Norfolk Vanguard Offshore Wind Farm

Statement of Common Ground

Highways England

Applicant: Norfolk Vanguard Limited
Document Reference: REP1-SOCG-7.1

Date: January 2019
Author: Royal HaskoningDHV

Photo: Kentish Flats Offshore Wind Farm

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
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Glossary

AMP	Access Management Plan
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
LiDAR	Light Detection and Ranging
MW	MegaWatt
NV	Norfolk Vanguard
OWF	Offshore Wind Farm
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
RWCS	Realistic worst case scenario
SoCG	Statement of Common Ground
TMP	Traffic Management Plan
TP	Travel Plan

Terminology

Array cables	Cables which link the wind turbines and the offshore electrical platform.
Landfall	Where the offshore cables come ashore at Happisburgh South
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
National Grid 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
Offshore accommodation platform	A fixed structure (if required) providing accommodation for offshore personnel. An accommodation vessel may be used instead
Offshore electrical platform	A fixed structure located within the wind farm area, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Onshore cable route	The 45m easement which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore project	A compound containing electrical equipment to enable connection to the

substation	National Grid. The substation will convert the exported power from High Voltage Direct Current (HVDC) to High Voltage Alternating Current (HVAC), to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
The OWF sites	The two distinct offshore wind farm areas, Norfolk Vanguard East and Norfolk Vanguard West.
Trenchless crossing zone	Temporary areas required for trenchless crossing works (e.g. HDD).

1 INTRODUCTION

1. This Statement of Common Ground (SoCG) has been prepared between Highways England and Norfolk Vanguard Limited (hereafter the Applicant) to set out the areas of agreement and disagreement in relation to the Development Consent Order (DCO) application for the Norfolk Vanguard Offshore Wind Farm (hereafter 'the project').

2. This SoCG comprises an agreement log which has been structured to reflect topics of interest to Highways England on the Norfolk Vanguard DCO application (hereafter 'the Application'). Topic specific matters agreed, not agreed and actions to resolve between Highways England and the Applicant are included.

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. Points 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 Vanguard Offshore Wind Farm (OWF) and associated infrastructure. The OWF comprises two distinct areas, Norfolk Vanguard (NV) East and NV West ('the OWF sites'), which are located in the southern North Sea, approximately 70km and 47km from the nearest point of the Norfolk coast respectively. The location of the OWF sites is shown in Chapter 5 Project Description Figure 5.1 of the Application. The OWF would be connected to the shore by offshore export cables installed within the offshore cable corridor from the OWF sites to a landfall point at Happisburgh South, Norfolk. From there, onshore cables would transport power over approximately 60km to the onshore project substation and grid connection point near Necton, Norfolk.

5. Once built, Norfolk Vanguard would have an export capacity of up to 1800MW, with the offshore components comprising:

- Wind turbines;
- Offshore electrical platforms;
- Accommodation platforms;
- Met masts;
- Measuring equipment (LiDAR and wave buoys);
- Array cables;
- Interconnector cables; and
- Export cables.

6. The key onshore components of the project are as follows:

- Landfall;
- Onshore cable route, accesses, trenchless crossing technique (e.g. Horizontal Directional Drilling (HDD)) zones and mobilisation areas;
- Onshore project substation; and
- Extension to the existing Necton National Grid substation and overhead line modifications.

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).

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. During formal (Section 42) consultation, Highways England provided comments on the Preliminary Environmental Information Report (PEIR) by way of a letter dated 7th December 2017.

10. Further to the statutory Section 42 consultation, several meetings were held with Highways England through the Evidence Plan Process. These are detailed throughout the SoCG and minutes of the meetings are provided in Appendices 9.15 – 9.26 (pre-Section 42) and Appendices 25.1 – 25.9 (post-Section 42) of the Consultation Report (document reference 5.1 of the Application).

1.2.2 Post-Application

11. Since the submission of the application the Norfolk Vanguard transport team has been in contact with Highways England to continue discussions regarding the strategy for accessing the works from the A47. This SoCG is a live document that will be updated as required during the examination.

2 STATEMENT OF COMMON GROUND

12. Within the sections and tables below the different topics for areas of agreement and disagreement between Highways England and the Applicant are set out.

2.1 Traffic and Transport

13. 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), provides an assessment of the significance of these impacts.

14. Table 1 provides an overview of meetings and correspondence undertaken with Highways England regarding traffic and transport.

15. Table 2 provides areas of agreement and disagreement regarding traffic and transport.

16. Further details on the Evidence Plan for traffic and transport can be found in Appendix 9.21 and Appendix 25.5 of the Consultation Report (document reference 5.1 of the Application).

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

Date	Contact Type	Topic
Pre-Application		
14th January 2017	Email from the Applicant	Provision of the Traffic and Transport, Air Quality and Noise Method Statements (Appendix 9.4 of the Consultation Report).
27th February 2017	Traffic and Transport Expert Topic Group (ETG) Meeting	Discussion of Scoping responses and approach to Environmental Impact Assessment (EIA) (minutes provided in Appendix 9.21 of the Consultation Report).
7th March 2017	Email from Highways England	Traffic and Transport Method Statement Response: Raised a potential impact on the A47 at the substation site near to Necton, requiring detailed analysis of traffic generation and a review of historic collisions.
17th July 2017	Onshore Traffic and Transport pre-Preliminary Environmental Information (PEI) ETG Meeting	Project update and overview of results to date (minutes provided in Appendix 9.21 of the Consultation Report).
7th December 2017	Email from Highways England	PEIR response
25th January 2018	Onshore Traffic and Transport ETG meeting – PEI Responses	Access options from the A47 discussed, and conversation regarding junction sensitivity tests (minutes provided in Appendix 25.5 of the Consultation Report).

Date	Contact Type	Topic
12th April 2018	Email from the Applicant	Provision of A47 Access Technical Note (provided in Appendix 25.12 of the Consultation Report).
Post-Application		
16th August 2018	Email from Highways England	Provision of a Briefing Note (AECOM BN03) covering A47 access requirements as set out in the application, which is attached as Appendix A to this SOCG.
24th August 2018	Email from Highways England	Request for clarification on aspects of the proposed A47 accesses.
10th December 2018	Email from the Applicant	Provision of an A47 Substation Access Briefing Note (the SABN) which is attached as Appendix B to this SOCG.

Table 2 Statement of Common Ground - traffic and transport

Topic	Norfolk Vanguard Limited position	Highways England position	Final position
Policy and Legislation			
Legislation	The legislation adopted for Norfolk Vanguard 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 Vanguard accords with national renewable energy targets and objectives. This was noted in Highways England's PEIR response in November 2017.	Agreed	It is agreed by both parties that Norfolk Vanguard accords with national renewable energy targets and objectives
Environmental Impact Assessment			
Existing Environment	Sufficient survey data (extent/duration) has been collected to inform the characterisation of the baseline environment.	Agreed, with the exception of the specific items to be covered in the CCATN and the SACTN as listed below.	It is agreed by both parties that once the additional data to be contained in the CCATN and SACTN referred to below is made available, sufficient survey data will have 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	It is agreed by both parties that the transport impact assessment methodologies are appropriate.

Topic	Norfolk Vanguard Limited position	Highways England position	Final position
	The methodology adopted for the Great Yarmouth port assessment (onshore construction traffic derived from the port) is acceptable. This was discussed and agreed in communications following the ETG meeting in July 2017.	Agreed	Both parties agree the assessment of onshore construction traffic derived from Great Yarmouth port is acceptable.
	The assessment adequately defines the realistic worst case scenario (RWCS) for traffic demand. This was discussed and agreed (in principle) during the ETG meeting in July 2017.	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.	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 with the exception of the specific items to be covered in the CCATN and the SACTN as listed below.	It is agreed by both parties that, once the additional analyses to be included within the CCATN and SACTN are provided, the assessment will adequately characterise the traffic and transport environment.
Assessment findings	The assessment of impacts for construction, operation and decommissioning presented are appropriate and adhere to the agreed assessment methodology.	Agreed.	

