

Norfolk Vanguard Offshore Wind Farm Outline Access Management Plan

Applicant: Norfolk Vanguard Limited
Document Reference: 8.10
APFP Regulation: 5(2)(q)

Date: 30 May 2019
Revision: Version 3
Author: Royal HaskoningDHV

Photo: Kentish Flats Offshore Wind Farm



Document Reference: 8.10

May 2019

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Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
04/05/18	01D	First draft for Norfolk Vanguard Limited review	PC/AR	ST	AH
05/06/18	01F	Final submission	PC/AR	ST	AH
25/01/19	02D	Updates for Deadline 2	PC/AR	ST	AH
30/05/19	03D	Updates for Deadline 8	RE	AR	JA

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Glossary

AADT	Annual Average Daily Traffic
AMP	Access Management Plan
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
HDD	Horizontal Direction Drilling
HDPE	High Density Polyethylene
HE	Highways England
HGV	Heavy Goods Vehicle
HVDC	High Voltage Direct Current
MA	Mobilisation Area
OAMP	Outline Access Management Plan
OTMP	Outline Traffic Management Plan
OTP	Outline Travel Plan
PEIR	Preliminary Environmental Information Report
TC	Trenchless Crossing

Terminology

Cable Relay Station	Primarily comprised of an outdoor compound containing reactors (also called inductors, or coils) and switchgear to increase the power transfer capability of the cables under the HVAC technology scenario as considered in the PEIR. This is no longer required for the project as the HVDC technology has been selected.
Control Point	A location that provides the checks and controls for the movement of HGVs and employees.
Delivery	A delivery is the process of transporting goods from a source location to a predefined destination. A delivery will generate two vehicle movements (an arrival and departure)
Jointing pit	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.
Landfall	Where the offshore cables come ashore at Happisburgh South
Landfall compound	Compound at landfall within which HDD drilling would take place
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Mobilisation area	Areas approximately 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 and suitable for the delivery of heavy and oversized materials and equipment.
National Grid new / replacement overhead line tower	New overhead line towers to be installed at the Necton National Grid substation.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines
National Grid substation	The permanent footprint of the National Grid substation extension

extension	
National Grid temporary works area	Land adjacent to the Necton National Grid substation which would be temporarily required during construction of the National Grid substation extension.
Necton National Grid substation	The existing 400kV substation at Necton, which will be the grid connection location for Norfolk Vanguard
Onshore 400kV cable route	Buried high-voltage cables linking the onshore project substation to the Necton National Grid substation
Onshore cable route	The 45m easement which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore cables	The cables which take the electricity from landfall to the onshore project substation.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the project from landfall to grid connection.
Onshore project area	All onshore electrical infrastructure (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 Necton National Grid substation and overhead line modification)
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Running track	The track along the onshore cable route which the construction traffic would use to access workfronts.
The Applicant	Norfolk Vanguard Limited
The project	Norfolk Vanguard Offshore Wind Farm, including the onshore and offshore infrastructure.
Transition pit	Underground structures that house the joints between the offshore export cables and the onshore cables.
Trenchless crossing zone (e.g. HDD)	Temporary areas required for trenchless crossing works.
Vehicle movement	A single trip (i.e. either an arrival to, or departure from site) for the transfer of employees or goods.
Vehicle (HGV, Traffic) flow	Total vehicle movements on a road (highway link).
Workfront	The 150m length of onshore cable route within which duct installation would occur

1 INTRODUCTION

1.1 Background

1. This document forms part of the Development Consent Order (DCO) application for the onshore project area for the Norfolk Vanguard Offshore Wind Farm (hereafter 'the project').
2. A traffic and transport impact assessment has been undertaken for the project and is detailed in Chapter 24 Traffic and Transport of the Environmental Statement (ES) (document reference 6.1.24).
3. In respect of traffic and transport, the certified plans referred to in the DCO are outlined below:
 - Outline Traffic Management Plan (OTMP) (document reference 8.8): The OTMP sets out the standards and procedures for managing the impact of Heavy Goods Vehicles (HGV) traffic during the onshore construction period, including localised road improvements necessary to facilitate the safe use of the existing road network;
 - Outline Travel Plan (OTP) (document reference 8.9): The OTP sets out how onshore construction employee traffic would be managed and controlled; and
 - Outline Access Management Plan (OAMP) (document reference 8.10): The OAMP sets out detail on the location, frontage, general layout, visibility and embedded mitigation measures for access for the onshore project substation, landfall and points of access to the onshore cable route. It presents the requirements and standards that will be incorporated into the final access design.
4. Final plans which accord with these outline documents must be submitted to and approved by the relevant local planning authority (in consultation with Norfolk County Council (NCC) and Highways England (HE)) prior to commencement of any relevant works, as per Requirement 22 of the draft DCO.
5. This OAMP is complimented by the OTMP which details additional measures to facilitate vehicles (particularly HGVs) to safely access the main distributor highway network via the identified access tracks and minor routes during the onshore construction period.
6. Following appointment of a contractor, the measures outlined in the respective plans would be validated and optimised in consultation with NCC and HE.
7. Norfolk Vanguard Limited is seeking consent for the following onshore elements of the project:

