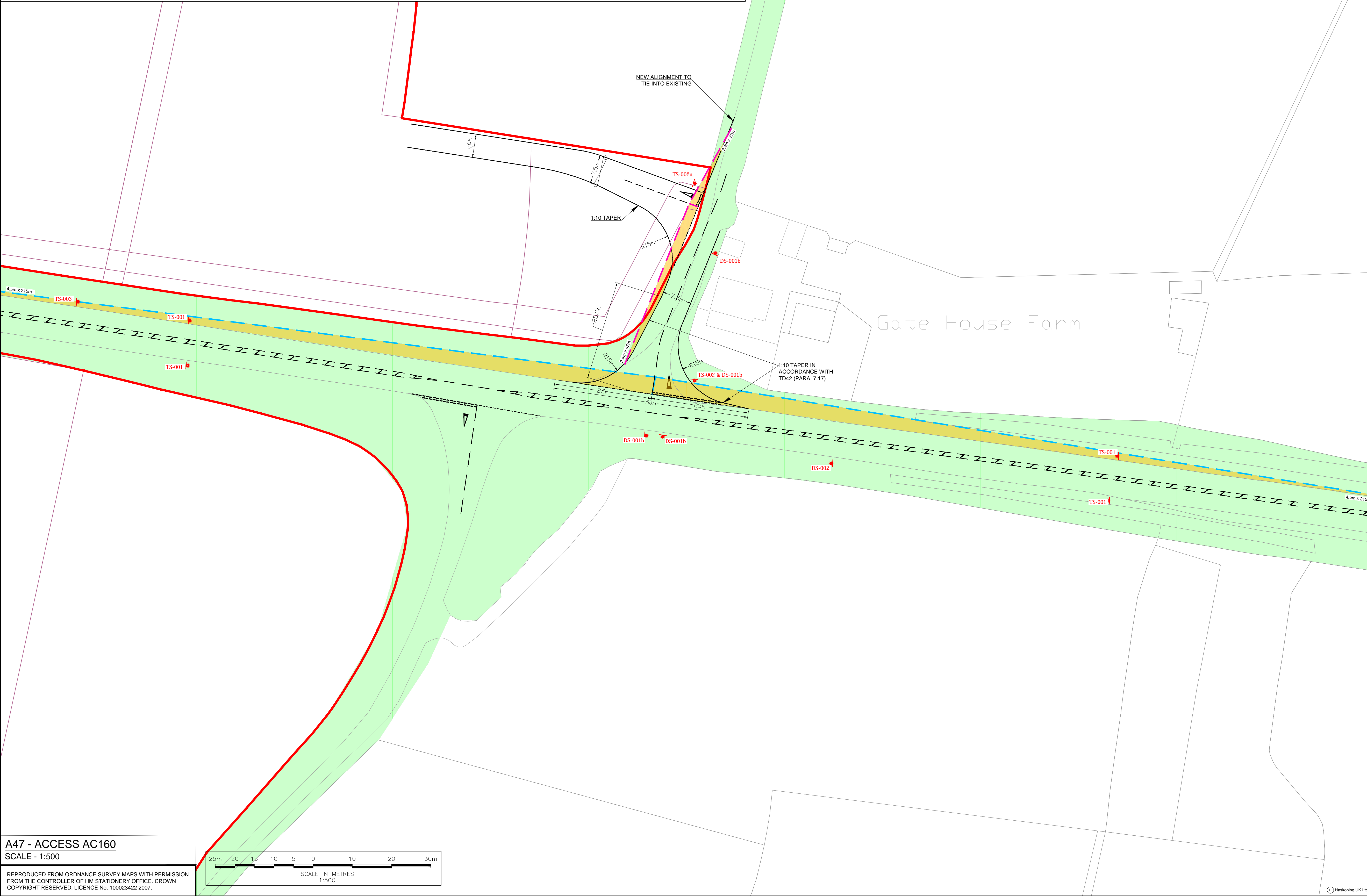
Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
1	1	Slight	Driver or rider	Male	36 - 45	Unknown or other	Unknown or other

For more information about the data please visit: [www.crashmap.co.uk/home/aboutthedata](http://www.crashmap.co.uk/home/aboutthedata) and [www.crashmap.co.uk/home/definitions](http://www.crashmap.co.uk/home/definitions)

## Appendix B – Access General Arrangement

 <p><b>NVOWF traffic</b></p>	 <p><b>NVOWF traffic</b> 7 miles</p>	 <p><b>Lorries turning</b></p>	 <p><b>GIVE WAY</b></p>	 <p><b>WORKS ACCESS</b></p>	 <p><b>WORKS ACCESS</b></p>
---------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------

ALL SIGNAGE TO BE AGREED DURING DETAILED DESIGN STAGE



- NOTES**
- Do not scale from this drawing, all dimensions are in metres unless noted otherwise.
  - This drawing has been based upon Ordnance Survey Maps and Royal Haskoning can not guarantee the accuracy of data.
- Visibility**
- Stopping Sight Distance (SSD) for design speed of the road.
  - X-distance - the set back from the nearest edge of the carriageway from which the access will be taken
  - Y-distance - the SSD measured along the nearest edge of the carriageway to its intersection with the centreline of the access.
  - All vegetation to be cleared/trimmed within identified visibility envelope.
- Road Signs**
- All permanent traffic signs to be set out in accordance with the requirements of Traffic Signs Manual Chapter 1-7 and Traffic Signs Regulations General Direction 2016 and DMRB TD/42 during the detailed design stage.
  - Setting out of signs to be undertaken only by approved traffic management operatives.

- KEY**
- ORDER LIMITS
  - EXISTING METALLED ROAD BOUNDARY
  - PROPOSED ACCESS BOUNDARY/ROAD MARKINGS
  - VISIBILITY SPLAY (DMRB) applicable to 60mph design speed
  - VISIBILITY SPLAY (M5) applicable to 20mph design speed
  - PROPOSED GATE
  - APPROXIMATE SIGN LOCATION
  - APPROXIMATE HIGHWAY BOUNDARY
  - LAND REQUIRED FOR VISIBILITY SPLAYS

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REV	DATE	DESCRIPTION	BY	CHK	APP
D.01		FIRST ISSUE			

REVISIONS

CLIENT



PROJECT  
NORFOLK VANGUARD OFFSHORE WIND FARM

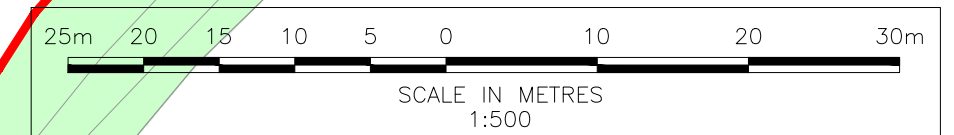
TITLE  
ACCESS AC 160  
CONCEPT DESIGN  
MA2-E, TC#1 (N) AND TC#2 (N & S)



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Peterborough, Cambridgeshire, PE3 8DW  
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DRAWN	J1	CHECKED	RNE	APPROVED	ADR
DATE	11.02.19	SCALE AT A1	1:500 up to	CLIENTS REF.	
DRAWING No.	TP-PB4476-DR025				REVISION
CLIENT DWG No.					D0.1

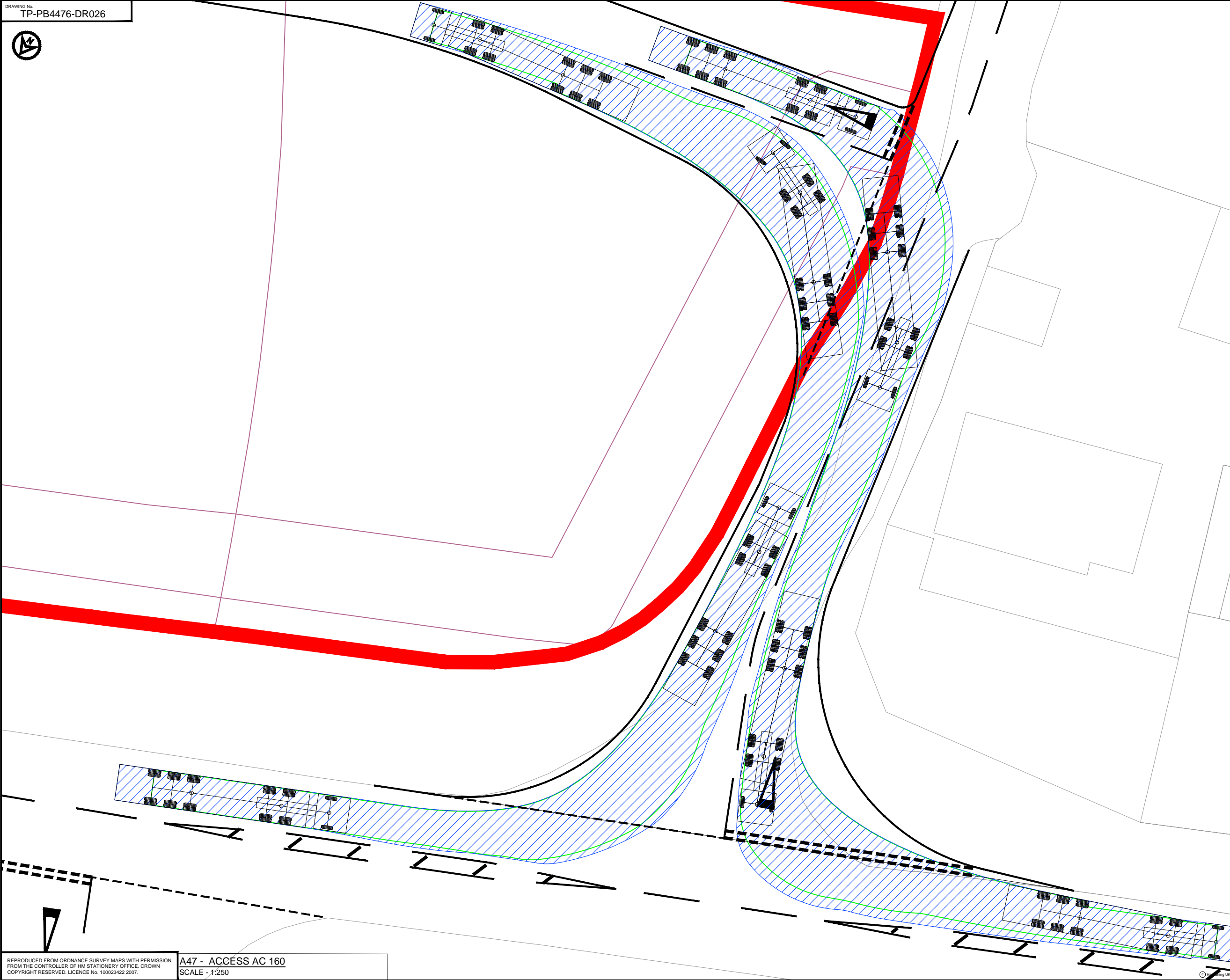
A47 - ACCESS AC160  
SCALE - 1:500



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## Appendix C – Swept Path Analysis Drawings

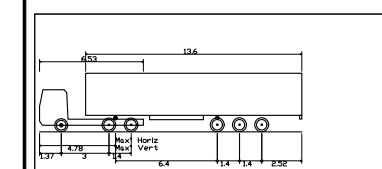




**NOTES**  
 1. Do not scale from this drawing, all dimensions are in metres unless noted otherwise.  
 2. This drawing has been based upon Ordnance Survey Maps and Royal Haskoning can not guarantee the accuracy of data.