Topic	Norfolk Vanguard 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 reference 8.8, 8.9 and 8.10), 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 on traffic and transport. This is secured through DCO Requirement 21. This was discussed and agreed (in principle) during the ETG meeting in July 2017.	Agreed, with the exception of the specific issues listed below.	It is agreed by both parties that the production of a final TMP, TP and AMP will provide sufficient mitigation, with the exception of the specific issues listed below, which are still under discussion.
A47 sensitive junctions 1 - 4 in the Great Yarmouth and Acle areas.	To facilitate the assessment of driver delay, Norfolk County Council and Highways England have identified four junctions that they consider most sensitive (ES Chapter 24 Traffic and Transport, section 24.6.5). Namely: 1. A12 Gapton Hall Roundabout; 2. A47 Vauxhall Roundabout; 3. A149 Fuller's Hill Roundabout; and 4. Junction of the A47 and the A1064. The project's peak hour traffic demand has been assigned to the sensitive junctions to facilitate an assessment of impact significance.	Highways England are in the process of providing a response to the issues identified in the ES at these locations and will anticipate requiring more specific measures to be brought forward through the TMP in respect of these junctions.	Under discussion.

Topic	Norfolk Vanguard Limited position	Highways England position	Final position
A47 Substation access at Necton	A Substation Access Briefing Note (SABN) related to access proposals off the A47(T) has been submitted to Highways England for review. The SABN clarifies the approach the Applicant will take for subsequent assessment and design work to ensure that the final junction design will be undertaken to the satisfaction of Highways England. 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. Following agreement of the SABN (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).	Not agreed AECOM BN03 and the email dated 24th August 2018 provide details of a number of matters of concern to Highways England. These were partially resolved through the provision of the Substation Access Briefing Note (SABN), which Highways England are in the process of responding to; and through the production of an A47 Substations Access Clarifications Technical Note (SACTN), which is anticipated to be provided during Q1 2019.	In discussion. Issues previously raised are in the process of being addressed.

Topic	Norfolk Vanguard Limited position	Highways England position	Final position
A47 Cable Crossing access at Scarning	A separate technical note will be produced in January 2019 detailing the access strategy for the A47 cable crossing north west of Scarning. The note will include the following workstreams: 1. Existing baseline information (traffic flows, speed and collision data); 2. Proposed Development turning count movements; 3. Proposed access locations (with scaled junction layouts, visibility splays and SPA drawings); and 4. Further potential mitigation measures. The aim of the CCATN is in pursuant of Highways England's 'Agreement in Principle' for the A47 cable crossing access strategy.	AECOM BN01 and the email dated 24th August 2018 provide details of a number of matters of concern to Highways England. These have not yet been addressed. Highways England understand that an A47 Cable Crossing Access Technical Note (CCATN) is in preparation and will be provided during Q1 2019.	Under discussion. Issues previously raised are in the process of being addressed.
Cumulative Impact Assessment (CIA)			
Methodology	The methodology adopted for the CIA and projects assessed for cumulative impacts with Norfolk Vanguard is appropriate. This was discussed and agreed via email communications in March 2018.	Agreed	The CIA methodology and projects identified are appropriate.
Draft Development Consent Order (DCO)			
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.	On-going discussion	To be agreed once the outstanding issues listed above have been addressed.

The undersigned agree to the provisions within this SOCG

Name	Eric Cooper
Position	Team Leader, Spatial Planning
On behalf of	Highways England
Date	16 January 2019

Name	Rebecca Sherwood
Position	Norfolk Vanguard Consents Manager
On behalf of	Norfolk Vanguard Ltd (the Applicant)
Date	16 January 2019

APPENDIX A - AECOM Briefing Note 03

Briefing Note 03

Project:	**Highways England Spatial Planning Arrangement 2016-2020**	Job No:	**60506522 / DN052.002**
Subject:	**Norfolk Vanguard Wind Farm – A47 Substation Access Technical Note Review**		
Prepared by:	**Kelly Davis**	Date:	**11th May 2018**
Checked by:	**Andrew Cuthbert**	Date:	**16th May 2018**
Verified by:	**Liz Judson**	Date:	**17th May 2018**
Approved by:	**Andrew Cuthbert**	Date:	**17th May 2018**

Introduction

1. This Briefing Note provides a response to the Norfolk Vanguard Substation – A47 Substation Access Review Technical Note, 'the A47 Access TN', produced by Royal Haskoning DHV (RHDHV) on behalf of Vattenfall Wind Power Ltd, dated 23 March 2018 which relates to the Norfolk Vanguard Offshore Windfarm project.

2. This Briefing Note follows AECOM's previous reviews of the Traffic and Transport Method Statement and Preliminary Environmental Information Report (PEIR) which are documented in Briefing Notes 01 (March 2017) and 02 (December 2017) respectively.

3. 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. As part of the Norfolk Vanguard project, an extension to the existing substation will be required as well as construction of a new onshore substation (at the Necton site) for the Norfolk Vanguard Wind Farm.

4. The A47 Access TN refers to the access to the onshore sub-station and proposed sub-station extension during the construction phase of the Norfolk Vanguard project.

5. A number of access options off the A47 have been presented, which Highways England have been invited to consider and comment on. Each option has been assessed against a set of criteria including highway safety, environmental impact and infrastructure requirements. Speed, volume and historic Personal Injury Accident (PIA) data for this section of the A47 has also been provided.

6. The data provided shows that there are no existing accident patterns or trends and that average speeds recorded are within the range of 50-60mph. Therefore, in terms of visibility splays from the proposed accesses, 215m is required to be compliant with DMRB standards for a 100kph design speed.

Substation Access (Access Options A, A1 and B)

7. During previous consultation discussions for the Norfolk Vanguard project, Highways England explained to RHDHV that the Policy set out in DfT Circular 02/2013 would not prohibit a new substation access point being created on the A47, but that the preference would be to use an existing access.

Direct Tel: +44 (0)1245 77 1255
T +44 (0)1245 771200
E Kelly.Davis2@aecom.com
www.aecom.com

Saxon House
27 Duke Street
Chelmsford, Essex
CM1 1HT

8. RHDHV have since explained that two substation accesses, to the south of the A47, are required. The existing access would be used for construction traffic relating to the extension of the existing National Grid substation and another access would be needed for the construction of the offshore substation for the Norfolk Vanguard Wind Farm. Access options A, A1 and B have been considered as presented in drawing no. PB4476-003-00X-002 of the A47 Access TN.

9. AECOM understand from our previous review of the PEIR that the construction period for the substations will be approximately 18 months. During this time, a total of 164 vehicle movements a day are expected (84 HGVs and 80 light vehicles). Of these, 66 vehicle movements a day would be associated with the National Grid substation extension (26 HGVs and 40 light vehicles) and 98 would be associated with the Norfolk Vanguard onshore substation (58 HGVs and 40 light vehicles).

10. The existing National Grid substation near Necton is currently accessed via a priority T-junction off the A47 westbound carriageway, referred to in the A47 Access TN as 'Access A'. As the A47 Access TN explains, this access was upgraded in 2014 to accommodate construction vehicle access for the National Grid and Dudgeon Offshore Wind Farm substations, known as the Necton Electricity Substation (NES). RHDHV have acknowledged that the existing 'Access A' junction is sub-standard.

11. During the construction of the NES a traffic management strategy was employed which included a temporary right turn ban into and out of Access A. Instead construction traffic had to u-turn at either the A1075 junction at Dereham (to the east) or the Norwich Road roundabout at Swaffham (to the west). The A47 Access TN highlights that if a similar traffic management strategy was employed for Norfolk Vanguard, it is forecast to result in 79 HGVs a day making a 15.5 mile diversion via Dereham and suggests that a full assessment of the impact of the diversion route would be required. **AECOM agree that the junctions to the east and west of the site access would require capacity assessments if this were the case.**

12. As an alternative, 'Access A1' has been considered at this location to upgrade the existing junction to a DMRB compliant layout which would allow right turns into and out of the substation access.

13. Access A1 would require widening of the A47 carriageway to accommodate a right turn lane and ghost island, construction of a new bellmouth and removal of vegetation associated with the carriageway widening to allow for required visibility splays.

14. Although Access A1 would offset some of the concerns regarding the diversion route and resulting impact this would have on the SRN, the construction of the upgraded junction itself would result in some disruption to A47 through traffic near to the substation site.

15. A secondary access to the Norfolk Vanguard substation site is required to the south of the A47. This is proposed to be 'Access B' which is an existing farm track just north of the Spicer's Corner junction. RHDHV recognise that Access B would need to be upgraded to make it DMRB compliant. This would involve creating a new access point to the south of the existing farm track to ensure adequate spacing between the Spicer's Corner junction (to the north of the A47) and the new Access B junction.

16. Access B would require widening of the A47 carriageway to accommodate a right turn lane and ghost island and construction of a new bellmouth.

17. Section 7 of the A47 Access TN scores the proposed access options against the set of criteria mentioned above (para 4) and concludes that Access A, A1 and B score identically. AECOM agree that either the proposal for Access A (with a traffic management strategy for banned turns employed) or an upgraded Access A1 (with right turn lane) appear suitable.

