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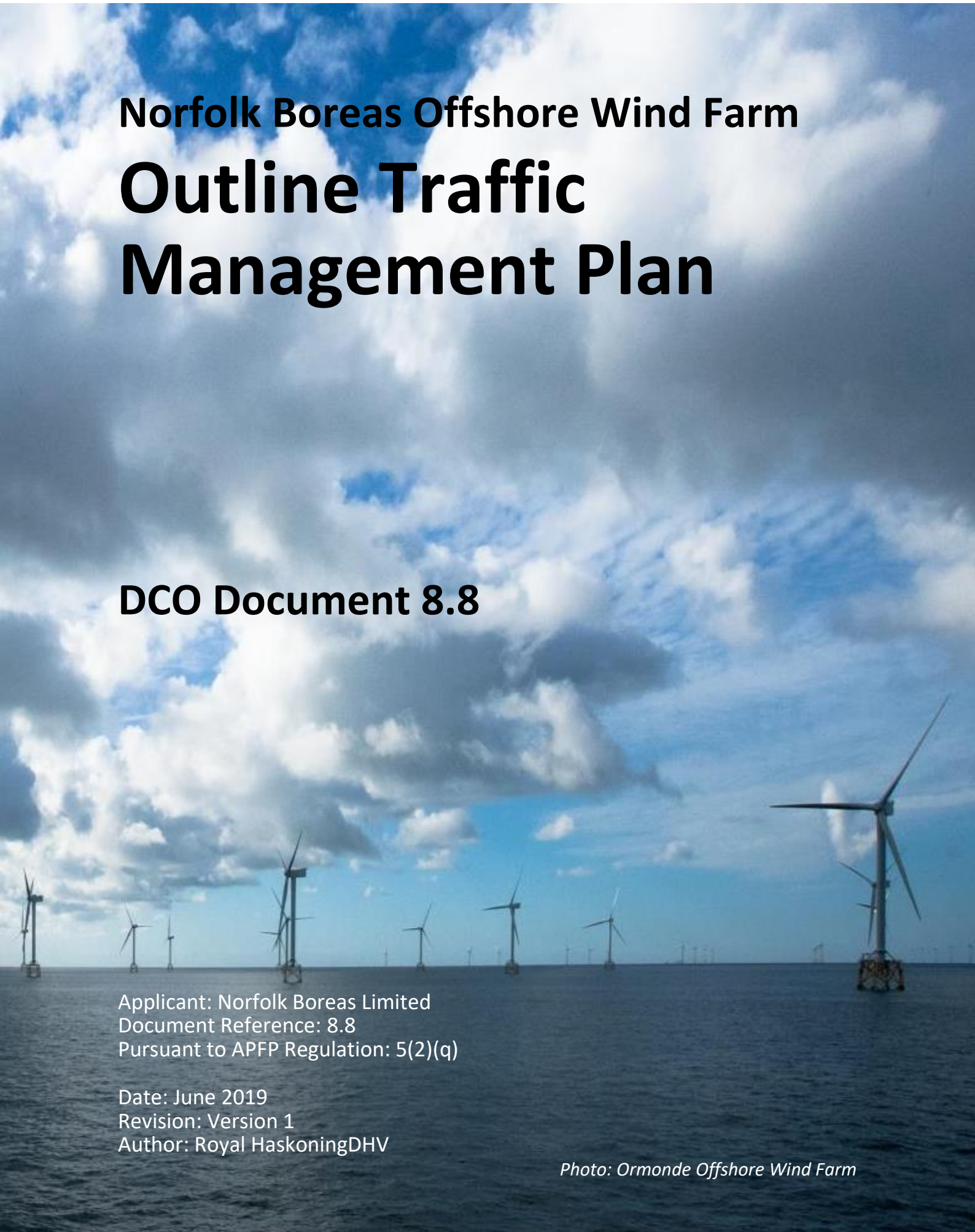

Norfolk Boreas Offshore Wind Farm

Outline Traffic Management Plan

DCO Document 8.8

Applicant: Norfolk Boreas Limited
Document Reference: 8.8
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23/05/19	01F	Final for DCO submission	RE	CD	JL

Table of Contents

Tables

Figures

Glossary of Acronyms

AADT	Annual Average Daily Traffic
AC	Access
AILs	Abnormal Indivisible Loads
AMP	Access Management Plan
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
EIA	Environment Impact Assessment
ES	Environmental Statement
ESDAL	Electronic Service Delivery for Abnormal Loads
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HVDC	High Voltage Direct Current
MA	Mobilisation Area
NCC	Norfolk County Council
OAMP	Outline Access Management Plan
OTMP	Outline Traffic Management Plan
OTP	Outline Travel Plan
TC	Trenchless Crossing Point
TMP	Traffic Management Plan
VWPL	Vattenfall Wind Power Limited