- Landfall;
 - Onshore cable route, accesses, trenchless crossing (e.g. Horizontal Directional Drilling (HDD)) zones and mobilisation areas;
 - Onshore project substation; and
 - Extension to the Necton National Grid substation and overhead line modifications.
8. The applicant is also developing Norfolk Boreas, a ‘sister project’ to Norfolk Vanguard. Norfolk Boreas would share a grid connection location and also much of the offshore and onshore cable corridors with Norfolk Vanguard. Therefore, in order to minimise impacts, Norfolk Vanguard Limited will include within its Development Consent Order (DCO) application some enabling works for the Norfolk Boreas project (subject to Norfolk Boreas DCO and Financial Investment Decision), these include:
- Installation of ducts to house the Norfolk Boreas export cables, along the entirety of the onshore cable route from the landward side of the landfall transition pit to the Norfolk Boreas’ onshore project substation; and
 - Modification of the existing overhead lines in the vicinity of the Necton National Grid substation for Norfolk Vanguard and Norfolk Boreas.
9. The scope of the OAMP covers all the public highway access requirements for the construction phase of the onshore elements of the project and the operational phase of the onshore project substation permanent access.
10. During the operational phase, for the remaining onshore project elements, traffic movements would be limited to periodic maintenance at the link boxes/test pits along the onshore cable route. Due to the limited nature of these operations, the OAMP does not consider operational access for the onshore cable route.

1.2 Purpose of the OAMP

11. The purpose of the OAMP is to set out details on the location, general layout, visibility and embedded mitigation measures for access for the onshore project substation, and points of access to the onshore cable route.
12. The OAMP presents the requirements and standards that will be incorporated into the final Access Management Plan (AMP) pursuant to the discharge of Requirement 22 of the DCO.
13. Norfolk Vanguard Limited would define performance standards to be observed as part of the Contractor’s obligations to comply with and observe the Requirements 21 and 22 of the DCO.
14. Norfolk Vanguard Limited will work with the relevant Local Authorities to ensure that the provisions set out in the OAMP are adhered to.

1.3 Consultation

15. Norfolk Vanguard Limited has undertaken pre-application consultation on the project in accordance with the requirements of the Planning Act 2008.
16. To date, consultation regarding traffic and transport has been conducted through transport specific Expert Topic Group (ETG) meetings in January 2016, July 2017 and January 2018 to review and agree methodologies for the assessments, the Scoping Report (Royal HaskoningDHV, 2016) and the Preliminary Environmental Information Report (PEIR) (Norfolk Vanguard Limited, 2017). The ETG included transportation professionals from Norfolk County Council (NCC), Highways England (HE) and Norfolk Vanguard Limited. Whilst not a member of the ETG, Suffolk County Council were kept informed of developments, noting that the south east tip of the traffic and transport study area encompassed two roads within their administration area.
17. Further details of consultation undertaken to date is outlined within Chapter 24 Traffic and Transport of the ES (document reference 6.1.24).

1.4 Project Description

18. A comprehensive project description of the onshore project area is contained within Chapter 5 Project Description of the ES (document reference 6.1.5),
19. The onshore cable route is approximately 60km in length and travels west from the landfall at Happisburgh South towards the northern edge of North Walsham before bearing southwest to the onshore project substation near Necton as shown in Figure 1.
20. The onshore project substation at Necton will be constructed approximately 1km away from the existing Necton National Grid substation.
21. The onshore cable route would require trenches (within which ducts would be installed to house the cable circuits); a running track to deliver equipment to the installation site from mobilisation areas, and separate storage areas for topsoil and subsoil.
22. The main installation method would be through the use of open cut trenching. Ducts would be installed within the trenches and the soil backfilled. Cables would then be pulled through the pre-laid ducts at a later stage in the programme.