18. **Highways England will require scale plans of the proposed Access A/A1 and Access B junction layouts (with dimensions and visibility splays shown) before agreeing to the proposals in principle. Any agreement would also be subject to acceptance by NCC and a Stage 1 Road Safety Audit.**

19. **If Access A is progressed, Highways England would require the temporary traffic management strategy or construction management plan for review and an assessment of the impact of u-turning traffic on the A47/ A1075 junction at Dereham.**

Access to the north of A47 (Access Options C, D and D1)

20. As part of the proposed National Grid substation extension, RHDHV have advised that access to a field containing an electricity pylon to the north of the A47 (off the eastbound carriageway) will be required for overhead line modification works. The A47 Access TN explains that these works will comprise two construction peaks, each lasting one week with a gap of 4-6 months between each peak. During the construction peaks a total of 48 vehicle movements a day (40 HGVs and 8 light vehicles) have been forecast. Access options C, D and D1 have been considered as presented in drawing no. PB4476-003-00X-002 of the A47 Access TN.

21. Some minor works would be required to allow HGV's to use any of the proposed accesses to the north of the A47. Due to the relatively short construction periods, RHDHV assert that fully compliant DMRB upgrades to the existing access options (with right turn lanes and ghost islands) would be disproportionate to the impact of the construction activity. AECOM agree with this as the works and traffic management required to implement the junction upgrade works would be likely to take longer than the construction periods for the overhead line modification works themselves.

22. After assessing the various access options against the set of criteria mentioned above (para 4), the A47 Access TN concludes that Access Option D1 is the preferred option. Although Option D1 would require a temporary speed restriction in order to achieve sufficient visibility splays in the vertical plane, AECOM agree that this option appears to be the most suitable as Options C and D are too narrow to accommodate HGVs exiting and entering the access simultaneously and hence carry a risk of vehicles queuing back and causing an obstruction to A47 through traffic.

23. The works required to facilitate access via Option D1 would include removal of existing vegetation to allow for sufficient visibility splays and widening of the existing access to allow the passing of two HGVs.

24. **AECOM recommend that Highways England state their preference for Option D1 as the most suitable access to the north of the A47 for the overhead line modification works.**

25. **If this option is progressed, Highways England will require scale plans of the proposed Access D1 junction layout (with dimensions and visibility splays shown) before agreeing to the proposal in principle. Any agreement would also be subject to acceptance by NCC and a Stage 1 Road Safety Audit.**

26. **Highways England would also require the temporary traffic management strategy or construction management plan for scrutiny.**

Appendix B - Substation Access Briefing Note

Note / Memo

HaskoningDHV UK Ltd.
Transport & Planning

To: Highways England - Shamsul Hoque
From: Ryan Eldon
Date: 07 December 2018
Copy: Norfolk Vanguard Ltd
Our reference: T&PPB4476N006F2.0
Classification: Internal use only

Subject: Norfolk Vanguard - A47 Substation Access Briefing Note

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1 Introduction

This A47 Substation Access Briefing Note (SABN) has been prepared by Royal HaskoningDHV on behalf of Norfolk Vanguard Ltd in relation to the Norfolk Vanguard Offshore Wind Farm ('the Project').

The SABN has been produced to provide clarification to Highways England of the ongoing and future workstreams which will provide definitive answers to the raised comments and concerns regarding the A47 Substation Access Technical Note (SATN), (T&P-PB4476-N002-F2.0) (see Appendix A)

The workstreams outlined are pursuant of Highways England's 'Agreement in Principle' for the A47 substation access strategy proposed for the Norfolk Vanguard Project.

Highways England are requested to review the SABN and confirm the workstreams and clarifications are appropriate to address their representations. Reference to the SABN has been included within the Statement of Common Ground between Norfolk Vanguard Ltd and Highways England which has been requested by The Planning Inspectorate in their Rule 6 letter (published 9 November) and which must be submitted by Deadline 1 on Monday 14 January 2019.

2 Future Workstreams

Table 1 details the comments raised by HE, through their traffic consultants' (Aecom) review of the SATN contained within the Briefing Note 03 (BN03), (60506522 / DN052.002) and via recent email correspondence. In response, RHDHV have detailed the planned workstreams that will be undertaken to address the concerns. A projected timeline for providing the results to the workstreams has also been detailed.

Table 1: Comments, Response and Timeframes

Source	Reference	Highways England Comment	RHDHV Response and Timeline
BN03 (Aecom)	Para 11	Junctions to the east and west of the existing site access A would require capacity assessments if a 'Right Turn' ban traffic Management system was proposed.	To determine the impact of the proposed temporary Traffic Management Plans (TMP) on junction capacity, four manual classified turning count surveys are to be undertaken Q1 2019 at the following locations; 1. A47 / Norwich Road (east of Swaffham) 2. A47 (off ramp) / A1075 (Tavern Lane) 3. A1075 (Tavern Lane) / A1075 (Yaxham Road)

Source	Reference	Highways England Comment	RHDHV Response and Timeline
			4. A1075 (Yaxham Road) / A47 (on ramp) Results to be contained within an 'A47 Substation Access Clarifications Technical Note' (SACTN) to be distributed Q1 2019.
	Para 18	Highways England will require scale plans of the proposed Access A/A1 and Access B junction layouts (with dimensions and visibility splays shown) before agreeing to the proposals in principle. Any agreement would also be subject to acceptance by NCC and a Stage 1 Road Safety Audit.	Access A/A1 and B scaled junction layouts, visibility splays and Swept Path Analysis (SPA) drawings to be provided by 21 December 2018 for HE's review. Stage 1 RSAs to be undertaken in January 2019.
	Para 19	If Access A is progressed, Highways England would require the temporary traffic management strategy or construction management plan for review and an assessment of the impact of u-turning traffic on the A47/ A1075 junction at Dereham.	Access A Temporary Traffic Management Plan to be contained with the SACTN to be distributed mid-February. See response to Paragraph 11 reference for u-turning traffic impact.
	Para 24	AECOM recommend that Highways England state their preference for Option D1 as the most suitable access to the north of the A47 for the overhead line modification works.	Access D1 is to be confirmed as the preferred northern access off the A47 within the SACTN. Access D1 scaled junction layouts, visibility splays and SPA drawings to be provided by 21 December 2018 for review. Access D1 Temporary Traffic Management Plan to be contained with the SACTN to be distributed mid-February 2019.
	Para 25	If this option is progressed, Highways England will require scale plans of the proposed Access D1 junction layout (with dimensions and visibility splays shown) before agreeing to the proposal in principle. Any agreement would also be subject to acceptance by NCC and a Stage 1 Road Safety Audit.	
	Para 26	Highways England would also require the temporary traffic management strategy or construction management plan for scrutiny.	
Email (Aecom)	Kathryn Carman	• A firm decision as to which of the various access points available has been chosen to access the work sites at the substation close to Necton; • Whether it is intended to operate these as full turning movement junctions or to restrict them to left-in, left-out operation; o If left-in, left-out operation is selected, a firm indication as to the diversionary routes to be used by vehicles not permitted to make the right turns into and out of the site(s) and evidence to show how these diversion routes will be enforced; • Detailed scale plans of the proposed substation accesses; • Plans showing forward and emerging visibility splays achievable for traffic entering and leaving the Trunk Road; • Plans showing the swept paths of the largest HGVs likely to use them on a regular basis, to show that there will be no conflict between vehicles entering and leaving the site simultaneously (this is in addition to the swept path plots for the abnormal load vehicle which we have located in the OTMP); • Any Stage 1 Road Safety Audits undertaken in respect of the intended access points;	See responses to BN03 comments. A separate A47 Cable Crossing Access Technical Note will be produced in January 2019 for HE's review. See section 3.1 for further details.

Source	Reference	Highways England Comment	RHDHV Response and Timeline
		• Any similar supporting material in respect of the access to the work sites for the proposed cable crossing of the A47 to the west of Dereham; and • Any other supporting documentation, as recommended in our Briefing Note 03.	

3 Further Clarifications

3.1 A47 Substation Access Clarifications Technical Note (SACTN)

The previous A47 SATN was based on the traffic demand presented within the Norfolk Vanguard Preliminary Environmental Information Report (PEIR). The SACTN will update the PEIR numbers to the final forecasted vehicle trips extrapolated from the recently submitted Traffic and Transport Chapter of the Norfolk Vanguard DCO Application Environment Statement (PB4476-005-024)

The SACTN will detail the peak HGV turning movements and the programmed length of duration alongside the average daily turning movements and duration for comparison purposes.