**KEY**  
 ORDER LIMITS

**VEHICLE TRACKING**



Max Legal Length (UK) Articulated Vehicle (16.5m)  
 Overall Length 16.50m  
 Overall Width 2.55m  
 Overall Body Height 3.25m  
 Min Body Ground Clearance 0.41m  
 Max Truck Width 2.50m  
 Lock to lock time 6.0s  
 Kerb to Kerb Turning Radius 6.530m

VEHICLE BODY SWEEP PATH (FORWARD GEAR)  
 VEHICLE CHASSIS SWEEP PATH

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D.01	FIRST ISSUE				
REV	DATE	DESCRIPTION	BY	CHK	APP

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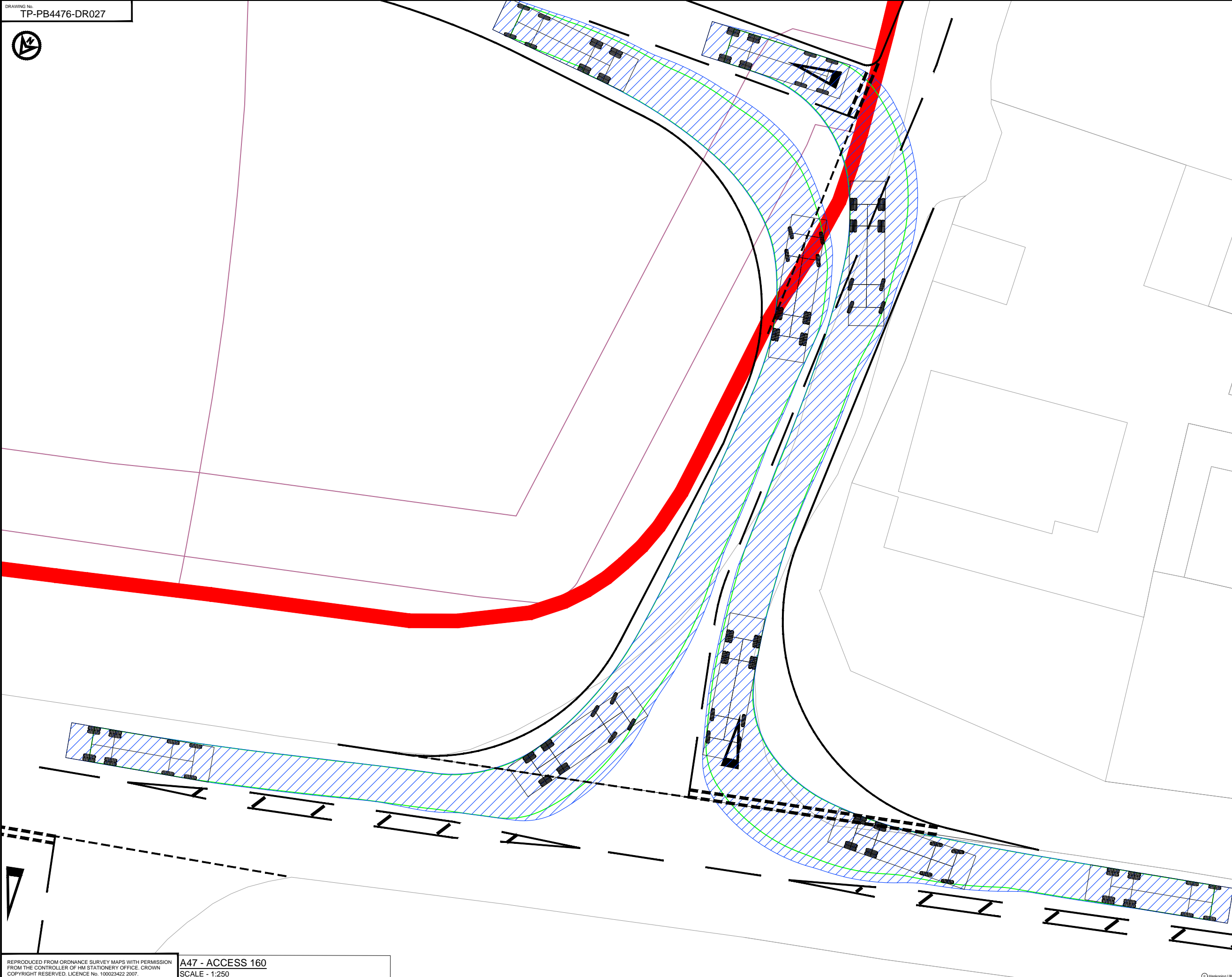
PROJECT  
 NORFOLK VANGUARD OFFSHORE WIND FARM

TITLE  
 ACCESS AC 160  
 ARTICULATED VEHICLE SWEEP PATH ANALYSIS



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DATE	11.02.19	SCALE AT A3	1:250	CLIENTS REF.	
DRAWING No.	TP-PB4476-DR026				REVISION
CLIENT DWG No.					D0.1

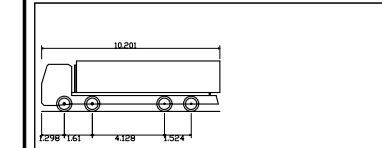
DRAWING No.  
TP-PB4476-DR027



**NOTES**  
1. Do not scale from this drawing, all dimensions are in metres unless noted otherwise.  
2. This drawing has been based upon Ordnance Survey Maps and Royal Haskoning can not guarantee the accuracy of data.

**KEY**  
— ORDER LIMITS

**VEHICLE TRACKING**



Large Tipper  
Overall Length 10.201m  
Overall Width 2.435m  
Overall Body Height 5.890m  
Min Body Ground Clearance 0.341m  
Track Width 2.471m  
Lock to lock time 5.00s  
Kerb to Kerb Turning Radius 11.550m

▨ VEHICLE BODY SWEEP PATH (FORWARD GEAR)  
— VEHICLE CHASSIS SWEEP PATH

**DRAFT - NOT FOR CONSTRUCTION**

REV	DATE	DESCRIPTION	BY	CHK	APP
D.01		FIRST ISSUE			

REVISIONS

CLIENT



PROJECT  
NORFOLK VANGUARD OFFSHORE WIND FARM

TITLE  
ACCESS AC 160  
LARGE TIPPER  
SWEEP PATH ANALYSIS



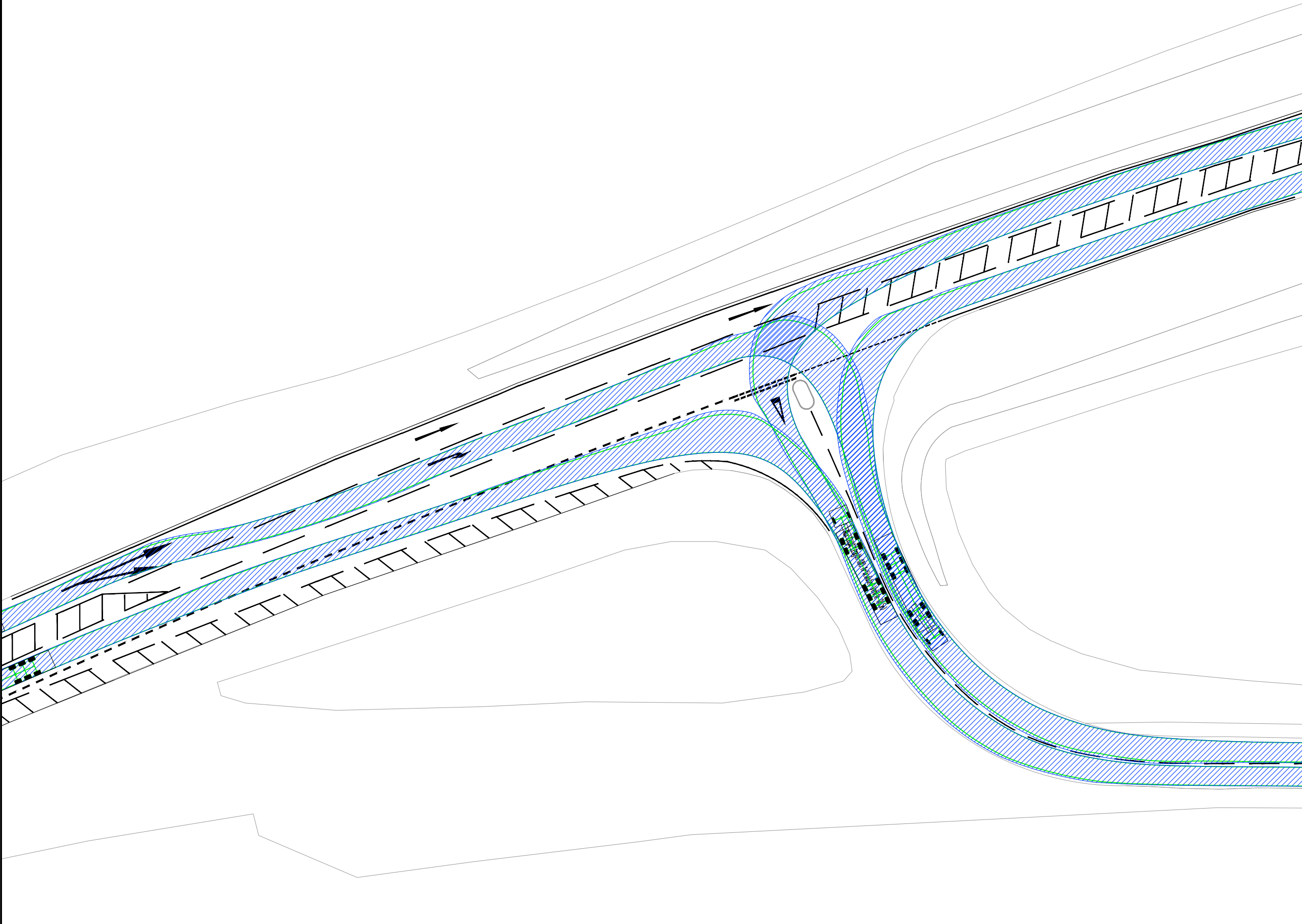
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CLIENT DWG No.					D0.1

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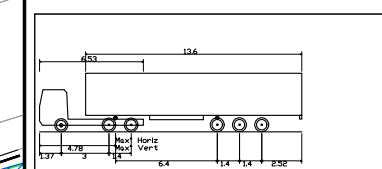
A47 - ACCESS 160  
SCALE - 1:250

## Appendix D – A47 / Dereham Road - Swept Path Analysis Drawings



**NOTES**  
 1. Do not scale from this drawing, all dimensions are in metres unless noted otherwise.  
 2. This drawing has been based upon Ordnance Survey Maps and Royal HaskoningDHV cannot guarantee the accuracy of data.

**KEY**  
**VEHICLE TRACKING**



Max Legal Length (UK) Articulated Vehicle (16.5m)  
 Overall Length 16.50m  
 Overall Width 2.55m  
 Overall Body Height 3.25m  
 Min Body Ground Clearance 0.41m  
 Max Truck Width 2.50m  
 Lock to lock time 6.80s  
 Kerb to Kerb Turning Radius 6.530m

VEHICLE BODY SWEEP PATH (FORWARD GEAR)  
 VEHICLE CHASSIS SWEEP PATH

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D.01	FIRST ISSUE				
REV	DATE	DESCRIPTION	BY	CHK	APP

REVISIONS

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PROJECT  
 NORFOLK VANGUARD OFFSHORE WIND FARM

TITLE  
 A47 / DEREHAM ROAD JUNCTION  
 ARTICULATE VEHICLE SPA



DRAWN	J1	CHECKED	RNE	APPROVED	ADR
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DRAWING No.	TP-PB4476-DR028			REVISION	
CLIENT DWG No.					D0.1

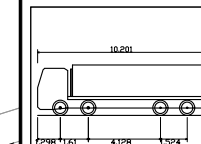




**NOTES**  
 1. Do not scale from this drawing, all dimensions are in metres unless noted otherwise.  
 2. This drawing has been based upon Ordnance Survey Maps and Royal HaskoningDHV cannot guarantee the accuracy of data.

**KEY**

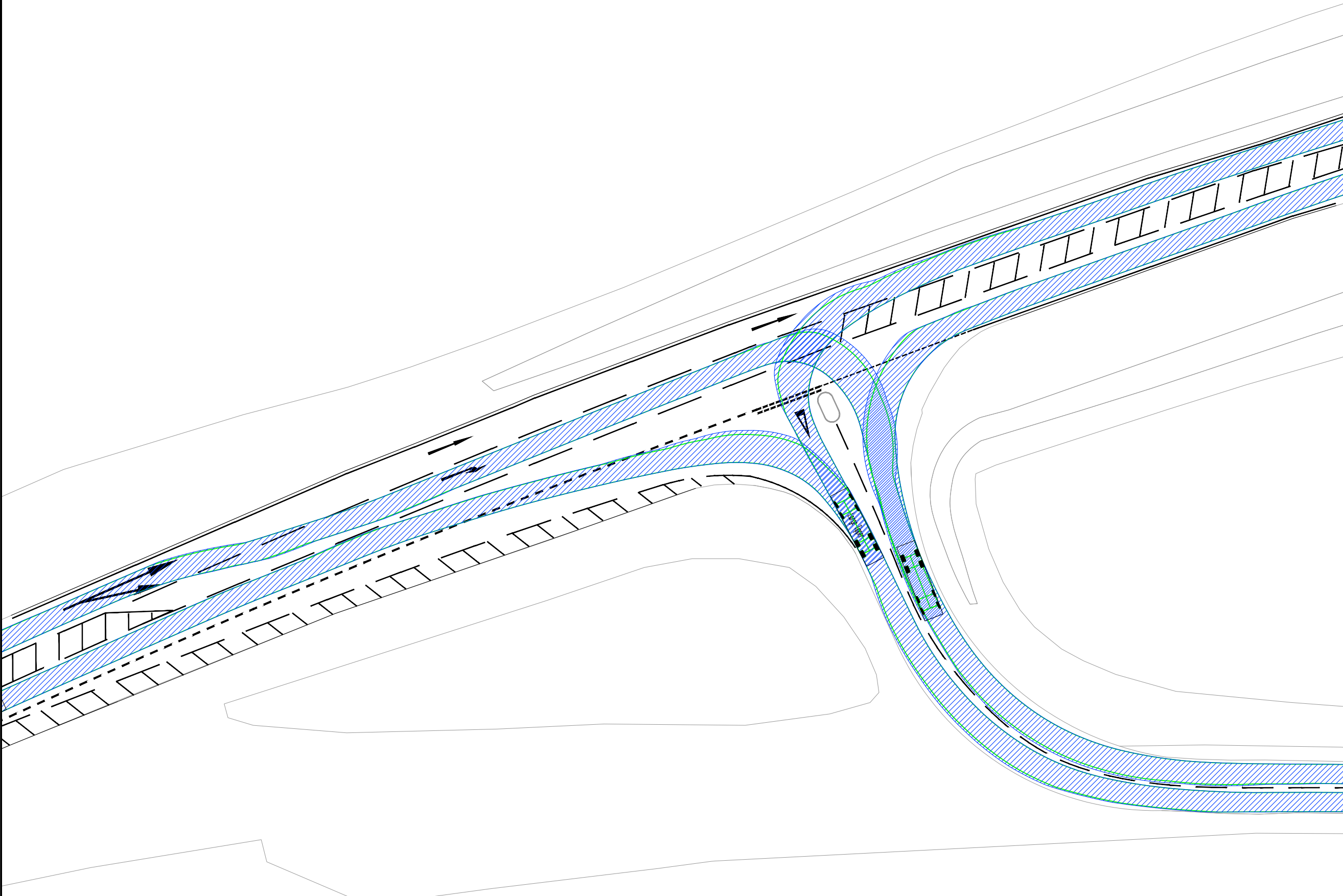
**VEHICLE TRACKING**



Large Tipper  
 Overall Length 10.201m  
 Overall Width 2.495m  
 Overall Body Height 5.890m  
 Min Body Ground Clearance 0.341m  
 Track Width 2.471m  
 Lock to lock time 6.00s  
 Kerb to Kerb Turning Radius 11.550m