2 EMBEDDED MITIGATION

23. Norfolk Vanguard Limited has committed to a number of techniques and engineering designs/modifications as part of the project, during the pre-application phase, in order to avoid a number of impacts or reduce impacts as far as possible. Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process.
24. Full details of the embedded mitigation can be found within Chapter 5 Project description of the ES.
25. Table 2.1 sets out the designed in (embedded) mitigation measures that have been applied to the traffic forecasts contained in this OAMP.

Table 2.1 Embedded mitigation

Parameter	Mitigation measures embedded into the project design	Notes
Trenchless Crossings	<p>Commitment to trenchless crossing techniques at key sensitive environmental features, including but not limited to; waterways, protected wildlife sites, woodlands, long distance cycle route/footpaths, and major transport corridors to avoid significant environmental disturbance. These include avoiding specific features such as;</p> <ul style="list-style-type: none"> • Trunk/Principal Roads including A47, A140, A149, A1067; • Mid-Norfolk Railway; and • Network Rail. 	A commitment to a number of trenchless crossings at some sensitive locations has been a project commitment from the outset. However, in light of consultation received during PEIR Norfolk Vanguard Limited has committed to additional trenchless crossings as a direct response to stakeholder requests.
Mobilisation Areas	<p>Mobilisation areas would be located close to main A-roads and B-roads minimising impacts upon local communities and utilising the most suitable roads.</p> <p>Mobilisation areas located away from population centres where practical to reduce impact on local communities and population centres.</p>	
Duct Installation	Suitable access points and identification of optimum routes for construction traffic to use. This minimises impacts on sensitive receptors	Details contained within the OAMP (document reference 8.10)
Cable Pull and Jointing Stage access	Suitable side accesses and road crossing locations reviewed from initial schedule of 200+ access points to 76 realistic potential access points to minimise local route impacts.	Details contained within in the OAMP (document reference 8.10)
Vehicle Movement	Construction of an (up to) 6m wide running track with an approximate length of 60km. This would reduce the number of access points required and HGV movements on the local road network.	Details contained within the OTMP (document reference 8.8)

Parameter	Mitigation measures embedded into the project design	Notes
	<p>Consolidating HGVs at mobilisation areas to reduce vehicle movements along more sensitive local routes.</p> <p>Carefully selected delivery routes acknowledging the sensitive receptors within the study area</p> <p>Management measures to control timing deliveries</p>	
Onshore Cable Route Site Selection	Consolidating onshore cable route section construction employee movements at mobilisation areas. Onward travel along the running track to place of work reducing vehicle movements along local routes.	Details contained in the OTP (document reference 8.9)

3 ACCESS STRATEGY

3.1 Access Strategy Summary

26. Table 3.1 details all accesses (AC) required for duct installation works and onshore project substation primary works (stage 2) and cable pull, joint and commission (stage 3) construction phases. Locations for ACs are detailed graphically in the DCO Access to Work Plans (document reference 2.5), submitted as part of the DCO application.
27. For stage 2, the project components to be accessed are detailed as follows: MA (mobilisation area), TC (trenchless crossing location), landfall and onshore project substation. For stage 3, the cable section to be accessed is detailed.

Table 3.1 Access location and function

Access ID	Highway Link	Potential Access Route	Stage 2	Stage 3
AC3	Whimpwell Street	B1159, Vicarage Road, The Common, Coronation Road, Whimpwell Street	Landfall	Cable Section 16
AC5	Grub Street	B1159, N Walsham Road, Grub Street	Crossing only	Cable Section 16
AC10	Walcott Green	B1159, N Walsham Road, Walcott Green	Crossing only	Cable Section 16
AC12	North Walsham Road	B1159, North Walsham Road	Not required	Cable Section 16
AC13	North Walsham Road	B1159, North Walsham Road	MA11 (Cable section 17 & 18)	Cable Section 15 & 16
AC16	North Walsham Road	B1159, Happisburgh Road, N Walsham Road	Crossing only	Cable Section 15
AC18	Hole House Road	B1159, Happisburgh Road, N Walsham Road, Hole House Road	Crossing only	Cable Section 15
AC20	Edingthorpe	B1159, N Walsham Road, Bacton Road, Edingthorpe	Not required	Cable Section 15
AC21	Bacton Road	B1159, Happisburgh Road, N Walsham Road, Bacton Road	Crossing only	Cable Section 15
AC22	Edingthorpe	B1159, Happisburgh Road, N Walsham	Crossing only	Cable Section 15