3.2 A47 Cable Crossing Access Technical Note (CCATN)

A separate technical note will be produced in January 2019 detailing the access strategy for the A47 cable crossing north west of Scarning. The note will include the following workstreams;

- Existing baseline information (traffic flows, speed and collision data);
- Proposed Development turning count movements;
- Proposed access locations (with scaled junction layouts, visibility splays and SPA drawings); and
- Further potential mitigation measures.

The aim of the CCATN is in pursuant of Highways England's 'Agreement in Principle' for the A47 cable crossing access strategy.

3.3 Future Engagement

It is planned to meet with Highways England at a future Expert Topic Group meeting to be arranged for the Norfolk Boreas Project (mid Q1 2019) where RHDHV can present the outcomes of the SACTN and CCATN and provided to HE for review.

Appendix A

Note / Memo

HaskoningDHV UK Ltd.
Transport & Planning

To:	Norfolk Vanguard Ltd
From:	Royal HaskoningDHV
Date:	23 March 2018
Copy:	Norfolk Vanguard Ltd
Our reference:	T&PPB4476N002F2.0
Classification:	Project related

Subject: **Norfolk Vanguard Substation – A47 Substation Access Review**

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1 Introduction

This Technical Note (TN) has been prepared on behalf of Norfolk Vanguard Ltd in relation to the Norfolk Vanguard Offshore Windfarm Project ('the Norfolk Vanguard Project'). The note sets out a review of the Norfolk Vanguard Project onshore access options from the A47.

During the construction phase of the Norfolk Vanguard Project, Heavy Goods Vehicles (HGVs) and workforce traffic will require access to project infrastructure sites south of the A47, namely the:

- Onshore Project Substation;
- Mobilisation Area 1 (MA1); and
- National Grid Substation Extension (NGSE).

A subset of National Grid's construction traffic will need to access the field to the north of the A47 (where an electricity pylon is situated) to complete the Overhead Line Modification (OHLM) works.

Figure 01 details the project infrastructure sites and the associated access study area. The purpose of this note is to evaluate potential access options to inform the Norfolk Vanguard Project design.

1.1 Engagement

To facilitate stakeholder engagement a Transport Expert Topic Group (ETG) was established, consisting of transportation professionals from Norfolk County Council, Highways England and Norfolk Vanguard Ltd. The ETG raised a number of issues with respect to potential access off the A47 all of which have informed this technical note. **Table 1.1** details ETG and other relevant input.

Table 1.1: A47 Consultation Feedback

Consultee	Date	Comment
Highways England	27 February 2017: First Expert Topic Group Meeting	The proposed existing access off the A47 to substation site was presented. It was agreed that a review of the accident record would be undertaken if this facility was to be relied upon. Highways England explained that current policy does

		not prevent a new access from the A47 from being created, however, preference was for an existing access point to be utilised.
Highways England	7 March 2017: EIA Traffic & Transport Method Statement Response (Red:60506522/DN052.0002 BN01)	Impact on A47 at substation site near to Necton raised, requiring detailed analysis of traffic generation and a review of historic collisions.
Highways England and Norfolk county Council	17 July 2017: Second Expert Topic Group Meeting	Queries raised relating to the existing National Grid substation extension site access and potential for a new access north of the site. NCC noted a historic u-turn strategy at Dereham requiring HGV traffic to left turn into Substation Site.
Local Stakeholders	8 September 2017: Site visit with local stakeholders	Stakeholders voiced concerns in utilising a u-turn strategy at Dereham to negate the need for right turns into the substation site.
National Grid	Email correspondence	Liaison with National Grid to determine total quantity of vehicles required to access north of the A47.

2 Access Options

The accesses to be reviewed are detailed within **Table 2.1** together with the associated infrastructure sites served. The access locations are presented in **Figure 02**.

Table 2.1: Potential Accesses

Access ID	Access Description	Access to Infrastructure	Eastings	Northings
A	Existing Necton Electricity Substation access	NV onshore project substation NV MA1 NGSE	588435	310734
B	Existing Farm access	NV onshore project substation NV MA1	589285	311409
C	Existing Field and Residential Access	NG OHLM	588482	310789
D	Existing Field and Residential Access	NG OHLM	588882	311088
D1	Existing Field Access	NG OHLM	588668	310932

2.1 Access A – Existing Necton Electricity Substation Access

Access A was historically used by famers to access the field south of the A47. In 2014 the access was upgraded to accommodate construction vehicle access for the National Grid and Dudgeon Offshore Windfarm substations collectively known as the Necton Electricity Substation (NES). The upgrade

comprised a simple T junction with grasscrete ‘over-run’ for abnormal loads. Construction work for the NES was completed by early 2017.

At present the access is currently shared by local farmers accessing farmland and by operational and maintenance vehicles in servicing the NES.

2.2 Access B – Existing Farm Access

Access B is a field and farm access leading south east off the A47. It comprises of a loose gravel track allowing access to various farmland and farm buildings.

2.3 Access C – Existing Field and Residential Access

Access C is a metalled access with a short driveway leading to a gated residential property. At this point the access track turns north east and runs parallel to the A47 through a wooded area for approximately 230m before entering the field with the electricity pylon. This access was proposed by National Grid as their preferred access point.

2.4 Access D – Existing Residential and Field Access

Access D is a field access located on Moor Lane approximately 270m north west of its junction with the A47. The A47/Moor Lane junction is a metalled bellmouth junction leading to a single vehicle track. Moor Lane is used to access farmland, residential properties and a number of farm buildings. This access has been proposed as an alternative to Access C by National Grid.

2.5 Access D1 – Existing Field Access

Access D1 is an existing field access located on the northern verge of the A47 approximately 300 north east of the existing NES access. The access allows immediate access to the field with the electricity pylon. This access has been identified as an alternative to Access C during the course of this study.

3 Baseline Situation

3.1 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, managed by Highways England.

Within the A47 access study area, the A47 is a relatively 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. There is a slight hill with a gradient of approximately 3%. The crest of the hill is located approximately 200m to the northeast of the existing NES access.

The A47 is bounded to the north by established hedgerows, woodland and agricultural land. The existing NES and further agricultural land is located to the south of the A47 with a number of hedgerows that border along the extent of the southern A47 verge.

3.2 Background Traffic Data

Traffic flow data obtained from the Department of Transport confirms a 24 hour Annual Average Daily Flows (AADF) of 15,380 total vehicles including 1,546 HGV component.

Speed surveys were undertaken within the access study area during August and September 2017. The location of the surveys can be observed in **Figure 03,** the results of the speed surveys are detailed **Table 3.1**.

Table 3.1: Speed Survey Results

Speed Survey ID	Date	85th Percentile (mph) Northbound	85th Percentile (mph) Southbound
SS1	16.09.17 to 22.09.17	55.5	54.4
SS2	22.08.17 to 28.08.17	54.1	53.5

The results of the speed surveys indicate that vehicle speeds passing the proposed site access are below the posted 60mph speed limit with, a maximum 85th percentile of 55.5 mph recorded.

3.3 Personal Injury Collision (PIC) Data

To assess whether there are any inherent road safety issues within the access study area, detailed STATS19[1] data have been obtained from NCC for the five year period, 01.05.12 to 30.04.17. **Figure 03** details the location of the PICs within the access study area and **Appendix A** provides the STATS19 data.

A review of the STATS19 data has identified two collisions occurring on the A47 within the access study area. The first collision (PIC1) occurred north east of access A and C and involved a driver travelling eastbound who fell asleep at the wheel and veered into an oncoming car. The second collision (PIC2) involved a rear end shunt which occurred when vehicles travelling eastbound braked heavily in the vicinity of 'Spicers Corner' junction. Both collisions resulted in slight injuries.

From the analysis of PICs it is concluded that there is no inherent pattern of collisions identified. Furthermore, neither of the collisions involved HGV traffic and only one (PIC2) was located within 100m of a proposed access.

It should be noted the STATS19 data sourced covers the construction period for the Necton Electricity Substation.

[1] Accidents on the public highway that are reported to the police and which involve injury or death are recorded by the police on a STATS19 form. The form collects a wide variety of information about the accident (such as time, date, location, road conditions).

4 Norfolk Vanguard Traffic Demand

4.1 Vehicle Types

The vehicle types expected to access the Norfolk Vanguard infrastructure sites during construction will include:

- concrete trucks;
- tipper trucks;
- articulated low loader vehicles;
- cranes;
- Light Commercial Vehicles (LCVs);
- site plant; and
- Abnormal Indivisible Loads. (AILs).