VEHICLE BODY SWEEP PATH (FORWARD GEAR)

VEHICLE CHASSIS SWEEP PATH



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D.01	FIRST ISSUE				
REV	DATE	DESCRIPTION	BY	CHK	APP

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PROJECT  
 NORFOLK VANGUARD OFFSHORE WIND FARM

TITLE  
 A47 / DEREHAM ROAD JUNCTION  
 LARGE TIPPER SPA



DRAWN	JJ	CHECKED	RNE	APPROVED	ADR
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DATE	20.02.19	SCALE AT A3	1:250	CLIENTS REF.	
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DRAWING No.	TP-PB4476-DR029	REVISION	
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CLIENT DWG No.	D0.1
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## Appendix E – Peak Daily HGV Access Turning Movements

Infrastructure	Daily HGV Movements	Peak Daily HGV Turning Movements							
		If Kings Lynn was Origin Location				If Great Yarmouth / Lowestoft was Origin Location			
		West (70%)		East (30%)		West (30%)		East (70%)	
AC160 Turning Movements		A	G	H	B	A	G	H	B
MA2-E	48	16.8	16.8	7.2	7.2	7.2	7.2	16.8	16.8
TC#1 or TC#2*	96	33.6	33.6	14.4	14.4	14.4	14.4	33.6	33.6
<b>Totals</b>	<b>144</b>	<b>50.4</b>	<b>50.4</b>	<b>21.6</b>	<b>21.6</b>	<b>21.6</b>	<b>21.6</b>	<b>50.4</b>	<b>50.4</b>
AC163 Turning Movements		A	D	A	D	A	D	A	D
MA1b-W	48	16.8	16.8	8.1	8.1	8.1	8.1	18.9	18.9
TC#1**	72	25.2	25.2	10.8	10.8	10.8	10.8	25.2	25.2
<b>Totals</b>	<b>120</b>	<b>42</b>	<b>42</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>42</b>	<b>42</b>

**Turning Movement Key**

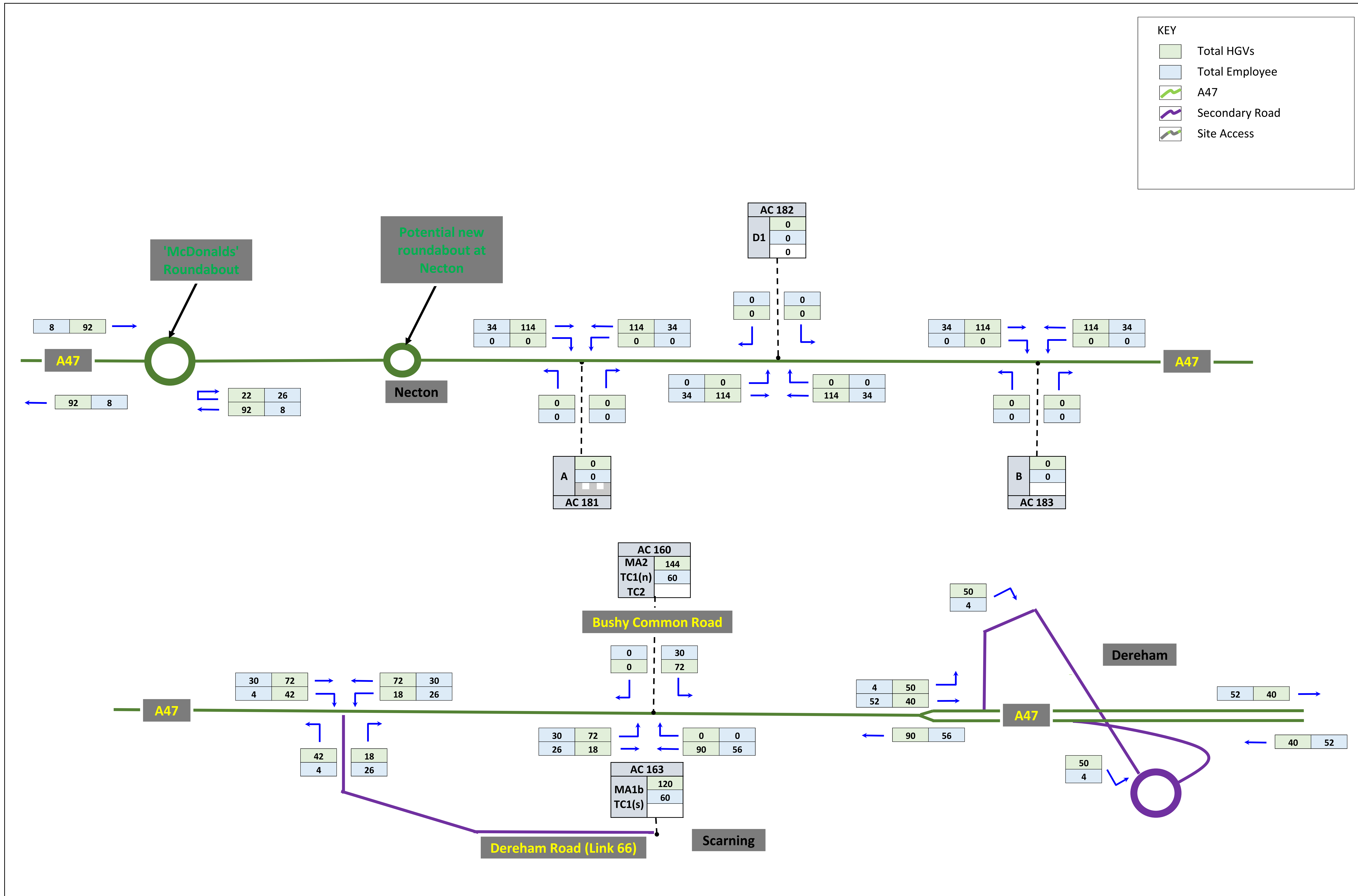
- A = Left turn in
- B = Left turn out
- C = Right turn in
- D = Right turn out
- E = Left turn in utilising diversion at Dereham
- F = Left turn out utilising diversion at McDonald's Roundabout
- G = Left turn out utilising diversion at Dereham
- H = Left turn in utilising diversion at McDonald's Roundabout

\*Only 1 Trenchless Crossing (TC) active at any time. Worst case traffic demand scenario if TC#2 was constructed requiring both the launch (75%) and receive (25%) compounds accessed at AC160

\*\* Worst case traffic demand scenario if the launch compound (75% traffic) was accessed at AC163

## Appendix F – CCATN Network Flow Diagrams (AM, PM and Daily)

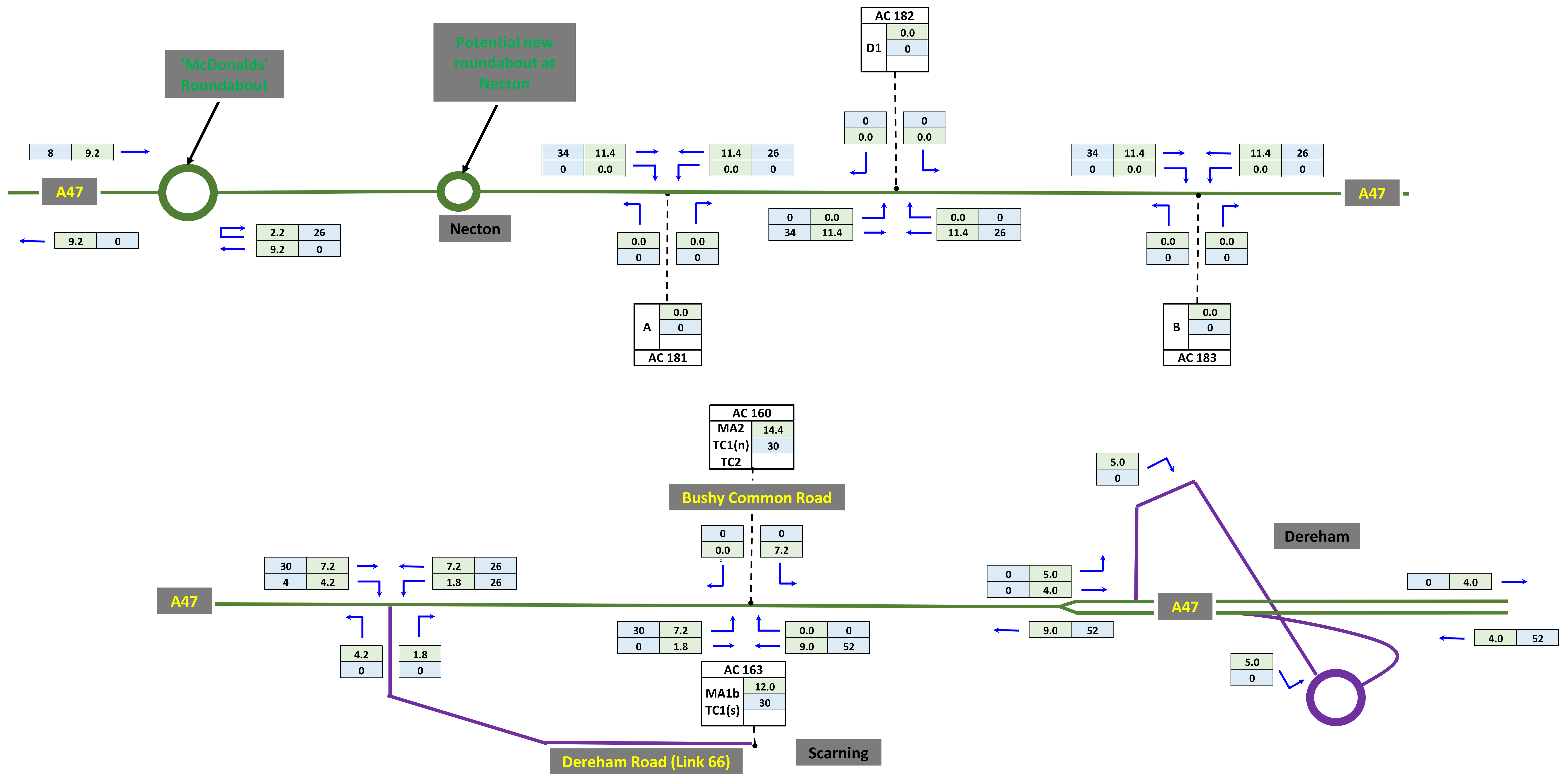




	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 1 - Kings Lynn (70%) Peak Daily Vehicle Turning Movements (CCATN)	
	Job Number	Date	F1
	PB4476	Apr-19	