Glossary of Terminology

Cable pulling	Installation of cables within pre-installed ducts from jointing pits located along the onshore cable route.
Control Point	A location that provides the checks and controls for the movement of HGVs and employees.
Delivery	A delivery is the process of transporting goods from a source location to a predefined destination. A delivery will generate two vehicle movements (an arrival and departure)
Ducts	A duct is a length of underground piping, which is used to house electrical and communications cables.
Jointing pit	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts
Landfall	Where the offshore cables come ashore at Happisburgh South
Landfall compound	Compound at landfall within which HDD drilling would take place
Landfall zone	Area within which the landfall would be located
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
National Grid new / replacement overhead line tower	New overhead line towers to be installed at the National Grid substation.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines.
National Grid substation extension	The permanent footprint of the National Grid substation extension.
National Grid temporary works area	Land adjacent to the Necton National Grid substation which would be temporarily required during construction of the National Grid substation extension.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard
Onshore 400kV cable route	Buried high-voltage cables linking the onshore project substation to the Necton National Grid substation
Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore cables	The cables which take power and communications from landfall to the onshore project substation
Onshore infrastructure	The combined name for all onshore infrastructure associated with the project from landfall to grid connection.
Onshore project area	The area of the onshore infrastructure (landfall, onshore cable route, accesses, trenchless crossing zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modifications).
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to

	HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Running track	The track along the onshore cable route which the construction traffic would use to access work areas.
The Applicant	Norfolk Boreas Limited
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.
Trenchless crossing zone	Areas within the onshore cable route which will house trenchless crossing entry and exit points.
Vehicle (HGV, Traffic) movement	A single trip (i.e. either an arrival to, or departure from site) for the transfer of employees or goods.
Vehicle (HGV, Traffic) flow	Total vehicle movements on a road (highway link).

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1 INTRODUCTION

1.1 Background

1. This document forms part of the Development Consent Order (DCO) application for the onshore project area of the Norfolk Boreas Offshore Wind Farm (herein '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 details 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 Requirements 21 and 22 of the Draft DCO.

5. The OTMP is complimented by the OAMP which details additional measures to facilitate vehicles (particularly HGVs) to safely access the main distributor highway network via the identified accesses and minor routes during the onshore construction period.

6. The OTMP does not consider the operational period of the onshore infrastructure as minimal traffic would be generated by the daily operation and periodic maintenance at the onshore project substation and at link boxes along the onshore cable route.

7. Following appointment of a contractor, the measures outlined in the respective plans would be validated and optimised during the detailed design phase post

consent in consultation with NCC and HE.

1.2 Development Scenarios

8. Vattenfall Wind Power Limited (VWPL), the parent company of Norfolk Boreas Limited, is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. The Norfolk Vanguard project is approximately one year ahead of Norfolk Boreas in its development programme having submitted its DCO application in June 2018. In order to minimise impacts associated with onshore construction works for the two projects, Norfolk Vanguard are seeking consent to undertake the duct installation and some enabling works for both projects at the same time. This is the preferred option and considered to be the most likely however, Norfolk Boreas needs to consider the possibility that Norfolk Vanguard may not proceed to construction.

9. Therefore, it is necessary for this OTMP to consider the following two alternative scenarios:

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

1.3 OTMP Approach to Development Scenarios

10. This OTMP is an outline strategy and takes account of both potential development scenarios for the project as discussed in section 1.2.

11. Where proposed mitigation measures would differ under Scenario 1 or Scenario 2, this is explicitly stated and mitigation measures are provided for both scenarios. Otherwise the mitigation detailed is applicable to both scenarios.

12. The final OTMP for the project will be drafted post consent, in consultation with NCC and HE, and drafted based on the final adopted scenario which would be taken forward to construction.

1.4 Purpose of the OTMP

13. The purpose of the OTMP is to capture and secure the mitigation principles that, for the construction phase of the onshore elements of the project, are to be included in the final Traffic Management Plan (TMP) to be submitted pursuant to the discharge of Requirement 21(a) of the Draft DCO.

14. During the operational phase, traffic movements would be limited to periodic maintenance at the substation and link boxes/test pits along the onshore cable

route. Due to the limited nature of these operations, the OTMP does not consider operational traffic movements.