Forecast vehicle trips during the project construction period have been extrapolated from the recently submitted Norfolk Vanguard Preliminary Environmental Information Report and are reproduced within **Table 4.1.**

Table 4.1 Norfolk Vanguard Traffic Demand

Norfolk Vanguard Work Activity	Daily Movements		Peak Hour Movements	
	LCVs	HGVs	LCVs	HGVs
Onshore Project Substation	40	58	20	6
National Grid Substation Extension*	40	26	20	3
MA 1 (Cable Route)	40	74	20	8
Totals	120	158	60	17
Total Vehicle Movements	278		77	

* A total of 200 HGVs and 40 LCV movements will be required to access north off the A47 (Access C/D) to complete the Overhead Line Modifications work. These movements would be conducted over two separate construction peaks lasting a week each and separated by a gap of four to six months.

5 Access Standards

The required standard for each access location has been evaluated against the criteria set out in the Design Manual for Roads and Bridges (Department for Transport, 1995). **Table 5.1** summarises.

Table 5.1 DMRB Access Requirements

Access ID	Background AADT Flows		Forecast Daily Construction Flows		Existing Available Visibility (Compliant speed)			DMRB 'Right turn' Traffic Flow Criteria Met[1]	Does Existing Access meet DMRB standards?
	Tot Veh	HGV	Tot Veh	HGV	Left	Right	Vertical		
A	15,380	1,546	278	158	215m (60mph applicable)	215m (60mph applicable)	Yes	Yes – Right turn required	No
B					215m (60mph applicable)	150m (60mph applicable)	Yes	Yes – Right turn required	No
C			24	20	215m (60mph applicable)	215m (60mph applicable)	Yes	Yes – Right turn required	No
D					113m (60mph applicable)	215m (60mph applicable)	Yes	Yes – Right turn required	No
D1					215m (60mph applicable)	215m (60mph applicable)	No	Yes – Right turn required	No

[1]DMRB states that upgrading at existing simple junctions to provide a right turn should always be considered where the minor road flows exceed 500 vehicles 2-way AADT, a right turning accident problem is evident or where vehicles waiting on the major road to turn right inhibit the through flow and create a hazard. The key criteria stated in DMRB to provide a Ghost Island junction with a right turn facility includes the major road traffic flows exceeding13,000 vehicles per day.

Table 5.1 shows that all five accesses currently do not conform to the standards set out in the DMRB for right-turning traffic to be accommodated and each would require engineering to be fully compliant with standards.

6 Access Reviews and Proposals.

A review of each access has been undertaken with reference to the information set out in **Sections 2**, **3**, **4** and **5**. An assessment of each option has been undertaken using the following parameters:

- Highway Safety;
- Environment; and
- Infrastructure requirement.

6.1 Access A Review

It is noted that the existing access arrangement is below the standard of what would be required for a modern trunk road access serving traffic of significant volumes of (side-road) traffic. To counteract this, a traffic management strategy was employed during the construction of the NES which precluded vehicles from making a right turn in, or right turn out of the site. Recognising these issues, Highways England has directed the following criteria must be met for the existing access to be considered with minimal modifications:

1) A review of PICs to evidence no patterns (clusters) attributable to the access design. The PIC review must cover the duration of the construction of the existing Necton Substation.

2) A forecast traffic demand no higher for the NES construction phase than that of the existing Necton sub-station.

3) A commitment from Norfolk Vanguard Limited to employ a 'no right turn traffic management strategy'.

To assist with the review, Royal HaskoningDHV has obtained anecdotal evidence from the NES substation construction contractors, Wilding Construction Ltd (WCL). WCL were responsible for site management of all partners involved in the construction of the NES (Siemens, Statoil, Laing O'Rourke and National Grid).

Criterion 1

Construction for the NES commenced in 2014 and was completed by early 2017. Construction activity peaked during summer 2016. **Section 3.3** of this report contains a review of PIC data covering these periods and concludes there was no-inherent highway safety issue.

Criterion 2

Section 4 confirms a forecast traffic demand for the construction of Norfolk Vanguard of 278 daily movements, consisting of 158 HGV movements and 120 light vehicle movements.

WCL feedback indicates at the height of the Construction works for the NES a total of 400 operatives and approximately 230 cars were accessing the site every day along with an average of 25-30 deliveries of various vehicle sizes from concrete lorries to tipper trucks.

The total NES daily peak construction traffic movements equates to approximately 520 movements per day (noting the HGV component is 60 movements).

This anecdotal evidence indicates that the forecast traffic flows for the Norfolk Vanguard Project could comfortably meet Criterion 2 albeit a higher HGV demand is predicted [to that of the NES].

Should the forecast higher HGV component be of concern to Highways England, daily movements could be controlled to NES levels by a Construction Traffic Management Plan but this would potentially impact on construction duration.

Criterion 3

The NES traffic management strategy consisted of an enforced restriction on right turns in and out of the site. This required HGV arrivals from the east to travel eastbound on the A47 turning off at the A1075 junction at Dereham and then returning westbound back to the Substation access. This journey would entail a diversion route totalling 15.5 miles.

HGV departures to the east would travel westbound to the 'McDonalds' Norwich Road Roundabout before 'u' turning and returning eastbound. This journey would entail a diversion route totalling 5.5 miles.

Light vehicles were also subject to the enforced restriction but had the option of a shorter eastbound diversion by utilising the layby at Spicers Corner to make a right turn to return westbound.

Feedback from WCL indicates the strategy (backed up with reporting and enforcement) was adhered to by all contractors (sub-station, cabling and National Grid).

If the NES traffic management strategy was applied to the Norfolk Vanguard Project, based on current forecasts this would lead to 79 HGVs per day making the 15.5 mile diversion via Dereham - a total increase of 1224.5 miles per day. This is likely to manifest in increased tender prices due to larger fleet sizes and fuel costs.

A further consideration is traffic growth subsequent to the NES consent (2012). It is conceivable that the characteristic of the highway network has changed as the economy has rallied in the region.

Specific to the diversion route, it is notable from site visits that Dereham has significant traffic congestion which particular impacts on two signalised junctions located at Tavern Lane/ Yaxham Road and Yaxham Road/ Greens Road. If NES traffic management strategy was to be implemented in the modern era it is recommended that a full assessment of capacity, delay, noise and air quality is undertaken for the Dereham diversion route.

To alleviate the restrictions associated with utilising the existing junction arrangement a standard DMRB[2] compliant design has been considered at this location (notated as Access A1).

The following subsections review Access A and A1 in context with the adopted study parameters.

Highway Safety

From a highway safety perspective, Access A currently provides the requisite highway visibility of 215m for a 60mph road in both directions. Within the visibility envelope the highway has a straight horizontal alignment with a slight gradient which rises to the eastbound. DMRB Compliant vertical visibility is achievable for Access A.

Access A1 would also achieve all the highway safety parameters as detailed for Access A.

Environmental Impact (Access A)

No significant vegetation clearance is required to obtain visibility splays. As previously noted, there are indirect environmental impact concerns with respect to the diversion route through Dereham.

Environmental Impact (Access A1)

From an ecology perspective, approximately 772m^2 of vegetation would need to be removed to allow for widening of the A47 and additional visibility splay envelopes. The timescales would be dictated by seasonal constraints.

Infrastructure Requirements (Access A1 only)

The following infrastructure improvements would be required:

- Removal of the existing grasscrete.
- Widening of the A47 carriageway to include a right turn lane and ghost island facility.
- Removal of existing vegetation to allow for highway widening and visibility splays.
- Realignment and widening of existing access approach to cater for a 7.3m approach width allowing passing of two HGVs.
- Construction of new a new bellmouth with 15m corner radii (potentially wider for abnormal loads).

In addition, there will be increased costs related to traffic management to allow existing NES and farm traffic to continue to use the access.

[2] Design speed of 100km/h (60mph) including ghost island right turn facility with turning lane width of 3.5m and queuing storage length of 49.5m.

The widening of the A47 carriageway would occur within land under Norfolk Vanguard control or public highway and would require night time working over several weeks.

The design of the access should allow for infrequent AILs to be delivered to site without further widening or strengthening work to be completed outside of the upgraded access envelope.

6.2 Access B Review

The current Access B is approximately 16m north of the existing Spicers Corner junction with the A47 to the north. The layout of these junctions creates a left-right stagger which is not compliant with DMRB standards.