**KEY**

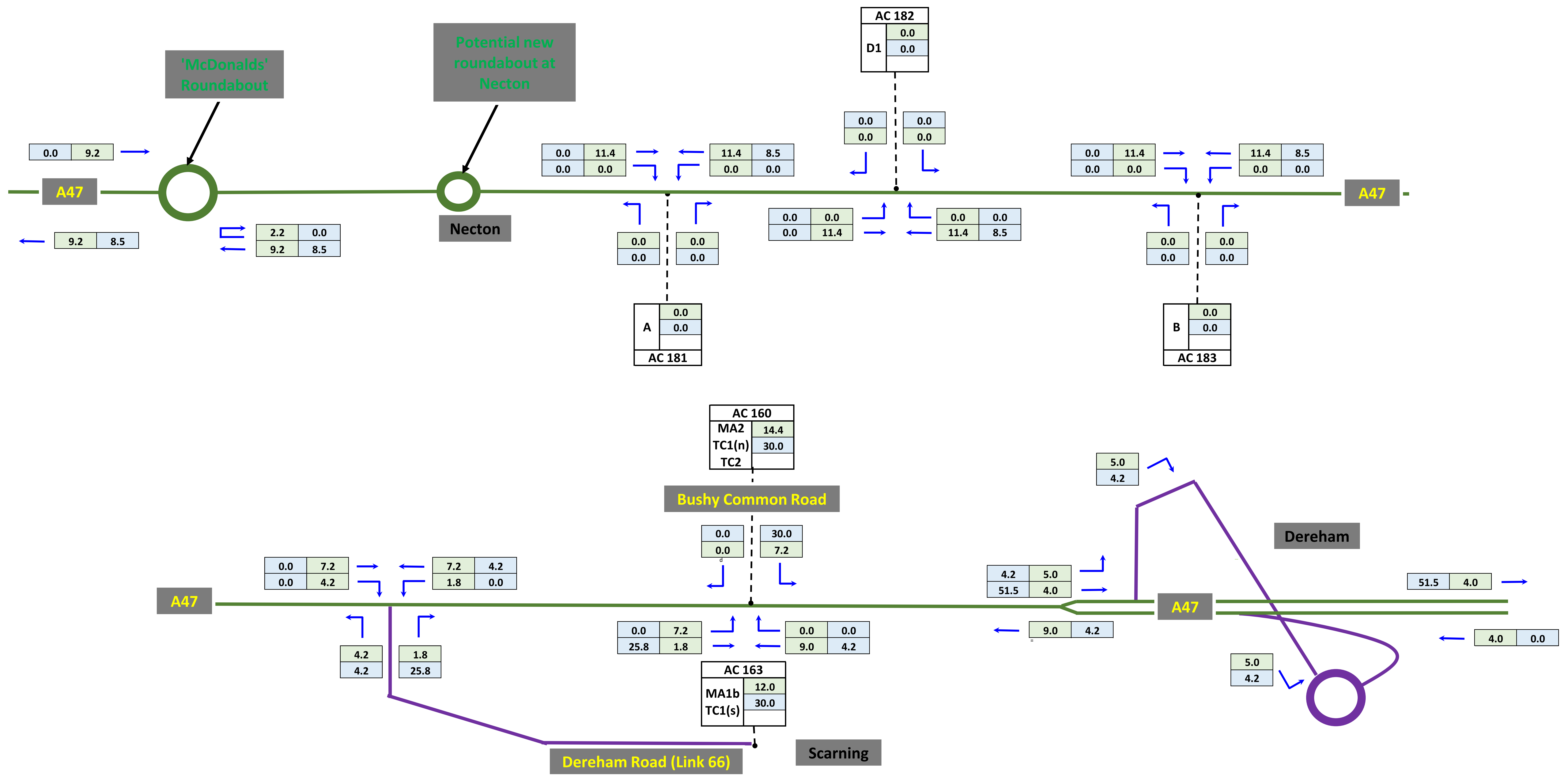
- Total HGVs
- Total Employee
- A47
- Secondary Road
- Site Access



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 1 - Kings Lynn (70%) AM Peak Vehicle Turning Movements (CCATN)	
	Job Number	Date	F2
	PB4476	Apr-19	

**KEY**

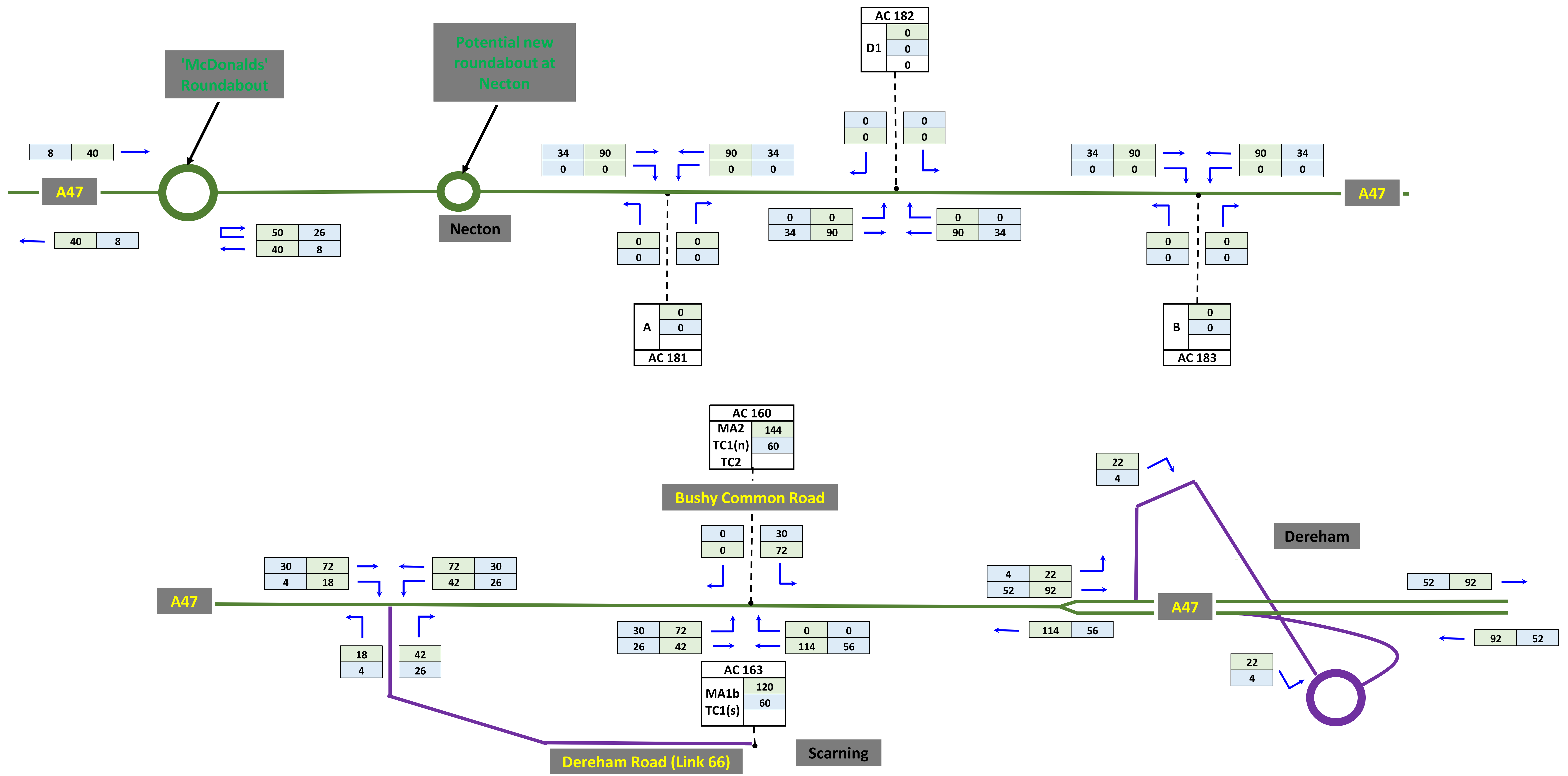
- Total HGVs
- Total Employee
- A47
- Secondary Road
- Site Access



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 1 - Kings Lynn (70%) PM Peak Vehicle Turning Movements (CCATN)	
	Job Number	Date	F3
	PB4476	Apr-19	

**KEY**

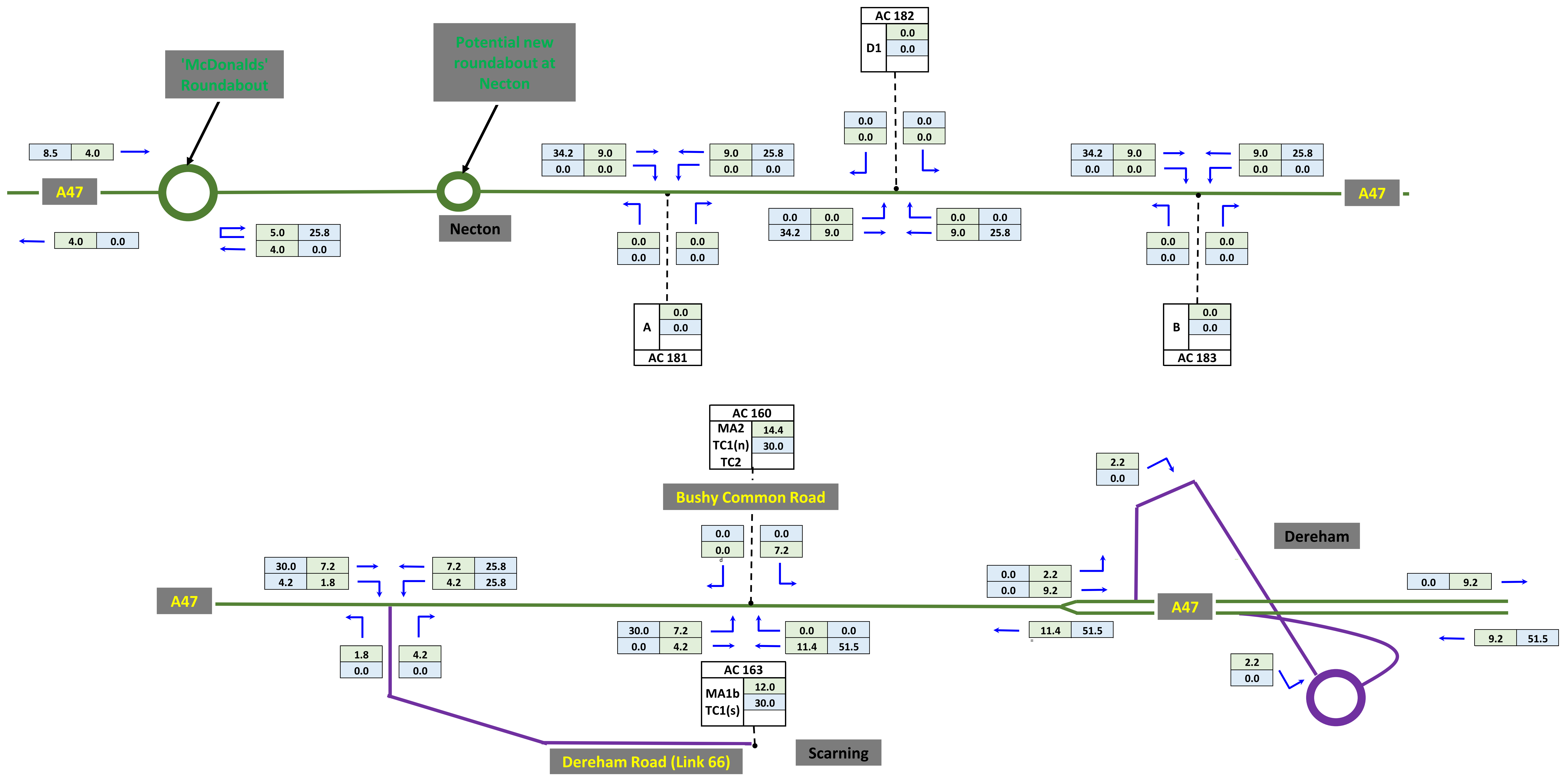
- Total HGVs
- Total Employee
- A47
- Secondary Road
- Site Access



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 2 - Great Yarmouth (70%) Peak Daily Vehicle Turning Movements (CCATN)	
	Job Number	Date	F4
	PB4476	Apr-19	