1.5 Consultation

15. Norfolk Boreas 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 a Scoping Report (Royal HaskoningDHV, May 2017), a Traffic and Transport Method Statement (Royal HaskoningDHV, 2018, unpublished) and the Expert Topic Group Meeting held in May 2018. Consultation has also been undertaken through the publishing of the Preliminary Environmental Information Report (Norfolk Boreas Limited, 2018) and subsequent public Drop In Events in November 2018.

17. The ETG included transportation professionals from NCC, HE and Norfolk Boreas 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.

18. Further ongoing consultation has been undertaken through the Norfolk Vanguard DCO examination process which in turn has informed the development of this document and the refinement of the mitigation measures presented. Information presented as part for the Norfolk Vanguard examination process up to Examination Deadline 7 (2nd May 2019) has been included in this document. However, at the time of writing it is recognised that a number of items are still under discussion and the intention is this document will be updated, if required, during examination.

19. Further details of consultation undertaken to date is outlined within Chapter 24 Traffic and Transport of the ES (document reference 6.1.24).

1.6 Interactions with Other Projects

1.6.1 Hornsea Project Three

20. The Hornsea Project Three application for development consent was submitted in May 2018 setting out a proposal to develop an offshore wind farm located in the southern North Sea, with a total generating capacity of up to 2,400MW.

21. The outline Export Cable Route (ECR) of Hornsea Project Three will make landfall at a location between Sheringham and Cley next the Sea. From the landfall location, the ECR heads approximately 55km south to connect to the Norwich Main National Grid Substation. A high level construction programme indicates that onshore construction is currently planned to commence in 2021 and last for a period of six years. Hornsea Project Three's construction could coincide with Norfolk Boreas's Scenario 2 duct

installation and onshore project substation construction works period should both projects proceed to construction on forecasted programmes.

22. This OTMP identifies the highway links that would be shared by both projects (in accordance with the CIA within ES Chapter 24 Traffic and Transport) which considers the final traffic numbers presented for Hornsea Project Three and sets out the measures and commitments to ensure the cumulative traffic impacts would be managed below significant (environmental impact) levels (in accordance with the EIA Methodology set out in ES Chapter 6, major and moderate impacts are deemed to be 'significant').

23. The respective Outline Code of Construction Practice (OCoCP) as submitted for both Norfolk Boreas (document reference 8.1) and Hornsea Project Three both include commitments to developing project specific Communication Plans post-consent and include a framework to set out the key points of how communications will be delivered. In order to ensure communication between the respective projects, the Communication Plans will set out the process of continued engagement between Norfolk Boreas, Hornsea Project Three and the Local Highway Authority. This will ensure that as construction programmes are refined post-consent this information is regularly shared between parties, particularly traffic demand on shared road links and that commitments to manage cumulative construction traffic demand are fully delivered; for example on a given road the two projects may have committed to programme works that ensure each scheme's peak traffic does not overlap.

1.6.2 Strategic Road Network

24. HE has proposed six improvement schemes for the A47 as part of the Road Investment Strategy (RIS) announced in 2014. Current timescales estimate that the DCO applications for these separate schemes will be submitted in either 2019 or 2020.

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

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

26. These schemes are expected to start construction in 2021 and predicted to end in 2023. The peak construction activity for these schemes is expected to finish before the commencement of construction works for Norfolk Boreas. Norfolk Boreas is scheduled for construction between 2023 and 2024 (Scenario 2) and as such, any

slippage in the programme for these separate schemes could potentially lead to cumulative impacts with the peak Scenario 2 traffic for Norfolk Boreas.

27. At this stage, three of the identified schemes have announced their preferred scheme options and further consultation is ongoing. DCO applications for these schemes have not yet been submitted and therefore it is not possible to determine the scope and scale of the construction traffic demand associated with the RIS schemes at this stage.

28. To manage potential cumulative traffic impacts, it has been agreed with HE that the management of the potential cumulative impacts can be addressed in the final submitted Traffic Management Plan (post consent) when there is greater certainty with regard to RIS scheme construction traffic data.

29. Norfolk Boreas's commitment to engage with HE to establish opportunities to co-ordinate activities and avoid significant impacts resulting from cumulative peak traffic is captured in the OCoCP (document reference 8.1) through the development of a Communication Plan.

1.7 Project Description

30. A comprehensive project description of the onshore project area is contained within Chapter 5 Project Description of the ES (document reference 6.1.5), this includes a detailed comparison of the scenarios provided in Appendix 5.1 (document reference 6.3.5.1).

31. 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.

32. The project is considering either two phases or one continuous construction phase for the cable pulling. For the purposes of the EIA, a two phase approach was assessed as the worst case for both scenarios.