Access ID	Highway Link	Potential Access Route	Stage 2	Stage 3
	Road	Road, Bacton Road, Edingthorpe Road		
AC24	Edingthorpe	B1159, Bloodslat Lane, N Walsham Road, Plantation Road	TC16(e)	Cable Section 14
AC25	Plantation Road	B1159, Bloodslat Lane, N Walsham Road, Plantation Road	MA10a Cable Section 17a TC16(w).	Cable Section 14
AC28	North Walsham Road	B1159, Bloodslat Lane, N Walsham Road	Crossing only	Cable Section 14
AC32	Paston Road	B1159, Bloodslat Lane, N Walsham Road, Paston Road	Crossing only	Cable Section 14
AC34	Hall Lane	B1145, Bacton Road, Hall Lane	TC15(e)	Cable Section 14
AC35	Hall Lane	B1159, Bloodslat Lane, N Walsham Road, Hall Lane	TC15(e)	Cable Section 14
AC37	Little London Road	B1145, Little London Road	TC14(e), TC15(w)	Cable Section 14
AC38	B1145	B1145	MA10 (Cable Section 15 & 16a) TC13(e)	Cable Section 14
AC47	A149	A149	MA9 (Cable section 14) TC12(e)(w), TC13(w)	Cable Section 13
AC49	Felmingham Road	B1145, Felmingham Road	Crossing only	Cable Section 13
AC50	Felmingham Road	B1145, Felmingham Road	Not required	Cable Section 13
AC51	Brick Kiln Lane	B1145, Felmingham Road, Brick Kiln Lane	Not required	Cable Section 13
AC55	Suffield Road	B1145, Suffield Road	TC11(e)	Cable Section 12

Access ID	Highway Link	Potential Access Route	Stage 2	Stage 3
AC57	Church Road, into farm access	A140, High Noon Road, Church Road	TC11(w)	Cable Section 12
AC58	Church Road	A140, High Noon Road, Church Road	Crossing only	Cable Section 12
AC62	Banningham Road	A140, Banningham Road	Crossing only	Cable Section 11
AC66	A140	A140	MA8 (Cable section 13) TC10(w)(e), TC9(w)	Cable Section 11
AC75	Un-named Road	B1149, B1354 (Brickling Road), Un-named Road	TC9(w)	Cable Section 11
AC77	Blickling Road	B1149, B1354 (Brickling Road)	Crossing only	Cable Section 10 & 11
AC78	Blickling Road	B1149, B1354 (Brickling Road)	Not required	Cable Section 10
AC84	Heydon Road	B1149, The Street, Heydon Road	MA7 (Cable section 11 & 12)	Cable Section 10
AC85	Heydon Road	B1149, The Street, Heydon Road	Not required	Cable Section 10
AC88	The Street	B1149, The Street	Not required	Cable Section 9
AC89	B1149	B1149	Crossing only	Cable Section 9
AC91	Southgate (Road to Southgate from B1149)	B1149, Southgate	Not required	Cable Section 9
AC92	Southgate (Road to Southgate from B1149)	B1149, Southgate	Crossing only	Cable Section 9
AC96	Heydon Road	B1149, B1145, Heydon Road	Crossing only	Cable Section 9
AC102	B1145 (Cawston)	B1149, B1145	MA7 (Cable section 9 & 10)	Cable Section 8