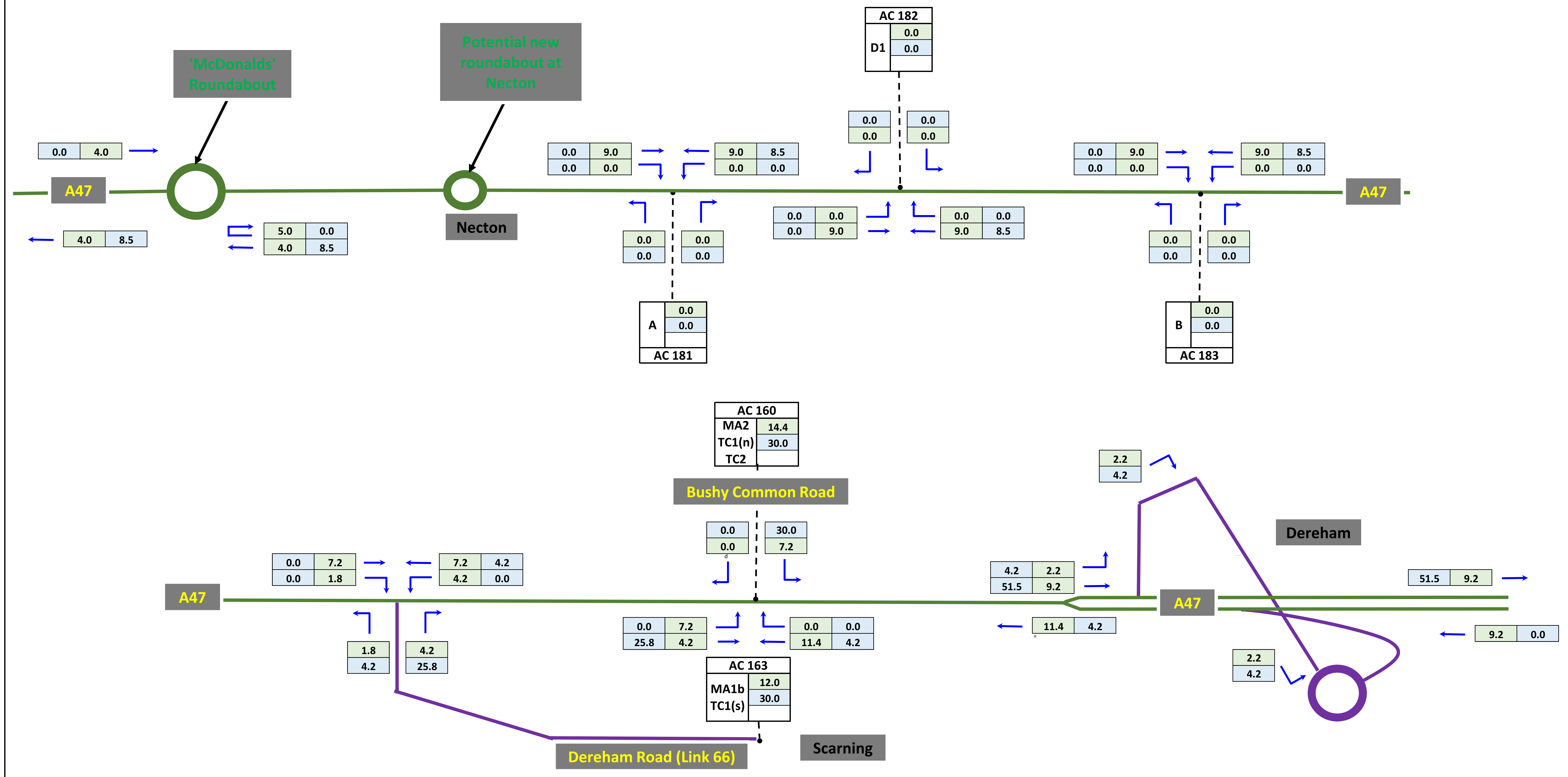


KEY	
	Total HGVs
	Total Employee
	A47
	Secondary Road
	Site Access



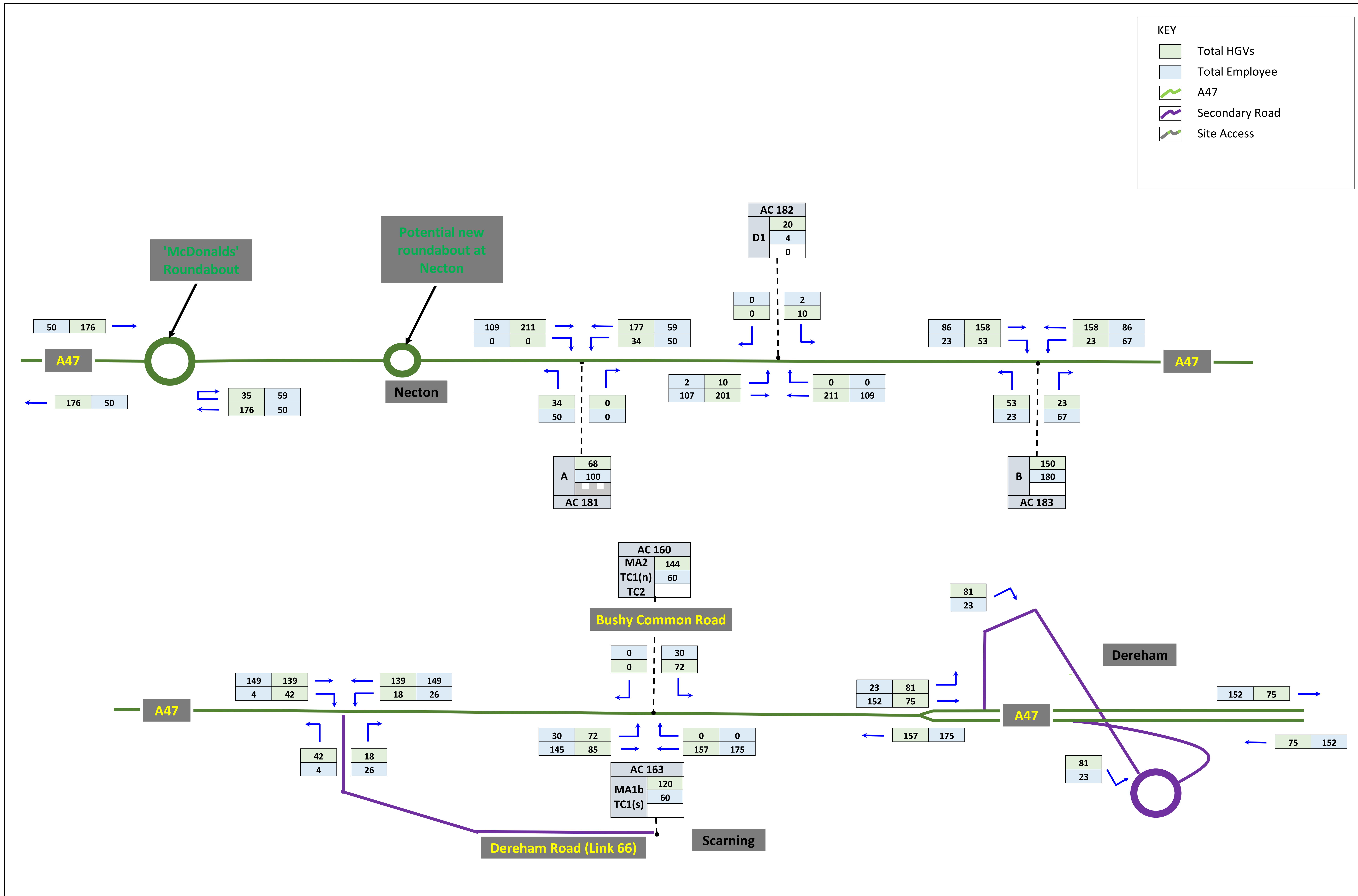
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	Job Number	Date	F5
	PB4476	Apr-19	

KEY	
	Total HGVs
	Total Employee
	A47
	Secondary Road
	Site Access



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 2 - Great Yarmouth (70%) PM Peak Vehicle Turning Movements (CCATN)	
	Job Number	Date	F6
	PB4476	Apr-19	

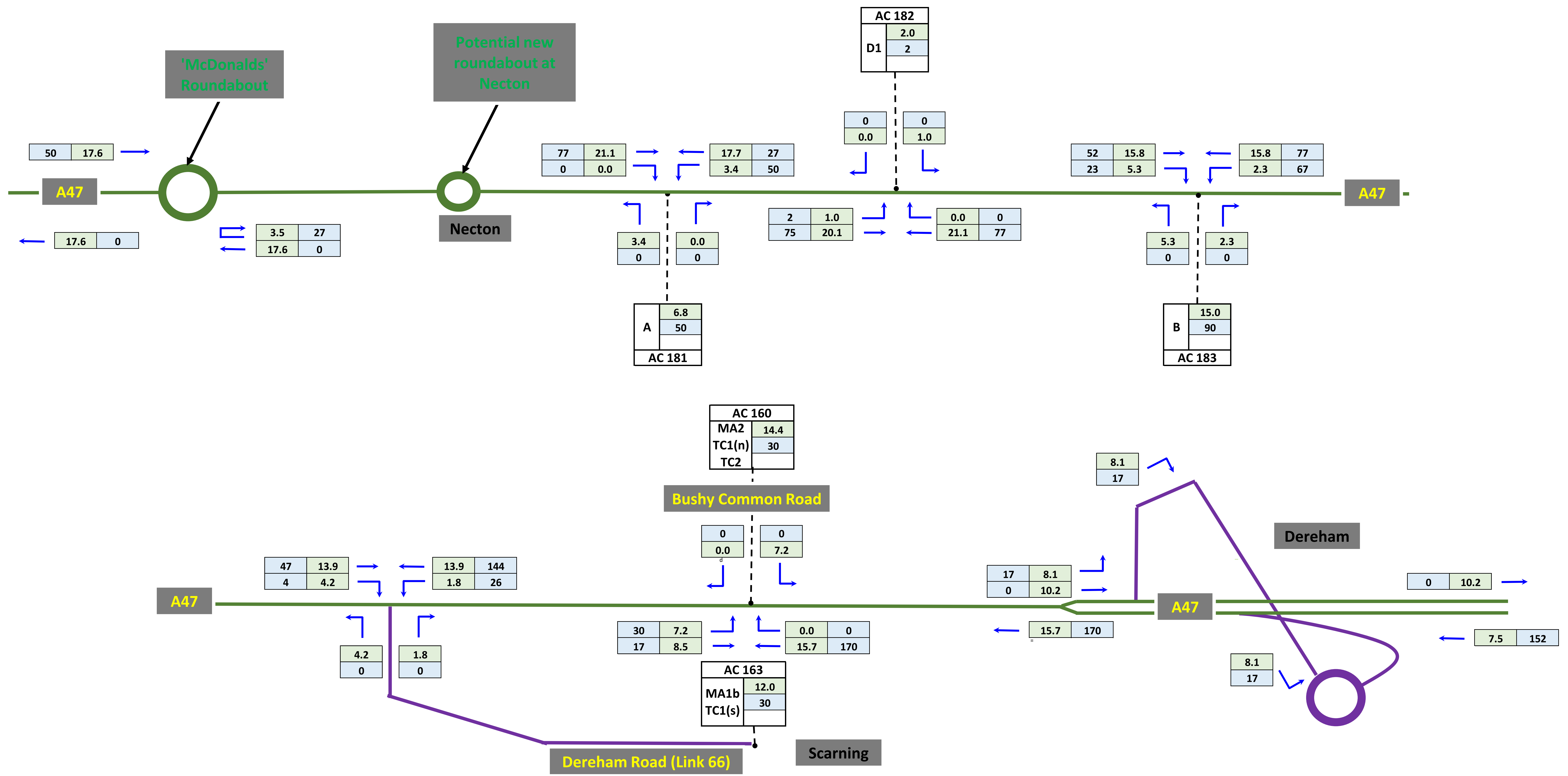
## **Appendix G – Total (CCATN and SACTN) Network Flow Diagrams (AM, PM and Daily)**



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 1 - Kings Lynn (70%) Peak Daily Vehicle Turning Movements	
	Job Number	Date	G1
	PB4476	Apr-19	

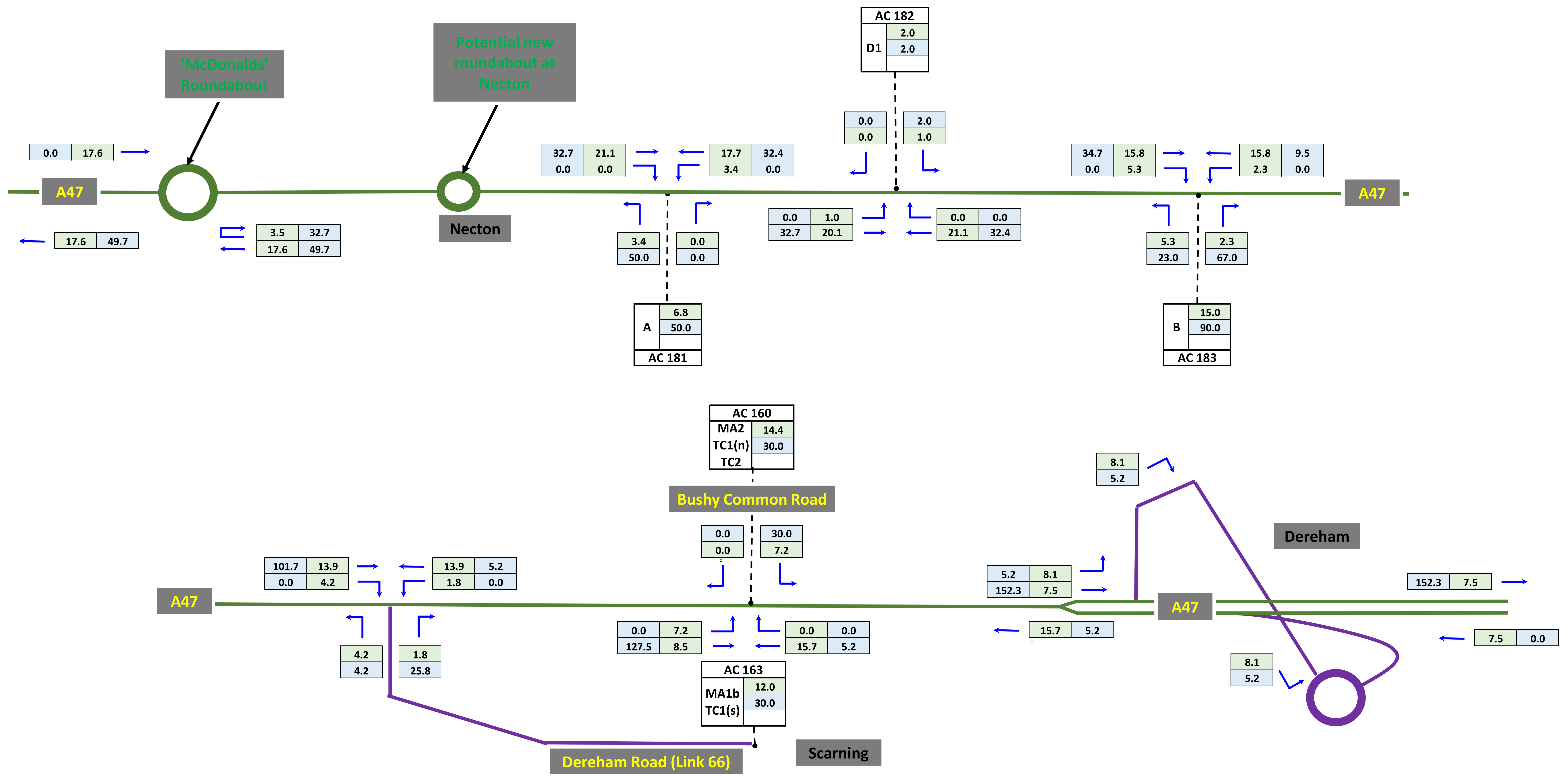


KEY	
	Total HGVs
	Total Employee
	A47
	Secondary Road
	Site Access



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 1 - Kings Lynn (70%) AM Peak Vehicle Turning Movements	
	Job Number	Date	G2
	PB4476	Apr-19	