Based on the current baseflows and forecast Norfolk Vanguard project construction flows, Access B would require upgrading to a DMRB standard compliant access. A new access point would need to be created approximately 68m to the south west of the existing access to create a DMRB[3] compliant right-left stagger with a minimum 50m distance between both junction centrelines.

The following subsections review Access B in context with the adopted study parameters.

Highway Safety

From an existing highway perspective, there has been no collision patterns identified as described in Section 3.3. Access B would be standard compliant and meet all the required visibility splays for a 100kph design speed.

Environmental Impact

From an ecology perspective, the new access would require the removal of existing vegetation and the potential removal of a number of established trees. The vegetation clearance would encompass the whole of the visibility envelope and to the extents of the new access and A47 widening works this would comprise of approximately 750m^2 of land.

Infrastructure Requirements

The following infrastructure improvements would be required:

- Widening of the A47 carriageway to include a right turn lane and ghost island facility.
- Construction of a new access to incorporate a bellmouth with 15m corner radii and a 7.3m approach width allowing passing of two HGVs (potentially wider for abnormal loads).
- Additional internal track to tie back into the substation access track.

[3] Design speed of 100km/h (60mph) including ghost island right turn facility with turning lane width of 3.5m and queuing storage length of 49.5m.

The required visibility of 215m to the east would be achieved following relocation of the access 68m further south and the widening works on the southern verge of the land within Norfolk Vanguard control or public highway land.

The construction works would require night time working with substantial temporary traffic management required over several weeks.

The design of the access should allow for infrequent AILs to be delivered to site without further widening or strengthening work to be completed outside of the upgraded access envelope.

6.3 Access C and D Review

The following subsections review Accesses C, D and D1 in context with the adopted study parameters.

Highway Safety

From a highway safety perspective Access C could achieve the requisite 215m visibility splays with vegetation cutback in both directions. Access D would require the cutback/remove approximately 100m of established hedgerow to the east to be compliant. Both accesses are situated on relatively straight roads on a hill with approximately a 3% gradient.

Both Access C and Access D would introduce conflicts with either existing farm or residential traffic and neither the access track (Access C) or Moor Lane (Access D) would allow two way HGV traffic movements. At both access locations vehicles exiting the A47 may have to wait for traffic departing the access points onto the A47. This has the potential of causing vehicles to queue back from these pinch points causing an obstruction to the A47 flow of traffic.

Recognising these road safety concerns, a potential alternative access in this vicinity has been identified (notated as D1). Access D1 is an existing field access 334m northeast of Access D with direct access to the field with the electricity pylon. The access could be widened and two-way HGV movements would be possible with no sharing of road space with existing farm traffic or other public vehicles.

Horizontal visibility is good (215m) in both directions. Vertical visibility is compromised approaching the junction from both directions with a minimum vertical height achievable of 0.48m from the west and 0.33m from the east. These heights are based on the height above the carriageway an approaching motorist can view over the hill crest to the access from a stopping sight distance of 215m (100kph design speed). These measurements do not meet the required 0.26m minimum height detailed in the DMRB and therefore Access D1 would require a speed restriction to achieve the desired forward visibility.

Environmental Impact

From an ecology perspective, all the accesses would require the removal of existing vegetation and the potential removal of a number of established trees. The vegetation clearance would encompass the whole of the visibility envelope.

Infrastructure Requirements

There is minimal scope for junction widening at Access C and D to allow the safe two-way movements of construction HGVs. Access C is constrained by an immediate right hand bend, while Access D is constrained by private properties and a drainage ditch to the north of the access route.

Access D1 has greater scope for junction improvements and would require the following infrastructure improvements:

- Removal of existing vegetation to allow for visibility splays.
- Widening of existing access approach to cater for a 6m approach width allowing passing of two HGVs.
- Construction of new a new bellmouth with 10m corner radii.

Proposed Access Management Strategy

A total of 200 HGVs and 40 LCVs would be required to access the Electricity Pylon field to complete the OHLM works. The works would be subject to two construction peaks of between 1-4 weeks with a 4-6 month gap between each peak.

It is therefore considered that constructing a DMRB compliant right-turn access would be disproportional to the traffic demand. As an alternative, it is proposed to implement an Access Management Strategy for the duration of the OHLM works. The Access Management Strategy would eradicate right turn maneuverers on the A47 by enforcing left in, left out manoeuvres to minimise infrastructure provision. and would include options based on which substation access (A or B) is taken forward.

All OHLM traffic would check in at the main NGSE works using Access A or A1. Traffic would then exit left out of Access A or A1 and perform a u-turn manoeuvre at the roundabout junction between the A47 and Norwich Road. A left turn in to either Access C, D or D1 could then be completed. This strategy would require an approximate 4.5mile diversion for a forecast 240 vehicles and could be enforced within the CTMP.

7 Summary and Conclusions

Table 7.1 provides a summary of the Norfolk Vanguard Project access review and applies a simple scoring system to differentiate between option.

Table 7.1. Access Scoring summary

Access Options	Highway Safety	Environmental Impacts	Infrastructure Requirements	Totals	Comments
A	2	2	5	9	- Requires u-turn traffic management strategy approval. - Potential capacity, delay, noise and air quality impacts within Dereham associated with diversion route.
A1	5	3	1	9	DMRB compliant access, significant engineering and environmental works required.

B	5	3	1	9	DMRB compliant access, significant engineering and environmental works required.
C	1	2	3	6	- Requires u-turn access management strategy approval. - Potential highway safety concern for A47 traffic associated with narrow access/egress.
D	1	2	4	7	- Requires u-turn access management strategy approval. - Potential highway safety concern for A47 traffic associated with narrow access/egress.
D1	4	2	3	9	- Requires u-turn access management strategy approval. - Requires a temporary speed limit for the duration of the OHLM works.
Highway safety scoring system used 1-5 (1 indicates low safety, 5 indicates high safety).					
Environmental impacts scoring system used 1-5 (1 indicates major impact, 5 indicates minimal impact).					
Infrastructure requirements scoring system used 1-5 (1 indicates greatest total cost, 5 indicates least total cost).					

For the project infrastructure sites south of the A47, Accesses A, A1 and B all score identical.

It is considered that the traffic management stipulations associated with Access A would have a significant impact on the efficient construction of the sub-station which in turn represents an economical risk. Access A1 and B have substantial infrastructure costs associated with implementing a standard compliant design.

Notwithstanding, based on the road safety and environmental impact assessment, there are no overriding reasons to reject any of these three access options. Furthermore, there are no overriding technical/policy constraints preventing both Access A/A1 and B being utilised, rather, there are potential road safety benefits in removing vehicle conflicts between Substation and NGES/OHLM works.

With regard to the OHLM works, Accesses C and D have constrained access/egress which give rise to safety concerns on the A47. Access D1 is the clear preferred option, but will require an approval of a temporary speed limit for the duration of the works.