Access ID	Highway Link	Potential Access Route	Stage 2	Stage 3
AC103	B1145 (Cawston)	B1149, B1145	TC8(e)	Cable Section 8
AC105	B1145 (Reepham)	B1145	Cable section 9a TC7(e), TC8(w)	Cable Section 8
AC107	Wood Dalling Road	B1145, Wood Dalling Road	Crossing only	Cable Section 8
AC108	Worlds End Lane	B1149, B1145, Wood Dalling Road, Worlds End Lane	Not required	Cable Section 8
AC110	B1145 (Bawdeswell)	A1067	Cable section 8a TC7(w)	Cable Section 7
AC111	B1145 (Bawdeswell)	A1067	Cable section 8a TC6(n)	Cable Section 7
AC112	B1145 (Bawdeswell)	A1067	TC6(s)	Cable Section 7
AC121	Private Access Track (Adjacent to Well Lane)	A1067, B1145, Private Access Track (Adjacent to Well Lane)	MA 5b (Cable section 8)	Cable Section 6
AC122	Lime Kiln Road	A1067, Lime Kiln Road	MA 5a (Cable section 7)	Cable Section 6
AC126	Mill Street	A1067, Elsing Lane, Mill Street	Crossing only	Cable Section 5
AC127	Unnamed Road to Bylaugh Hall	A1067, Elsing Lane, Unnamed Road to Bylaugh Hall	Cable section 16a TC5(e)	Cable Section 5
AC128	Elsing Road	A1067, B1147, Elsing Road	Not required	Cable Section 5
AC131	Elsing Road	A1067, B1147, Elsing Road	TC5(w)	Cable Section 5
AC132	Elsing Road, Private Access Track	A1067, B1147, Elsing Road, Private Access Track	Not required	Cable Section 5
SA135	Mowles Road, Farm	A47, B1147 (Norwich Road), Mowles	Not required	Cable Section 4

Access ID	Highway Link	Potential Access Route	Stage 2	Stage 3
	Access Track	Road, Farm Access Track		
AC136	Norwich Road	A47, B1147 (Norwich Road), Mowles Road, Norwich Road	Crossing only	Cable Section 4
AC137	Luddenham Road	A47, B1147 (Norwich Road), Mowles Road, Luddenham Road	MA4 (Cable section 5 & 6)	Cable Section 4
AC138	Swanton Road	A47, B1147 (Norwich Road), Mowles Road, Luddenham Road, Swanton Road	Crossing only	Cable Section 4
AC142	Hoe Road South	A47, B1147 (Norwich Road), Mowles Road, Luddenham Road, Swanton Road, Hoe Road South	Not required	Cable Section 4
AC143	Hoe Road South	A47, B1147 (Norwich Road), Mowles Road, Luddenham Road, Swanton Road, Hoe Road South	Not required	Cable Section 4
AC144	Hoe Road South	A47, B1147 (Norwich Road), Mowles Road, Luddenham Road, Swanton Road, Hoe Road South	TC4(w)(e)	Cable Section 4
AC145	Back Lane	A1067, B1145, B1110	Crossing only	Cable Section 4
AC147	B1146 (Holt Road)	A1067, B1145, B1110	MA4 (Cable section 3 & 4)	Cable Section 3
AC148	B1146 (Holt Road)	A1067, B1145, B1110	Not required	Cable Section 3
AC151	Mill Lane	A1067, B1146, Gressenhall Road to Dillington	TC3b(e)	Cable Section 3
AC152	Church Lane	A1067, B1146, Gressenhall Road to Dillington, Church Lane	TC3b(w)	Cable Section 3
AC153	Church Lane	B1146, Rushmeadow Rd, Longham Rd	TC3a(w)	Cable Section 3
AC160	Unnamed Road	A47, Unnamed Road	MA2 (Cable Section 2) TC1(n), TC2(n)(s)	Cable Section 2
AC161	Dale Road	A47, Dale Road	TC1(s)	Cable Section 2

Access ID	Highway Link	Potential Access Route	Stage 2	Stage 3
AC163	Dereham Road	A47, Greenbanks Road, Dereham Road	MA 1b (Cable section 1)	Cable Section 2
AC164	Dale Road	A47, Greenbanks Road, Dereham Road, Dale Road	Crossing only	Cable Section 2
AC165	Dereham Road	A47, Greenbanks Road	Crossing only	Cable Section 2
AC166	Bradenham Lane	A47, Bradenham Lane	Not required	Cable Section 2
AC167	Bradenham Lane	A47, Bradenham Lane	Not required	Cable Section 1
AC181	A47	A47	National Grid Substation Extension	Not required
AC182	A47	A47	National Grid Overhead Line Modifications	Not required
AC183	A47	A47	MA1a (Cable section 0 & 1) Onshore project substation	Cable Section 1