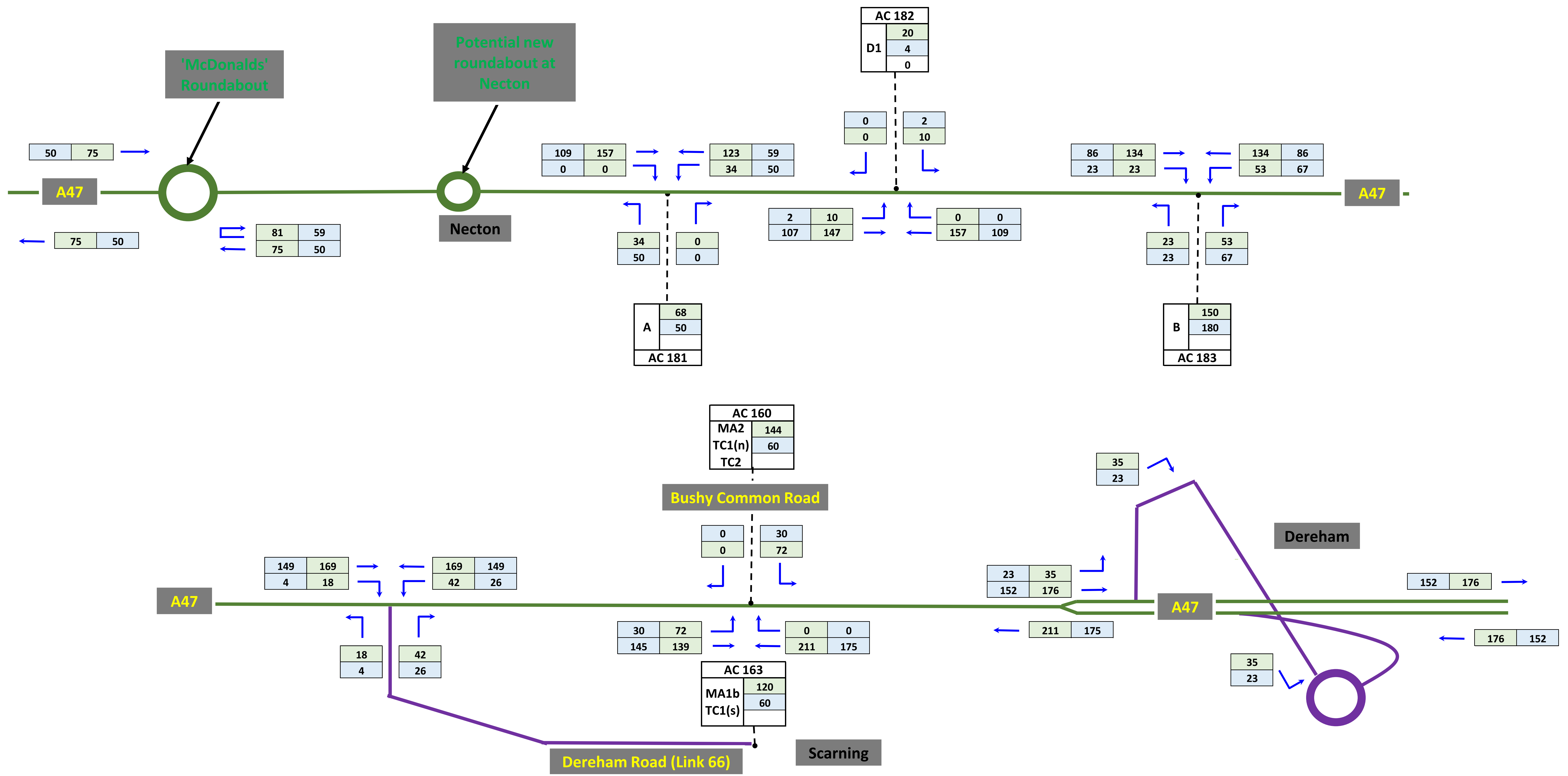
KEY	
	Total HGVs
	Total Employee
	A47
	Secondary Road
	Site Access



	Project Title	Appendix Title	Appendix No
	Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 1 - Kings Lynn (70%) PM Peak Vehicle Turning Movements	
	Job Number	Date	G3
	PB4476	Apr-19	

**KEY**

- Total HGVs
- Total Employee
- A47
- Secondary Road
- Site Access



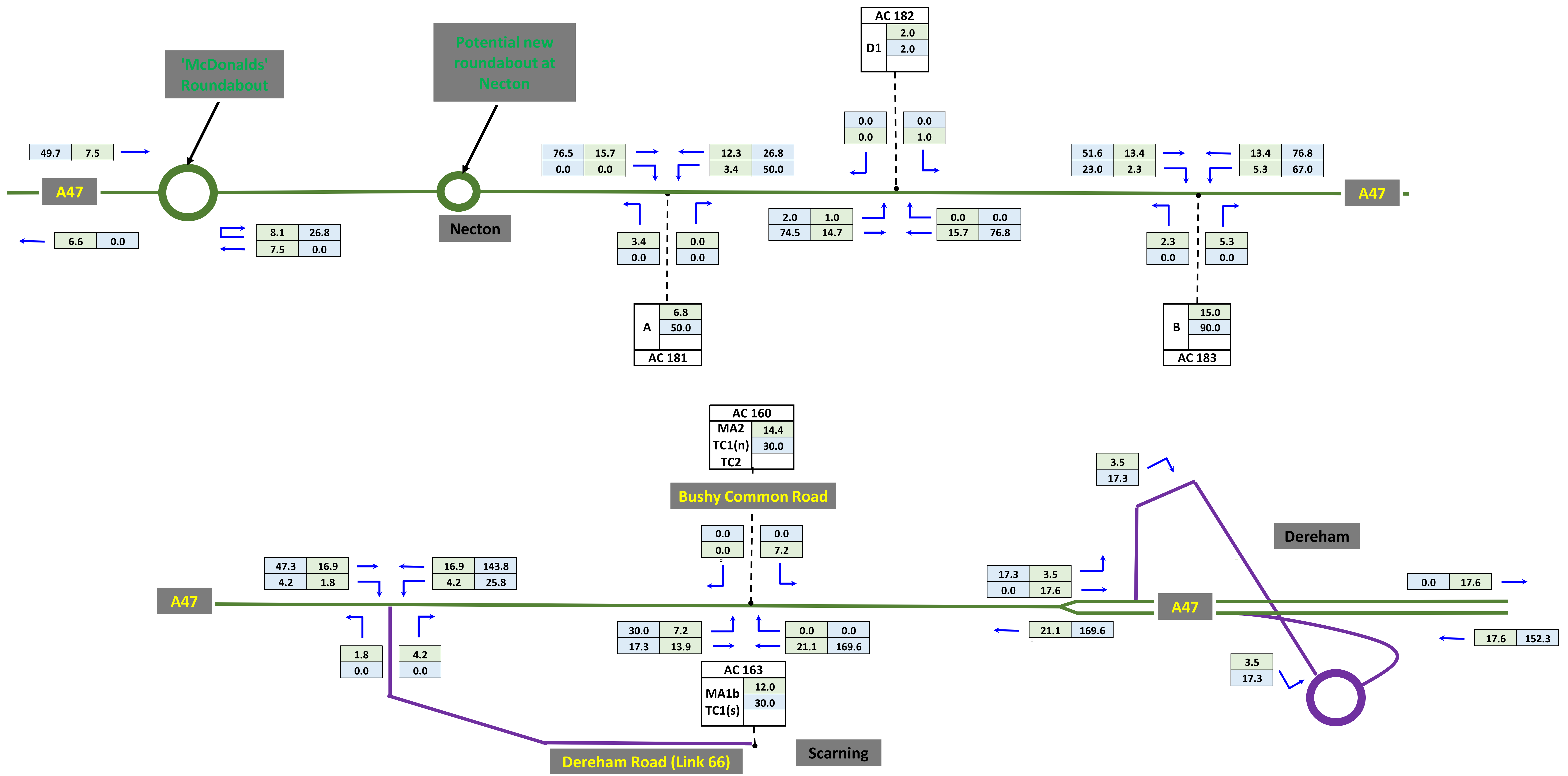
<b>Project Title</b>	Norfolk Vanguard - A47 Cable Crossing Access Technical Note
<b>Job Number</b>	PB4476

<b>Appendix Title</b>	Distribution Scenario 2 - Great Yarmouth (70%) Peak Daily Vehicle Turning Movements
<b>Date</b>	Apr-19

<b>Appendix No</b>	G4
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**KEY**

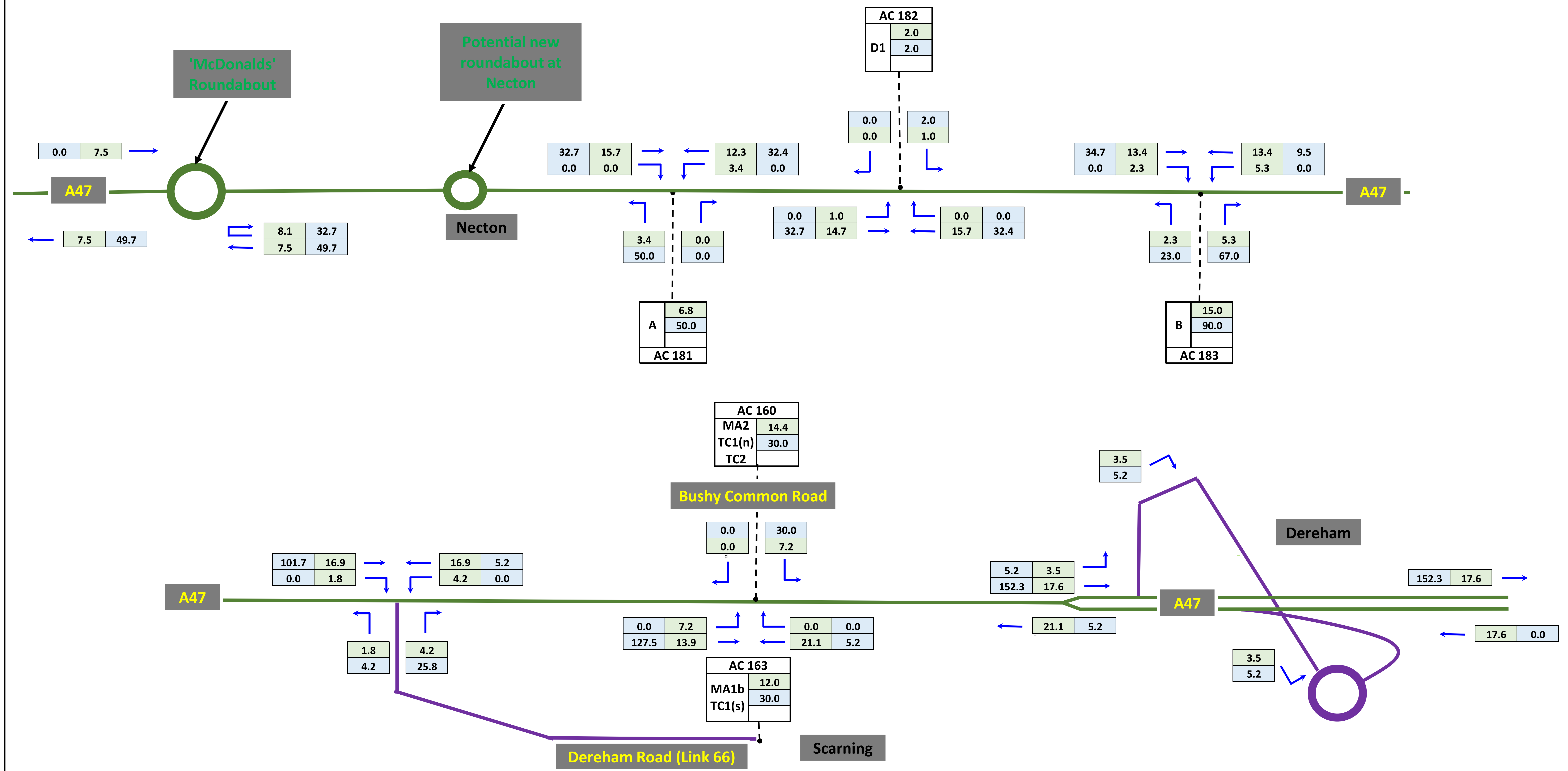
- Total HGVs
- Total Employee
- A47
- Secondary Road
- Site Access



	<b>Project Title</b> Norfolk Vanguard - A47 Cable Crossing Access Technical Note	<b>Appendix Title</b> Distribution Scenario 2 - Great Yarmouth (70%) AM Peak Vehicle Turning Movements	<b>Appendix No</b>
	<b>Job Number</b> PB4476	<b>Date</b> Apr-19	G5



KEY	
	Total HGVs
	Total Employee
	A47
	Secondary Road
	Site Access



Project Title	Appendix Title	Appendix No
Norfolk Vanguard - A47 Cable Crossing Access Technical Note	Distribution Scenario 2 - Great Yarmouth (70%) PM Peak Vehicle Turning Movements	G6
Job Number PB4476	Date Apr-19	

# Norfolk Boreas Offshore Wind Farm

## Appendix 3 Highways England Norfolk Vanguard Briefing Notes BN07 and BN08

Project:	<b>Highways England Spatial Planning Arrangement 2016-2020</b>	Job No:	<b>60600479/DN052.004</b>
Subject:	<b>Norfolk Vanguard Wind Farm - Substations Access Clarifications Technical Note</b>		
Prepared by:	<b>Andrew Cuthbert</b>	Date:	<b>4<sup>th</sup> April 2019</b>
Checked by:	<b>Andrew Beard</b>	Date:	<b>4<sup>th</sup> April 2019</b>
Verified by:	<b>John Alderman</b>	Date:	<b>5<sup>th</sup> April 2019</b>
Approved by:	<b>Andrew Cuthbert</b>	Date:	<b>5<sup>th</sup> April 2019</b>

## Introduction

1. This Briefing Note (BN07) comprises a review of the '**A47 Substation Access Clarification Technical Note**' (SACTN), dated 12th March 2019, prepared by Royal Haskoning DHV (RHDHV) in respect of the access arrangements required to serve the existing and proposed substations adjacent to the A47 Trunk Road at Necton, to the west of Dereham.
2. The SACTN was produced in response to AECOM Briefing Notes BN04 and BN06, which provided responses to previous proposals contained in earlier documents, namely the Substation Access Technical Note (SATN) and the Substation Access Briefing Note (SABN).
3. Three access points to the substation works are proposed, A, B and D1. All of these would obtain access directly from the A47 and all require new or adjusted layouts to make them acceptable to Highways England.
4. The access points would be used for the following purposes:
  - Access A would provide access to the works required to extend the existing National Grid substation (National Grid Substation Extension, NGSE);
  - Access B would provide access to the proposed Norfolk Vanguard Onshore Project Substation, together with Mobilisation Area 1 (MA1a) serving the installation of electricity cables in the vicinity of the two substations;
  - Access D1 would provide access to the overhead line modification works to the west of the A47.
5. The locations of these access points are illustrated in **Figure 1** below.