APPENDICES

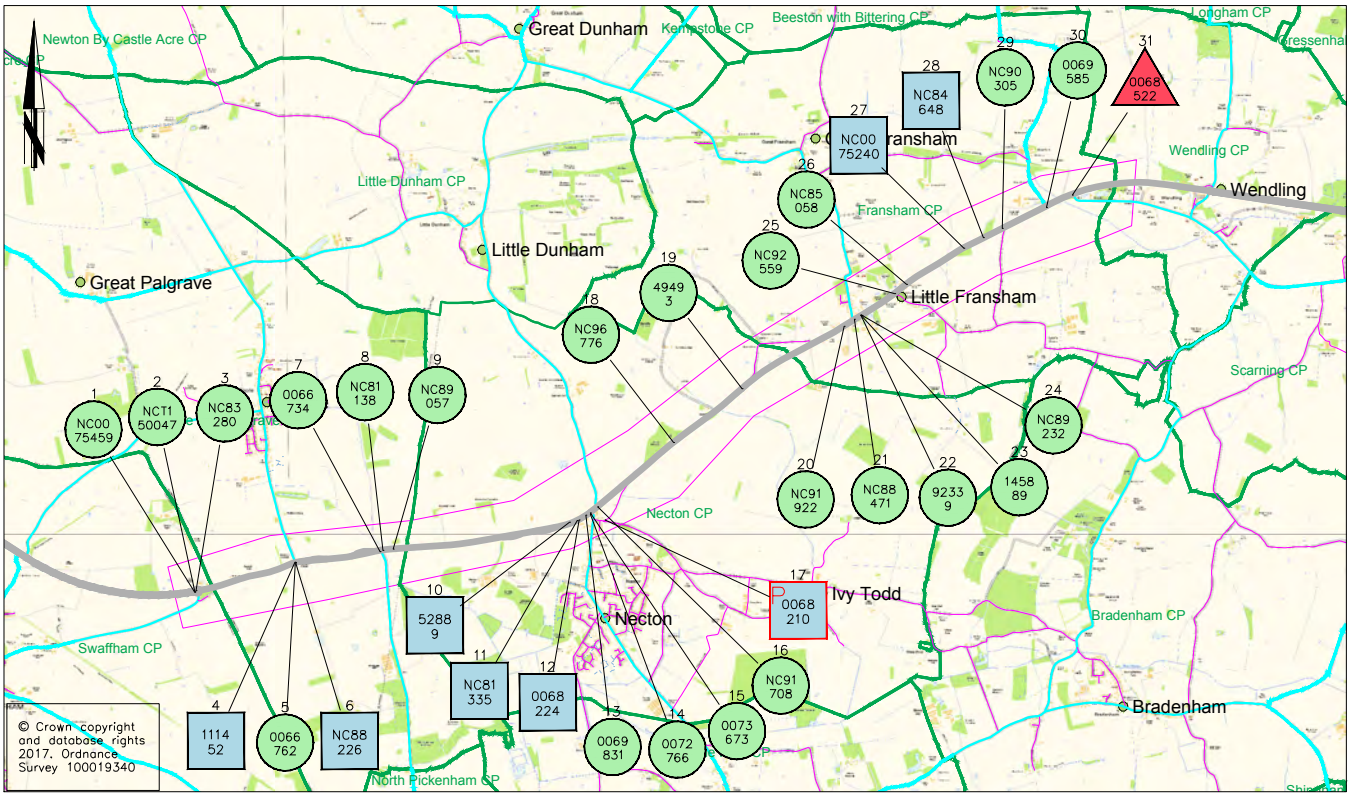
Royal HaskoningDHV
Enhancing Society Together

APPENDIX A

STATS 19 Data

Royal HaskoningDHV
Enhancing Society Together

Five years to end April 2017



Reference Number	1 NC00 75459	2 NCT1 50047	3 NC83 280	4 1114 52	5 0066 762	5a 0066 762	6 NC88 226	7 0066 734	8 NC81 138	9 NC89 057	10 5288 9	11 NC81 335	12 0068 224	13 0069 831	14 0072 766	15 0073 673
Date / Day	Fr 01	We 11	Mo 25	Fr 30	Fr 10		Th 19	Fr 03	Mo 09	Sa 21	We 09	Mo 23	Th 29	Mo 04	Su 14	Tu 20
Month	Nov	Mar	Aug	Sep	Aug		Feb	Aug	Jun	Mar	Mar	Jun	Nov	Mar	Jul	Aug
Year	2013	2015	2014	2016	2012		2015	2012	2014	2015	2016	2014	2012	2013	2013	2013
Time	1300	0845	1500	1733	0640		1115	1445	0845	1303	0638	2207	0920	1040	1915	1139
Severity	Sl	Sl	Sl	Se	Sl		Se	Sl	Sl	Sl	Se	Se	Se	Sl	Sl	Sl
Dark / Lit																
Weather Conditions																
Road Surface																
Special Conditions																
Carriageway Hazards																
Vehicle Manoeuvres																
Vehicle 1	32	58	62	20	50	43	28	77	41	19	50	24	19	62	18	77
Vehicle 2	47	34		49	58		67	39	57	50	30		84	35	56	20
Vehicle 3	77	49			55				53	48						
Vehicle 4					57											
Casualty / age	3	58	62	49	58 55		28 67	39 15	41 57	19 19 48 14 16	50	24	79	35 0	56	20

Reference Number	16 NC91 708	17 0068 210	18 NC96 776	19 4949 3	20 NC91 922	21 NC88 471	22 9233 9	23 1458 89	24 NC89 232	25 NC92 559	26 NC85 058	27 NC00 75240	28 NC84 648	29 NC90 305	30 0069 585	31 0068 522
Date / Day	Fr 03	Tu 04	Tu 08	Su 07	Sa 11	We 04	We 06	Tu 29	Fr 27	We 05	Su 26	Th 24	Tu 14	Mo 11	Th 14	Mo 24
Month	Jul	Dec	Dec	Feb	Jul	Mar	Jul	Nov	Mar	Aug	Oct	Oct	Oct	May	Feb	Dec
Year	2015	2012	2015	2016	2015	2015	2016	2016	2015	2015	2014	2013	2014	2015	2013	2012
Time	1514	1630	0856	1100	1600	1640	0745	0815	0750	1322	1235	2250	0640	1717	1010	1430
Severity	Sl	Se	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Se	Se	Sl	Sl	Fa
Dark / Lit																
Weather Conditions																
Road Surface																
Special Conditions																
Carriageway Hazards																
Vehicle Manoeuvres																
Vehicle 1	39	47	25	77	57	64	49	17	29	62	73	17	31	55	54	77
Vehicle 2	42		21	60	62		47	35	29	43	52	32	77	42	22	69
Vehicle 3								43	43					63		
Vehicle 4																
Casualty / age	39 42	16	21	59	62 60 60 60	64	49 47	35	29	62	52 11 17 40	17	31	42	22	77 76 69

Full Details Report Summary -

Accidents Found Date Range: 03/08/2012 - 29/11/2016
Grid Coordinate Range: 584290, 309490 - 592050, 313000
Accident Date BETWEEN '01-May-2012' AND '30-Apr-2017'

Accident Severity

	2012	2013	2014	2015	2016	Total
Fatal	**1**	**0**	**0**	**0**	**0**	**1**
Serious	**2**	**1**	**2**	**1**	**2**	**8**
Slight	**2**	**5**	**3**	**9**	**3**	**22**
Total	**5**	**6**	**5**	**10**	**5**	**31**

Casualty Severity

	2012	2013	2014	2015	2016	Total
Fatal	**3**	**0**	**0**	**0**	**0**	**3**
Serious	**2**	**1**	**2**	**1**	**2**	**8**
Slight	**4**	**6**	**7**	**18**	**4**	**39**
Total	**9**	**7**	**9**	**19**	**6**	**50**

Casualty KSI

	2012	2013	2014	2015	2016	Total
Adult KSI	**5**	**1**	**2**	**1**	**2**	**11**
Slight	**4**	**6**	**7**	**18**	**4**	**39**
Total	**9**	**7**	**9**	**19**	**6**	**50**

1.3 Accident Reference:NC96776 Slight NECTON, A47 APPROX 450MTRS SOUTH WEST OF MOOR LANE Accident 18 of 31

1.7 Date & 1.9 Time.....Tuesday 08/12/2015 08:56
1.11 Grid co-ordinates.....588525/310812
1.10 Local Authority.....Breckland
1.12/1.13 1st road identity..A47
1.18/1.19 2nd road identity..
1.22 Weather.....Rain
1.21 Light conditions.....Daylight
1.20a Crossing(human).....No Human control within 50m
1.20b Crossing(physical).....No crossing facility within 5
1.15 Speed limit.....60 Mph
1.14 Road type.....Single c'way
1.16 Junction detail.....Not at or within 20m of junction
1.17 Junction control.....
1.24 Special conditions...None
1.25 Carriageway hazards..None
1.5 Number of vehicles...2
1.6 Number of casualties.1
1.23 Surface.....Wet

Did a police officer attend?