4 ACCESS DESIGN

4.1 General Approach

28. The OAMP presents access design principles and concepts to be developed by the appointed contractor.
29. The recommendations contained within this document will be subject to detailed engineering and assessment of traffic management requirements in consultation with the relevant authorities (NCC and HE). All designs will be subject to an independent road safety audit.
30. This process will ultimately determine the design requirement at each of the project access points referred to in Table 3.1, including visibility requirements, adoption of any temporary speed reductions or other traffic management measures and any agreed departures from DMRB standards.
31. In addition to the powers set out in the draft DCO, relevant powers under the Highways Act (1980), the Road Traffic Regulation Act (1984) and the New Roads and Street Works Act (1991) may also be relied upon to implement the access strategy (e.g. to implement temporary speed limits).
32. The relevant drainage authorities would be consulted when determining appropriate access treatment to cross a watercourse.
33. Apart from the onshore project substation, all other project access points are temporary and following completion of construction would be reinstated to their former state unless otherwise agreed with the relevant local authority.
34. The design process will be supported by a Stage 1 Road Safety Audit¹ of each location.

4.2 Design Considerations

35. Access to the onshore cable route has been developed assuming the use of a suitably sized HGV (a 20t payload tipper and a low loader). The design of the accesses will provide suitable radii/ overrun areas for these vehicle types.
36. To minimise overrun areas on minor roads, it is assumed the HGVs entering the side access will be able to use the entire width of the side access carriageway to manoeuvre (rather than adhere to lane discipline).
37. With the exception of a small number of locations, the majority of the local highway network operates a 60mph speed limit. Most of the roads are rural, single

¹ Stage 1 Road Safety Audit to be undertaken at completion of preliminary design.

carriageway or tracks with no footways or street lighting present; many with established hedgerows or trees forming the highway boundary.

38. The Design Manual for Roads and Bridges (DMRB) is adopted as the most appropriate design standard for major roads (A and B roads) and for visibility splays for all roads.
39. Minor road access design has been developed by means of 'first principles' i.e. using vehicle simulation tools to size the side access.
40. The guiding principle in developing the access designs is to minimise the impact on the surrounding environment. Recognising the temporary nature of the majority of the accesses, opportunities will be sought to 'step below' design standards to minimise impact whilst maintaining safety.
41. If a requisite visibility splay cannot be achieved without substantial hedgerow removal, in the first instance the designer will seek to introduce speed limits/traffic management to reduce the distance required.

4.3 Access Designs

4.3.1 Access Design Concepts

42. Four access design concepts have been developed for the project through the ETG consultation process as shown in Appendix 2:
 - Type A access: a fully standard compliant (DMRB) major/ minor road junction (as shown in RHDHV drawing PB4476-DR-H1-D-0100). Intended for use on A and major B roads. For this type of access, the requirement for a major road right turn lane would be determined in accordance with validated turning traffic demand;
 - Type B and C access: a reduced footprint access suitable for small B roads, minor and unclassified roads (as shown in RHDHV drawing PB4476-DR-H1-D-0101); and
 - Type D access: a running track crossing point. This type of access could be adapted for limited construction traffic demand by adding radii to provide access where required to create a suitable access type A, B or C (as shown in RHDHV drawing PB4476-DR-H1-D-102).
43. Traffic control for each access type will be determined according to background traffic flow and visibility and would range from a simple priority junction to traffic signal control. For roads with high traffic flows a 'staggered' arrangement would be considered, incorporating type A access.

44. In all cases advance hazard warning signs will be provided in accordance with the Traffic Signs Manual, Chapter 8, Traffic Safety Measures and Signs for Road Works and Temporary Solutions, Parts 1 and 2, commonly referred to as Chapter 8. This signage will encourage drivers to slow in the knowledge that there is a hazard ahead such as the potential for turning vehicles.
45. The required public highway crossings and side accesses have been reviewed to determine appropriate access type and the requirement for traffic management to secure a suitable visibility splay. The results are set out in Table 4.1.

Table 4.1 Access review

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
AC3	D/B or C	61	B or C	31	30	Y	N
AC5	D	-	B or C	31	60	N	Y
AC10	D	-	B or C	31	60	N	Y
AC12	-	-	B or C	31	60	N	Y
AC13	B or C	96	B or C	31	60	N	Y
AC16	D	-	B or C	31	30	Y	N
AC18	D	-	B or C	32	60	N	Y
AC20	-	-	B or C	32	60	N	Y (East only)
AC21	D	-	B or C	32	60	Y	Y
AC22	D	-	B or C	32	60	N	Y
AC24	B or C	72	B or C	38	60	N	Y