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*This document has been prepared by AECOM Limited for the sole use of our clients ("Highways England") and in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM Limited and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM Limited, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM Limited.*

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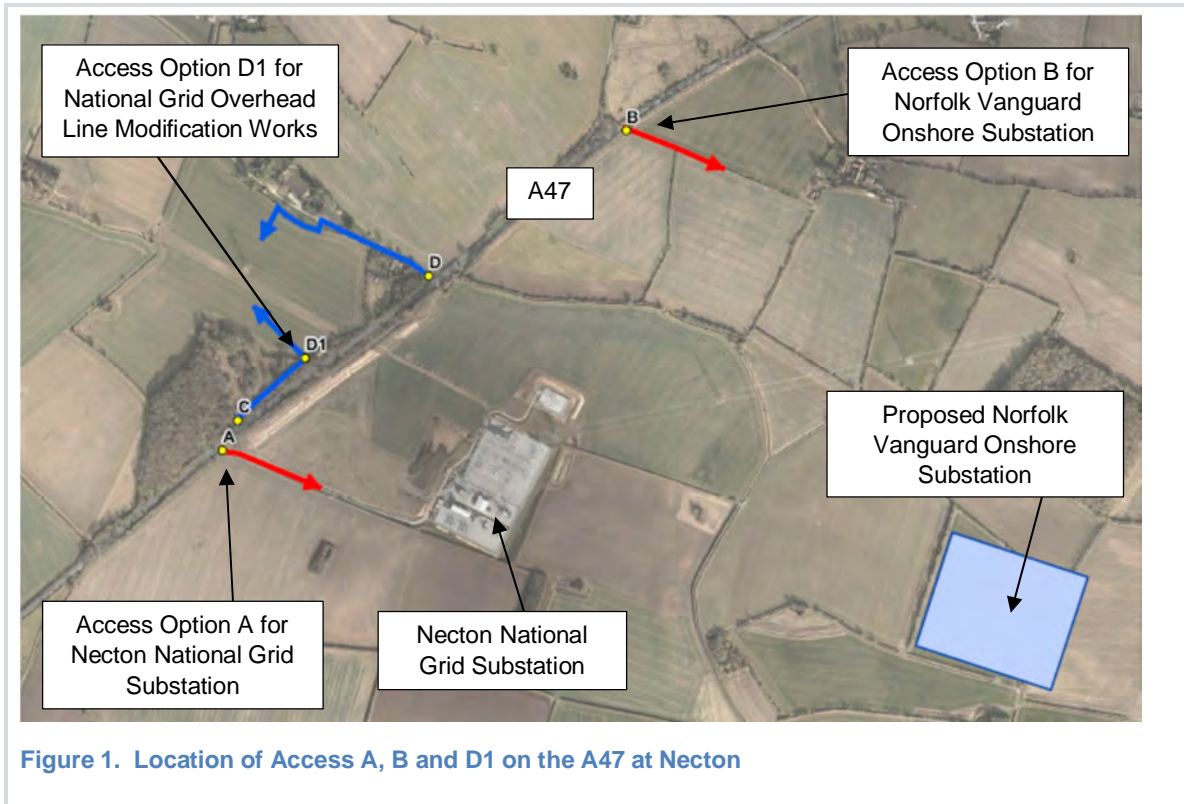


Figure 1. Location of Access A, B and D1 on the A47 at Necton

6. The issues previously raised by AECOM are set out in BN04 and BN06. These, together with the RHDHV response are summarised in Table 7.1 of the SACTN.
7. The SACTN contains the following material:
  - Updated layout plans for site accesses A, B and D1, including:
    - a general arrangement drawing (PB4476-008-006-005 rev 04);
    - swept path plots for the three access points ((PB4476-017, 018, 021, 022, 0233 & 023 rev F1.0).
  - Details of:
    - the traffic forecast to use each of these access points;
    - the duration over which this level of traffic is anticipated;
    - traffic management arrangements which will apply whilst they are in use; and
    - the flows anticipated to divert via the McDonalds roundabout at Swaffham and the Yaxham Road grade separated junction at Dereham because of the use of left-in, left-out only turning restrictions at access points A and D1.
8. Copies of Drawings PB4476-012, 014 & 015, rev F1.0, which provide a layout of each of the proposed site accesses annotated with DMRB geometric and visibility parameters, were not included in the SACTN and have been supplied separately.
9. AECOM's review of the layouts and the traffic flows reveals the following.



**Access Arrangements to be provided**

Item	Access A	Access B	Access D1
Drawing numbers	PB4476-DR012/F1.0 PB4476-DR017/F1.0 PB4476-DR018/F1.0	PB4476-DR014/F1.0 PB4476-DR021/F1.0 PB4476-DR022/F1.0	PB4476-DR015/F1.0 PB4476-DR023/F1.0 PB4476-DR024/F1.0
Junction type	Simple priority junction, to be limited to left-in, left-out operation	Ghost island priority junction	Simple priority junction, to be limited to left-in, left-out operation
Peak level of traffic use	100 light vehs/day; 68 HGV/ day; 50 light vehs/ peak hr; 7 HGV/ peak hr.	180 light vehs /day; 150 HGV/ day; 90 light vehs / peak hr; 16 HGV/ peak hr.	4 light vehs /day; 20 HGV/ day; 50 light vehs / peak hr; 7 HGV/ peak hr.
Duration of use	86 weeks in total, of which 16 weeks at the peak level of use	At least 100 weeks in total, of which 24 weeks at peak level of use	2 individual weeks of use, separated by a gap of 4-6 months
Design speed of main road adopted	100 km/hr	100 km/hr	60 km/hr (*)
Corner radii	15m	15m	15m
Exit tapers	25m @ 1:10	30m @ 1:6	25m @ 1:10
Visibility splays (assumes existing vegetation to be cleared/maintained as required) <u>NB evidence still to be submitted that these can be proven in the vertical plane</u>	4.5 x 215m	4.5 x 215m (L) 2.4 x 215m (R)	4.5 x 90m (*)
Swept path plots	These all show that HGVs can complete their turns without clipping kerb lines, and without encroaching on the wrong side of the A47		
	An HGV could enter the minor arm and stand clear of the A47 running lane whilst another HGV emerges from the minor arm	HGVs can enter and leave simultaneously without their swept paths conflicting.	An HGV could enter the minor arm and stand clear of the A47 running lane whilst another HGV emerges from the minor arm

(\*) – to be operated under a temporary 30 mph speed limit

10. The layouts shown on these drawings appear to have taken on board all the issues raised in AECOM Briefing Notes 04 and 06 and, with one exception, appear to meet in full the design requirements of DMRB. The exception is that the visibility to the right out of access point B can only be achieved from a position 2.4m back from the give way line. DMRB design standard TD42 permits a relaxation to 4.5m in difficult circumstances for lightly trafficked simple junctions and to 2.4m in exceptionally difficult circumstances.
11. The SACTN contains a statement that *'Increasing the 'x' distance to 4.5m would require the removal of a large proportion of established hedgerows, vegetation and trees. This will have ecological impact and would remove much of the native mature screening required to mitigate the landscape impact'*. In the circumstances, this appears to be sufficient grounds to permit what is effectively a two-step permitted relaxation in the provision of emerging visibility at access point B.
12. In the case of access point D, where concern was expressed in BN06 about the ability of HGVs to enter and leave simultaneously, the SACTN proposes a traffic management scheme in which HGVs

arriving from the west will be held at a layby some two miles west of the site and will be called in when the site can confirm that no HGVs are about to leave the site.

13. On that basis, the layouts currently offered for access points A, B and D1 appear satisfactory, subject to:
- visibility splays being cleared of foliage;
  - visibility being proven in the vertical plane;
  - the implementation of the traffic management measures proposed; and
  - the carrying out of Stage 1 and 2 Road Safety Audits.

### ***Diversions***

14. The SACTN contains an assessment of the volume of traffic likely to divert via the McDonalds roundabout at Swaffham and the Yaxham Road grade separated junction at Dereham, as a result of the implementation of left-in, left-out only operation at access options A and D1. This assessment appears to be soundly based and reveals that up to 65 vehicles per day (up to 36 per peak hour) are expected to U-turn at Swaffham and up to 49 per day (up to 20 per peak hour) are expected to U-turn at Dereham. These numbers can be accepted as being below the level that would normally trigger a requirement for a junction capacity assessment and, hence, that the impact of this additional traffic at these locations can be accepted as not 'severe'.

### ***Conclusion***

15. The updated layouts, traffic management arrangements and traffic flows presented in the SACTN provide sufficient confidence to allow AECOM to advise Highways England that they could now form the basis of an updated Statement of Common Ground indicating Highways England's agreement in principle with the access arrangements proposed.

Project:	<b>Highways England Spatial Planning Arrangement 2016-2020</b>	Job No:	<b>60600479/DN052.004</b>
Subject:	<b>Norfolk Vanguard Wind Farm - Cable Crossing Access Technical Note</b>		
Prepared by:	<b>Andrew Cuthbert</b>	Date:	<b>29<sup>th</sup> April 2019</b>
Checked by:	<b>Andrew Beard</b>	Date:	<b>30<sup>th</sup> April 2019</b>
Verified by:	<b>Liz Judson</b>	Date:	<b>30<sup>th</sup> April 2019</b>
Approved by:	<b>Andrew Cuthbert</b>	Date:	<b>2<sup>nd</sup> May 2019</b>

## Introduction

1. This Briefing Note (BN08) comprises a review of the '**A47 Cable Crossing Access Technical Note**' (CCATN), dated 17<sup>th</sup> April 2019, prepared by Royal Haskoning DHV (RHDHV) in respect of the access arrangements required to serve the proposed cable crossing of the A47 Trunk Road at Scarning, to the west of Dereham.
2. The cable crossing will use Trenchless Crossings (TC) to get the cables underneath the A47 without affecting the physical integrity of the carriageway or the users of the road. Details of the proposed TC methodology, including a Geotechnical Risk Report and a Preliminary Sources Study will follow post-consent. AECOM understand that this is acceptable to Highways England.
3. However, the TC works will require access to be gained to two construction compounds (TC1 north and south), to the north and south of the A47 respectively. The CCATN sets out how it is proposed to access these compounds. In addition, access to TC2 (Wendling Carr) and Mobilisation Area 2 (MA2-E) will use the same access point on the north side of the A47.
4. The locations of these work sites are illustrated in Figure 1 of the CCATN. There is an existing staggered priority junction between the A47 and Dale Road (to the south) and an un-named road to the north (referred to in the CCATN as Bushy Common Road) in the immediate vicinity and Highways England have previously expressed concern about the potential suitability of this low-standard junction to serve as access to these sites. The CCATN aims to address these concerns.
5. The following access arrangements are proposed:
  - Work sites TC1 (north), TC2 and MA2-E will gain access at location AC160, which is a field access on Bushy Common Road approximately 50m north of its junction with the A47. Vehicles using site access AC160 would turn on and off the A47 at its junction with Bushy Common Road, which would be improved to achieve compliance with the Design Manual for Roads and Bridges (DMRB), to provide adequate swept paths for heavy goods vehicles, adequate visibility splays and which would be restricted to left-in, left-out operation for site-related vehicles;
  - Work site TC1 (south) would share the access (AC163) proposed for Mobilisation Area MA1b. Site access AC163 is located on Dereham Road, some 500m to the south of the A47. Vehicles using site access AC163 would turn on and off the A47 at its junction with Dereham Road (known as the Greenbanks junction).
6. The locations of these access points are illustrated on Figure 1 below.