1.7.1 Scenario 1

33. Under Scenario 1 Norfolk Vanguard proceeds to construction and would have undertaken the following to benefit Norfolk Boreas:

- Installation of ducts to house Norfolk Boreas cables along the entirety of the onshore cable route from the landfall zone to the onshore project substation;
- A47 junction works for both projects and installation of a shared access road up to the Norfolk Vanguard substation; and

- Overhead line modifications at the Necton National Grid substation, which will accommodate both projects.

34. Under Scenario 1 the following onshore elements of the project will be constructed by Norfolk Boreas:

- Installation of cables and ducts at the landfall;
- Cable pulling through pre-installed ducts, including reinstallation of up to approximately 12km of temporary running track;
- Construction of onshore project substation, including extension of the access road from the A47 (installed by Norfolk Vanguard);
- Extension of the Necton National Grid Substation in an easterly direction, with a footprint of approximately 135m by 150m; and
- Landscape mitigation planting.

35. There are considered two discrete stages in the Scenario 1 construction, namely;

- Stage 1: Landfall and onshore project substation primary works (including National Grid substation extension); and
- Stage 2: Two phase cable pulling, jointing and commissioning.

36. Table 1.1 details an indicative onshore construction programme for Scenario 1.

Table 1.1 Indicative project construction programme Scenario 1

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

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

[2] In the two phase option, cables are installed in two consecutive years to facilitate the commissioning of the offshore wind turbine planting.

Activity	Year					
	2022	2023	2024	2025	2026	2027
Primary works						
Electrical plant installation and commission						
Phase 1[2]						
Phase 2[2]						

1.7.1.1 Scenario 1 - Stage 1: Landfall and onshore project substation primary works

37. The onshore project substation would be accessed from A47 via a permanent access which would have been constructed for the Norfolk Vanguard project and construction activities would be served by a Mobilisation Area (MA1a) and a temporary works area. The construction of the National Grid substation extension would be served by an alternative upgraded existing access undertaken by Norfolk Vanguard and would be served by a temporary works areas.

38. The landfall would be accessed via a preconstructed Norfolk Vanguard running track which would either be kept in situ for the Norfolk Boreas works or be required to be reinstalled (if reinstated by Norfolk Vanguard).

1.7.1.2 Scenario 1 - Stage 2: Cable pulling, jointing and commission

39. Cables would be pulled through the pre-installed ducts (installed by Norfolk Vanguard) in a two phase approach. This approach would allow the main civil works to be completed in advance by Norfolk Vanguard, preventing the requirement to reopen the land on a wholesale basis and minimising potential environmental impacts and disruption.

40. The cables would be pulled through the pre-installed ducts at jointing pit locations located along the onshore cable route. The jointing pits and associated accesses would be constructed to facilitate the cable pulling activities.

41. Access to the onshore cable route would be directly from the highway network (at running track crossing locations) or existing local access routes where possible. In some locations, isolated sections of the running track would be left in place from the Norfolk Vanguard duct and cable installation works or be reinstalled (if reinstated by Norfolk Vanguard) to allow access to more remote jointing pits. It is estimated that a running track would be required for up to 20% of the total onshore cable route length for the cable pulling works.

42. A review of over 200 access tracks, public highway roads and running track crossing points has been undertaken taking into account potential jointing pit locations. This has narrowed down the potential access points to the 75 locations as presented in this plan (refer to Table 3.2).

43. Figure 2 details the key components of the Scenario 1 onshore infrastructure.

1.7.2 Scenario 2

44. Under Scenario 2, the onshore elements of the project will be constructed by Norfolk Boreas:

- Installation of ducts and cables at the landfall;
- Duct installation via open trenching and trenchless crossings, including installation of 60km of temporary running track;
- Installation of mobilisation areas and trenchless crossing compounds;
- Cable pulling through pre-installed ducts, including retaining or reinstalling up to approximately 12km of temporary running track;
- Construction of onshore project substation, including installation of new permanent access road from A47 and associated junction improvement works;
- Extension of the Necton National Grid Substation in a westerly direction, with a footprint of approximately 200m by 150m;
- Modifications to the existing National Grid overhead lines; and
- Landscape mitigation planting.

45. 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.

46. 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 though the pre-laid ducts at a later stage in the programme.

47. There are three discrete stages in Scenario 2 construction, namely:

- Stage 1: Pre-construction works e.g. pre-construction surveys;
- Stage 2: Duct installation works, landfall and onshore project substation primary works (including National Grid substation extension); and
- Stage 3: Cable pulling, jointing and commission.