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
AC25	B or C	72	B or C	30	60	N	Y
AC28	D	-	B or C	30	60	N	Y
AC32	D	-	B or C	30	60	N	Y
AC34	B or C	72	B or C	30	60	N	Y
AC35	D/B or C	72	B or C	30	60	N	Y
AC37	B or C	48	B or C	30	60	N	Y
AC38	A	120	B or C	30	30	Y	N
AC47	A	120	B or C	30	60	Y	N
AC49	D	-	B or C	36	60	N	Y
AC50	-	-	B or C	36	60	Y	N
AC51	-	-	B or C	36	60	Y	N
AC55	D/B or C	72	B or C	31	60	N	Y
AC57	B or C	72	B or C	31	60	N	Y

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
AC58	D	-	B or C	31	60	N	Y
AC62	D	-	B or C	31	60	N	Y
AC66	A	144	B or C	33	60	Y	N
AC75	B or C	72	B or C	36	60	Y	N
AC77	D	-	B or C	35	60	N	Y
AC78	-	-	B or C	31	60	N	Y
AC84	D/B or C	96	B or C	35	60	N	Y
AC85	-	-	B or C	35	60	Y	N
AC88	-	-	B or C	35	60	Y	N
AC89	-	-	-	-	-	n/a	n/a
AC91	-	-	B or C	29	60	N	Y
AC92	D	-	B or C	29	60	N	Y
AC96	D	-	B or C	29	60	N	N

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
AC102	D/A	96	A	31	60	Y	N
AC103	A	72	A	31	60	N	Y
AC105	D/A	120	A	31	60	N	Y
AC107	D	-	B or C	31	60	N	Y
AC108	-	-	B or C	31	60 N/ 30 S	N (North only)	Y (North only)
AC110	B or C	72	B or C	38	60	N	Y
AC111	B or C	72	B or C	38	60	N	Y
AC112	B or C	72	B or C	38	60	N	Y
AC121	A	48	A	33	60	Y	N
AC122	B or C	48	B or C	33	60	N	Y
AC126	D	-	B or C	30	60	N	Y
AC127	B or C	72	B or C	30	60	N	Y
AC128	D/B or C	-	B or C	30	60	N	Y

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
AC131	B or C	72	B or C	30	60	Y	N
AC132	-	-	B or C	30	60	N	Y
AC135	-	-	B or C	29	60	N	Y
AC136	D	-	B or C	29	60	N	Y
AC137	D/A	96	B or C	29	60	N	Y
AC138	D	-	B or C	29	30 N/ 60 S	Y (North)/ N (South)	Y (South only)
AC142	-	-	B or C	29	60	N	Y
AC143	-	-	B or C	29	60	N	Y
AC144	B or C	96	B or C	29	60	N	Y
AC145	D	-	B or C	29	60	Y	N
AC147	D/A	96	B or C	34	60	N	Y
AC148	-	-	B or C	34	60	N (South only)	Y (South only)

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
AC151	B or C	72	B or C	34	60	N	Y
AC152	B or C	72	B or C	34	60	N	Y
AC153	D/B or C	72	B or C	34	60	N	Y
AC160	Temporary (refer to section 4.3.2.1) (TP-PB4476-DR010)	136	Temporary (refer to section 4.3.2.1) (TP-PB4476-DR010)	34	60	N	Y
AC161	B or C	72	B or C	34	60	N	Y
AC163	A	48	A	34	60	Y	N
AC164	D	-	B or C	34	60	N	Y
AC165	D	-	B or C	34	60	N	Y
AC166	-	-	B or C	34	60	N	Y
AC167	-	-	B or C	33	60	N	Y
AC181	Permanent (refer to section 4.3.2.2)	68	-	-	60	Y	N

Access ID	Stage 2 Access Type Required	Main Duct Installation / Primary Works Stage Peak HGVs Movements (Daily)	Stage 3 Access Type Required	Cable Pull Stage Peak HGVs Movements (Daily)	Existing speed limit (mph)	Visibility compliance* for existing design speed (Y/N)	Temp speed reduction required (Y/N)
	(TP-PB4476-DR001)						
AC182	Temporary (refer to section 4.3.2.3) (TP-PB4476-DR003)	20	Temporary (refer to section 4.3.2.3) (TP-PB4476-DR003)	-	60	Y	N
AC183	Permanent (refer to section 4.3.2.4) (TP-PB4476-DR002)	150	Permanent (refer to section 4.3.2.4) (TP-PB4476-DR002)	33	60	Y	N
*	DMRB visibility compliance in accordance to the DMRB TD 42/95 Volume 6 Section 2 Part 6 – Table 7/1						

46. Finalised drawings, showing full details of access improvements and hierarchical strategies allowing safe access/egress from the highway onto the onshore cable route would be agreed as part of the development of the AMP (once a contractor has been appointed), and in consultation with NCC and HE.