Yes

Accident Description

V1 ON A47 HEADED TOWARDS NORWICH WHEN DRIVER OF V1 FELL ASLEEP AT WHEEL DRIFTED ACROSS C/WAY AND HIT V2 IN OPPOSITE DIRECTION

2 Vehicles

2.4 Veh ref no.....1
2.17 Other vehicle.....0
2.5 Vehicle class.....Car
2.10 Junction location...Not at junction
2.9 Restricted location.On main carriageway
2.8 Movement from/to....South west North east
2.7 Manoeuvres.....Going ahead other
2.11 Skidding.....No
2.13 Left c'way.....Left c'way Offside
2.6 Towing.....No
2.28 Foreign vehicle.....Not foreign
2.16 First impact.....Offside
2.12 Hit object in c'way..None
2.14 Hit object off c'way.None
2.18 Parts damaged..... / /
2.21 Driver gender.....Male
2.22 Driver age.....25
2.24 Hit and Run.....No
2.23 Breath test.....Negative
2.29 Journey purpose.....Commuting to/from work

2.4 Veh ref no.....2
2.17 Other vehicle.....0
2.5 Vehicle class.....Car
2.10 Junction location...Not at junction
2.9 Restricted location.On main carriageway
2.8 Movement from/to....North east South west
2.7 Manoeuvres.....Going ahead other
2.11 Skidding.....No
2.13 Left c'way.....Did not leave c'way
2.6 Towing.....No
2.28 Foreign vehicle.....Not foreign
2.16 First impact.....Offside
2.12 Hit object in c'way..None
2.14 Hit object off c'way.None
2.18 Parts damaged..... / /
2.21 Driver gender.....Male
2.22 Driver age.....21
2.24 Hit and Run.....No
2.23 Breath test.....Negative
2.29 Journey purpose.....Commuting to/from work

1 Casualty

3.5 Cas ref no.....1
3.6 Casualty class.....Driver or Rider
3.7 Gender.....Male
3.8 Age.....21
3.9 Severity.....Slight
3.4 Vehicle no.....2
3.12 Ped Direction.....Not a pedestrian
3.15 Car passenger.....No
3.16 PSV passenger.....No
3.14 Seat belt usage.....Worn but not independently confirmed
3.17 School pupil.....Other
(3.19 School .....)
3.10 Pedestrian location..Not a pedestrian
3.11 Pedestrian movement..Not a pedestrian
3.19 Roadworker injured...No

1.3 Accident Reference:49493 Slight A47 Accident 19 of 31

1.7 Date & 1.9 Time.....Sunday 07/02/2016 11:00
1.11 Grid co-ordinates.....589129/311289
1.10 Local Authority.....King's Lynn and West Norfolk
1.12/1.13 1st road identity..A47
1.18/1.19 2nd road identity..
1.22 Weather.....Unknown
1.21 Light conditions.....Daylight
1.20a Crossing(human).....No Human control within 50m
1.20b Crossing(physical).....No crossing facility within 5
1.15 Speed limit.....60 Mph
1.14 Road type.....Single c'way
1.16 Junction detail.....Not at or within 20m of junction
1.17 Junction control.....
1.24 Special conditions...None
1.25 Carriageway hazards..None
1.5 Number of vehicles...2
1.6 Number of casualties.1
1.23 Surface.....Dry

Did a police officer attend?

No - reported over the counter

Accident Description

VEH2 IN A LINE OF TRAFFIC ON THE A47 TRAVELLING TOWARDS FRANSHAM. THE LINE OF TRAFFIC BRAKED HEAVILY AS DID VEH2, BUT VEH1 COLLIDED WITH THE REAR OF VEH2 CAUSING WHIPLASH INJURIES TO THE PASSANGER IN THE FRONT OF VEH2.

2 Vehicles

2.4 Veh ref no.....1
2.17 Other vehicle.....0
2.5 Vehicle class.....Car
2.10 Junction location...Not at junction
2.9 Restricted location.On main carriageway
2.8 Movement from/to....East West
2.7 Manoeuvres.....Going ahead other
2.11 Skidding.....No
2.13 Left c'way.....Did not leave c'way
2.6 Towing.....No
2.28 Foreign vehicle.....Not foreign
2.16 First impact.....Front
2.12 Hit object in c'way..None
2.14 Hit object off c'way.None
2.18 Parts damaged..... / /
2.21 Driver gender.....Male
2.22 Driver age.....-1
2.24 Hit and Run.....No
2.23 Breath test.....Not contacted
2.29 Journey purpose.....Unknown

2.4 Veh ref no.....2
2.17 Other vehicle.....0
2.5 Vehicle class.....Car
2.10 Junction location...Not at junction
2.9 Restricted location.On main carriageway
2.8 Movement from/to....East West
2.7 Manoeuvres.....Going ahead other
2.11 Skidding.....No
2.13 Left c'way.....Did not leave c'way
2.6 Towing.....No
2.28 Foreign vehicle.....Not foreign
2.16 First impact.....Back
2.12 Hit object in c'way..None
2.14 Hit object off c'way.None
2.18 Parts damaged..... / /
2.21 Driver gender.....Not known
2.22 Driver age.....60
2.24 Hit and Run.....No
2.23 Breath test.....Not contacted
2.29 Journey purpose.....Unknown

1 Casualty

3.5 Cas ref no.....1
3.6 Casualty class.....Passenger
3.7 Gender.....Female
3.8 Age.....59
3.9 Severity.....Slight
3.4 Vehicle no.....2
3.12 Ped Direction.....Not a pedestrian
3.15 Car passenger.....Front
3.16 PSV passenger.....No
3.14 Seat belt usage.....Unknown
3.13 School pupil.....Other
(3.19 School .....)
3.10 Pedestrian location..Not a pedestrian
3.11 Pedestrian movement..Not a pedestrian
3.19 Roadworker injured...No

FIGURES

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FIGURE 1

Site Location

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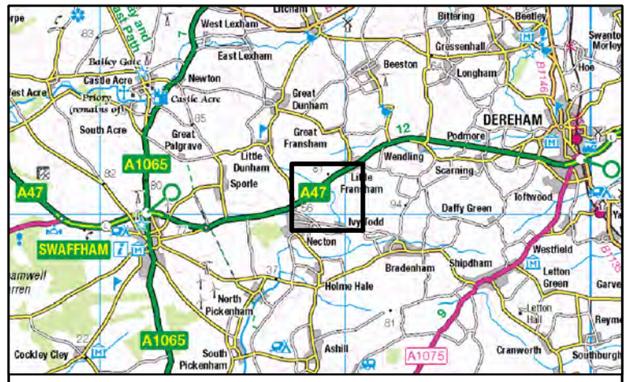
588000 589000 590000

312000 311000 310000

N



Legend:

- Proposed Norfolk Vanguard onshore project substation
- Red Line Boundary
- A47 Access Study Area

Note:
PMAI to be located within Red Line Boundary
at a location to be determined

Project:	Report:
Norfolk Vanguard	A47 Access Review

Title:

Site Location Plan

Figure: 1 | Drawing No: PB4476-003-00X-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	12/01/2018	GC	RE	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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0 200 400 Meters

FIGURE 2

Access Options

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588000 589000 590000

312000 311000 310000

N

B

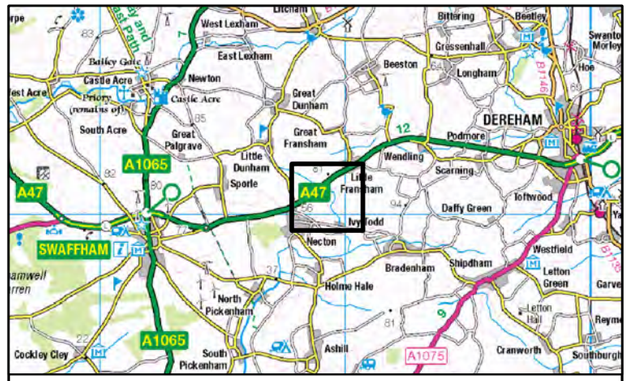
D

D1

C

A

0 200 400 Meters



Legend:

- Proposed Norfolk Vanguard onshore project substation
- Access Point ID
- Access Options for National Grid Overhead Line Modification Works
- Access Options for Norfolk Vanguard Onshore Project Substation and National Grids Substation Extension

Project:	Report:
Norfolk Vanguard	A47 Access Review

Title: Access Options

Figure: 2 | Drawing No: PB4476-003-00X-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	12/01/2018	GC	RE	A3	1:10,000

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FIGURE 3

Speed Survey and Personal Injury Collision Locations

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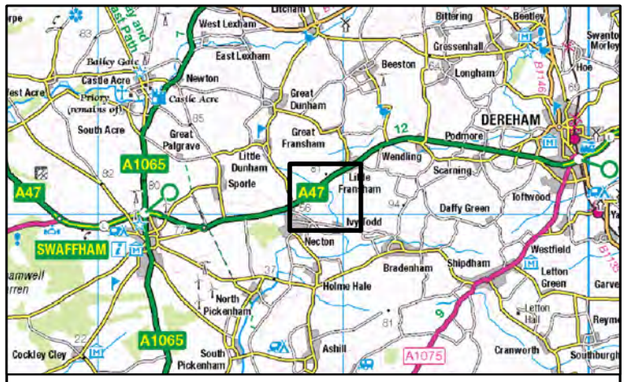

Legend:

- Proposed Norfolk Vanguard onshore project substation
- A47 Access Study
- Access Point ID
- Injury Collision Location
- Speed Survey Locations

Project:	Report:
Norfolk Vanguard	A47 Access Review

Title:

Speed Survey and Personal Injury Collision Locations

Figure:	Drawing No:
1	PB4476-003-00X-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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