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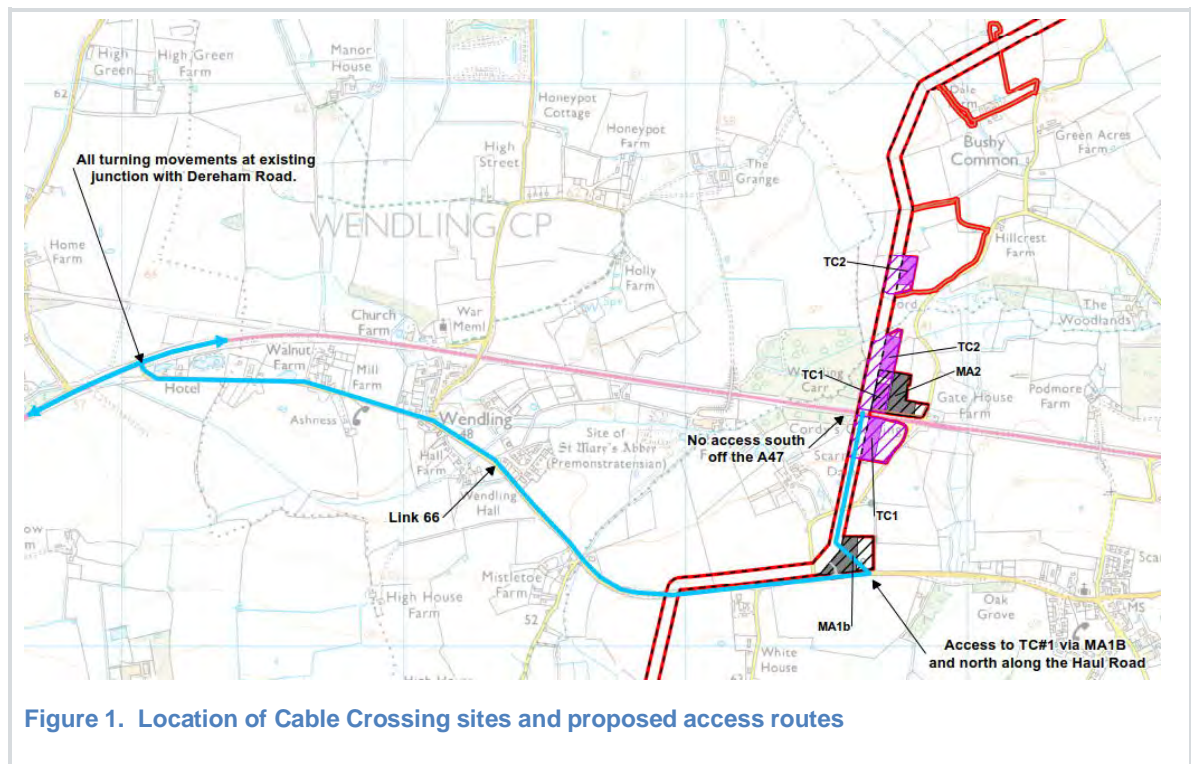


Figure 1. Location of Cable Crossing sites and proposed access routes

**Existing Conditions**

7. The A47 at this location is a rural single carriageway, believed to date back to the late 1970's and it provides a straight alignment likely to be characterised by high speeds;
8. The existing junctions with Dale Road and Bushy Common Road are low standard, simple T-junctions suitable to serve very minor country roads. They are not currently compliant with DMRB and the side road arms of the junctions rapidly narrow to tie in to the single track roads they serve. The existing junction with Dereham Road is of a higher standard, providing a ghost island right turn lane, generous corner radii and exit tapers and (subject to clearance of foliage) good visibility on and off the A47. Dereham Road is itself a former section of the A47, which was de-trunked when the current alignment was built.
9. The CCATN contains the following information about existing conditions at the A47/ Dale Road/ Bushy Common Road junction:
  - The A47 currently carries 15,380 vehicles per day (two-way AADT) with an HGV content of some 10%;
  - 85<sup>th</sup> percentile speeds were recorded as 62.6 mph (westbound) and 58.8 mph (eastbound);
  - The collision record contains 1 slight collision at the A47/ Dale Road junction within the five-year period 2014 - 2018.

No details are provided in the CCATN of the existing levels of use of either Bushy Common Road or Dereham Road, nor of the speed of traffic on these roads, nor of the collision record at the A47/ Dereham Road junction.

10. AECOM can accept that existing traffic flows using Bushy Common Road are likely to be minimal and that the impact of construction traffic on the A47/ Dereham Road junction is unlikely to be significant.
11. AECOM have briefly reviewed Crashmap in respect of the collision record at the A47/ Dereham Road junction and there appear to have been no collisions there within the last 5 years.

## Access Proposals

12. The CCATN contains the following drawings:

- a general arrangement drawing of the proposed layout of site access AC160 off Bushy Common Road and the layout of the proposed upgrade to the layout of the A47/ Bushy Common Road junction (PB4476-025 rev D0.1);
- swept path plots for the proposed layout of the A47/ Bushy Common junction (PB4476-026 & 027 rev D0.1);
- swept path plots for the existing layout of the A47/ Dereham Road junction (PB4476-028 & 029 rev D0.1).

(it should be noted that the scale of these latter two drawings appears to be incorrect, being stated as 1:250 at A3, whereas they appear to be 1:500).

13. The CCATN also contains details of the volume of traffic likely to be generated by the site compounds concerned and the durations over which they will be operating at 'peak' and 'average' levels of activity.

14. AECOM's review of the layouts and the traffic flows reveals the following:

Item	Site Access AC160	A47/ Bushy Common Road	A47/ Dereham Road
Drawing numbers	PB4476-DR025/ D0.1 PB4476-DR026/ D0.1 PB4476-DR027/ D0.1	PB4476-DR025/ D0.1 PB4476-DR026/ D0.1 PB4476-DR027/ D0.1	PB4476-DR028/ D0.1 PB4476-DR029/ D0.1
Junction type	Simple priority junction (assumed to be limited to left-in, right-out operation for site traffic)	Simple priority junction, to be limited to left-in, left-out operation for site traffic	Ghost island priority junction
Peak level of traffic use	60 light vehs/ day; 144 HGV/ day; 30 light vehs/ peak hr; 15 HGV/ peak hr.	60 light vehs/ day; 144 HGV/ day; 30 light vehs / peak hr; 15 HGV/ peak hr.	60 light vehs/ day; 120 HGV/ day; 30 light vehs / peak hr 12 HGV/ peak hr.
Duration of use	Up to 58 weeks in total, of which up to 23 weeks at the peak level of use	Up to 58 weeks in total, of which up to 23 weeks at the peak level of use	Not explicitly stated - likely to be of similar duration
Design speed of main road adopted	Not stated	100 km/hr	100 km/hr
Corner radii	15m	15m	20m
Exit tapers	25m @1:10	25m @1:10	23m @1:5 (estimated)
Visibility splays (assumes existing vegetation to be cleared/maintained as required) <u>NB evidence still to be submitted that these can be proven in the vertical plane</u>	2.4 x 22m to left; 2.4 x 45m to right (**)	4.5 x 215m	4.5 x 215m
Swept path plots	These all show that HGVs can complete their turns without clipping kerb lines, and without encroaching on the wrong side of the A47 or the minor road and that HGVs can enter and leave simultaneously without their swept paths conflicting.		

(\*\*) - visibility actually appears to be available as far as the kerb line of the A47 some 48m away

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## **Commentary - Site Access Junction**

15. The layout of site access junction AC160 illustrated on Drawing PB4476-DR025 D0.1 appears to provide satisfactory geometry to accommodate heavy vehicles turning to and from the A47. There is no suggestion that the use of this junction by vehicles accessing the works would give rise to a queue of stationary traffic within Bushy Common Road waiting to enter the site, such as would risk generating a queue of traffic back to the A47, some 50m away.
16. It is not explicitly stated in the CCATN but AECOM assume that heavy vehicles will not be permitted to enter or leave the site to/ from the minor road to the north. The corner radius provided is minimal and would not facilitate access even by light vehicles, such as would be generated by any members of the site staff who happen to live in the area served by Bushy Common Road. This is an issue for Norfolk County Council as Local Highway Authority.
17. The visibility splay to the right illustrated for the site access junction appears to provide visibility from an x-distance of 2.4m back into the minor arm all the way to the A47, some 50m away. Whilst this does not strictly comply with the requirements of TD41 Table 2/1, a visibility splay as far as the preceding junction should in practice be adequate to allow the driver of a vehicle emerging from the site access to see a vehicle approaching from the A47 at up to 30 mph. Speeds around the 15m corner radii between the A47 and Bushy Common Road are likely to be less than this. The relaxation of the X distance from 4.5m to 2.4m would be permitted in this location (TD41 para 2.21 refers).
18. The visibility splay to the left illustrated for the site access junction provides only 2.4m x 22m emerging visibility. In the absence of speed survey data for existing users of Bushy Common Road, it is not possible to say whether this would be adequate. However, this is an issue for Norfolk County Council as Local Highway Authority.

## **Commentary - A47/ Bushy Common Road Junction**

19. The layout of the improved junction between the A47 and Bushy Common Road, illustrated on Drawing PB4476-DR025 D0.1, appears to provide in full for the requirements of DMRB Design Standard TD42 for this type of junction. In addition, the swept path plots shown on Drawings PB4476-DR026 and 027 show that it can accommodate heavy vehicles turning on and off the A47 without clipping kerb lines, and without encroaching on the wrong side of the A47 or the minor road.
20. AECOM note that the 4.5 x 215m visibility splays proposed are currently obstructed by overgrowth of foliage (source: Google street view images dated October 2008 and June 2017). The CCATN acknowledges that this foliage will have to be cleared.
21. Whilst the visibility splays have not been proved in the vertical plane, the local topography is generally flat, although there appears to be a slight rise towards the back of the verge on the north side of the A47 to the west of the junction and this should be addressed as the design of the junction progresses. AECOM note that the land behind the highway verge lies within the red line boundary of the development and it is therefore within the power of the Applicant to address any problems.
22. The CCATN makes a commitment to operating the A47/ Bushy Common Road as a left-in, left-out only junction. This is to be welcomed, since right turns into and out of Bushy Common Road by large numbers of HGVs has the potential to become problematic with a risk that such vehicles might become stationary within the running lane of the A47 when waiting to turn right into the minor arm of the junction.
23. However, AECOM note that this will be more difficult to enforce here, where members of the general public will still be allowed to turn right into and out of the side road, than it would be at the Sub station accesses, where the right turn ban can potentially be applied to all traffic. An enhanced monitoring regime may be necessary to ensure compliance with the right turn ban and the signposted diversion.



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## **Commentary - A47/ Dereham Road (Greenbanks) Junction**

24. This is an existing junction of a relatively high standard. Whilst it does not appear to conform exactly to current DMRB standards, it broadly resembles the layout prescribed for a ghost island junction where the design speed of the main road is 100 km/hr, with corner radii of 20m, consistent with the highest standard required by TD42 at Para 7.17(e). There is a merge taper on to the A47 westbound which would not be provided were this junction being built today (TD42 para 7.59 refers). The swept path plots illustrated on Drawings PB4476 028 and 029 show that the junction can accommodate heavy vehicles turning on and off the A47 without clipping kerb lines, and without encroaching on the wrong side of the A47 or the minor road. No modifications are proposed at this junction to mitigate the impact of the proposed development and AECOM agree that none are required, other than the clearance of overgrown foliage from visibility splays.

## **Access Arrangements - Conclusion**

25. There is no evidence that a Stage 1 Road Safety Audit has been undertaken in respect of these layouts. The CCATN contains an undertaking to carry out both a Stage 1 and a Stage 2 Road Safety Audit and to prepare detailed Traffic and Access Management Plans post consent.
26. On that basis, the layouts currently offered for access to the Cable Crossing work sites at Scarning appear satisfactory, subject to:
- visibility splays being cleared of foliage;
  - visibility being proven in the vertical plane;
  - the implementation of the traffic management measures proposed, including the monitoring of banned right turns; and
  - the carrying out of Stage 1 and 2 Road Safety Audits.

## **Diversions**

27. The CCATN contains an assessment of the volume of traffic likely to divert via the McDonalds roundabout at Swaffham and the Yaxham Road grade separated junction at Dereham, as a result of the implementation of left-in, left-out only operation at the A47/ Bushy Common Road. This assessment appears to be soundly based and reveals that up to 76 vehicles per day (up to 31 per peak hour) are expected to U-turn at Swaffham and up to 54 per day (up to 9 per peak hour) are expected to U-turn at Dereham.
28. The CCATN also presents a cumulative assessment, for any period in which the Cable Crossing works at Scarning overlap with that for the Sub Stations at Necton. This reveals that up to 140 vehicles per day (41 per peak hour) would be expected to U-turn at Swaffham and up to 104 per day (25 per peak hour) at Dereham.
29. These numbers can be accepted as being below the level that would normally trigger a requirement for a junction capacity assessment and, hence, that the impact of this additional traffic at these locations can be accepted as not 'severe'.

## **Conclusion**

30. The updated layouts, traffic management arrangements and traffic flows presented in the CCATN provide sufficient confidence to allow AECOM to advise Highways England that they could now form the basis of an updated Statement of Common Ground indicating Highways England's agreement in principle to the access arrangements proposed.