4.3.2 Strategic Road Network (A47) Access Designs

47. The project access from the A47 requires specific design considerations as the locations will be subject to high traffic demand during the construction phase of the project. The substation site's treatment will be permanent to serve the operational phase of the project.
48. In consultation with HE, a number of specific A47 outline access designs have been developed including AC160, AC181, AC182 and AC183, a description of each access and respective design requirement follows:
49. The outline access designs for all A47 accesses can be found in Appendix 2 and corresponding swept path analysis is provided in Appendix 3.

4.3.2.1 AC160 – MA2-East and TC1 (north) and TC2

50. Access to the infrastructure sites north west of Scarning would require the following infrastructure improvements 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;
 - Upgrade of the existing A47 / Bushy Common Road bellmouth to a DMRB compliant rural simple priority junction incorporating a minimum 15m corner radii and 1:8 tapers over 30m distance; and
 - 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.

4.3.2.2 AC181 – National Grid Substation Extension

51. Access to the National Grid Substation Extension would require the following infrastructure improvements to enable the use of AC181:
 - Removal of the existing grasscrete;
 - Existing vegetation cutback/lowering to provide 215m visibility splays in both directions along the A47 in compliance with a 100A (60mph) design speed;

- Realignment and widening of existing access approach to cater for a 7.3m approach width, allowing passing of two HGVs; and
- Upgrade of the existing bellmouth to a DMRB compliant rural simple priority junction incorporating a minimum 15m corner radii and 1:10 tapers over 25m distance.

4.3.2.3 AC182 – National Grid Overhead Line Modifications Works.

52. Access to the field north of the A47 to complete the overhead Line Modification (OHLN) works would require the following infrastructure improvements to enable the use of AC182:

- Existing vegetation cutback/lowering to provide 90m visibility splays in both directions along the A47 in compliance with a 60B (30mph) design speed;
- Realignment and widening of existing access approach to cater for a 7.3m approach width, allowing passing of two HGVs;
- Upgrade of the existing bellmouth to a DMRB compliant rural simple priority junction incorporating a minimum 15m corner radii and 1:8 tapers over 30m distance; and
- Temporary 30mph speed limit to be introduced when AC179 is operational.

4.3.2.4 Access AC183 (onshore project substation, MA1a-West and MA1a-East)

53. Access to the onshore substation south off the A47 will require the following infrastructure requirements to enable the use of AC183.

- Construction of new access to a DMRB compliant right turn ghost island priority junction (all movements permitted) incorporating a minimum 15m corner radii and 1:6 tapers over 30m distance;
- Existing vegetation cutback/lowering to provide 215m visibility splays in both directions along the A47 in compliance with a 100A (60mph) design speed.
- Access approach width of 8.4m to allow passing of two HGVs and to cater for Abnormal Indivisible Load deliveries; and
- HGV turning area to be provided within the site allowing HGVS to enter and exit the A47 in a forward gear.

54. Alternative access arrangements are to be explored with the landowner, whereby a single point of access may be provided at access AC183 for construction and farm traffic. Details will be finalised during detailed design stage and a commitment will be included within the Final AMP as appropriate.

4.3.2.5 General Provisions

55. All temporary infrastructure requirements for accesses of the A47 (AC160, AC181, AC182 and AC183) would be contained within the highway boundaries or the 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) (document reference 8.7).

56. Accesses AC160, AC181 and AC182 are to adopt a 'no right turn' traffic management plan, details of diversion routes and enforcement measures are provided in the OTMP (document reference 8.8).
57. Accesses AC160, AC181, AC182 and AC183 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.
58. These stipulations will be captured in the final AMP prior to commencement of works on site.

5 REFERENCES

Design Manual for Roads and Bridges, Vol 6, Section 2, Part 6, TD 42/95 'Geometric Design of Major/Minor Priority Junctions'.

Design Manual for Roads and Bridges, Vol 5, Section 2, Part 2, HD 19/15 'Road Safety Audit'.
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Traffic Signs Manual, Chapter 8, 'Traffic safety measures and Signs for Road Works and Temporary solutions, Parts 1 and 2'
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