48. Table 1.2 details an indicative construction programme for Scenario 2.

Table 1.2 Indicative project construction programme under Scenario 2

Activity	Year					
	2021	2022	2023	2024	2025	2026
Landfall						
Duct Installation						
Cable Pulling, Jointing and Commission						
Phase 1[3]						
Phase 2[3]						
Onshore cable route						
Pre-construction works						
Duct installation works						
Cable pulling, jointing and commission						
Phase 1[3]						
Phase 2[3]						
Onshore project substation						
Pre-construction works						
Primary works						
Electrical plant installation and commission						
Phase 1[3]						
Phase 2[3]						

1.7.2.1 Scenario 2 - Stage 1: Pre-construction works

49. The pre-construction stage represents a number of activities with limited traffic demand (e.g. pre-construction surveys). Access to the onshore project area would be via existing tracks; however, some new accesses may be constructed during this phase to facilitate construction at Stage 2.

1.7.2.2 Scenario 2 - Stage 2: Duct installation works and onshore project substation primary works

50. The access strategy for Scenario 2 Stage 2 has been developed to accommodate the following requirements:

- Access to mobilisation areas (MA);
- Crossing of the highway by the project 'running track'; and
- Access to trenchless crossing locations.

[3] In the two phase option, cables are installed in two consecutive years to facilitate the commissioning of the offshore wind turbine planting.

51. The onshore duct installation and onshore project substation primary works are serviced by 14 mobilisation areas. The main function of the mobilisation areas is to provide a control point for HGVs delivering to the onshore cable route, as well as providing welfare facilities, parking for staff and storage areas for materials, plant and equipment.

52. The mobilisation areas are located in close proximity to A roads and B roads to concentrate traffic demand away from minor routes. They are located away from settlements to minimise disruption to local communities.

53. The onshore cable route has been separated into 20 cable route sections, which would be accessed from the mobilisation areas via a running track. The running track would provide safe access for construction vehicles along the onshore cable route, from mobilisation areas to duct installation sites and would serve to significantly reduce the number of trips on the local highway network.

54. The running track would be up to 6m wide and may ultimately extend along the majority length of the onshore cable route, crossing the public highway in a number of locations.

55. There are a number of physical features which cannot be disturbed by trenching methods or the running track; examples of this include rivers and railway lines. To install the onshore cable route across such features, a trenchless crossing technique[4] would be employed.

56. Each trenchless crossing[4] location would require access to the 'drive' and 'reception' zone of the crossing. Access would be via the running track in the majority of cases, however some locations may be totally 'land locked' and therefore require direct access either via a private track from the public highway (referred to as a 'side access') or via a road crossing access direct into the cable route.

57. Figure 3 details the key components of the stage 2 construction phase.

1.7.2.3 Scenario 2 - Stage 3: Cable pulling, jointing and commission

58. Details of Scenario 2 Stage 3: cable pulling, jointing and commission follows the assumptions set out within paragraphs 39 to 43 of Scenario 1 Stage 2.

59. Cable pulling would not require the trenches to be re-opened. The cables would be pulled through the pre-installed ducts installed during the duct installation works at jointing pit locations located along the onshore cable route. The jointing pits and associated accesses would be constructed during the cable pull phase which would facilitate the cable pulling activities.

[4] Trenchless crossing techniques include Horizontal Directional Drilling/Auger Bore/Micro Tunnel

60. This would be achieved through access to the onshore cable route directly from the highway network (at running track crossing locations) or existing local access routes where possible. In some locations, isolated sections of the running track would be left in place from the duct installation works or be reinstalled to allow access to more remote joint locations. It is estimated that a running track would be required for up to 20% of the total onshore cable route length for the cable pulling works.

61. The development of the access strategy for this stage has been informed by a reduced demand for materials and employees (relative to stage 2) leading to a substantial reduction in forecast traffic demand.

62. A review of over 200 access tracks, public highway roads and running track crossing points (from the previous construction stage) has been undertaken taking into account potential joint pit locations. This has narrowed down the potential access points to the 75 locations as presented in this OTMP (refer to Table 3.2).

2 EMBEDDED MITIGATION

63. Norfolk Boreas 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.

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

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

66. Full details of the embedded mitigation can be found within Chapter 6 EIA Methodology of the ES (document reference 6.1.6).

67. Table 2.1 outlines the key embedded mitigation measures relevant for this assessment. Where embedded mitigation measures have been incorporated into the design of the project with specific regard to the traffic forecasts contained in this OTMP these are described in Table 2.2.

Table 2.1 Embedded mitigation

Parameter	Mitigation measures embedded into the project design	Notes
Project Wide		
Commitment to HVDC technology	Commitment to HVDC technology minimises environmental impacts through the following design considerations; • HVDC requires fewer cables than the HVAC solution. During the duct installation phase in Scenario 2 this reduces the cable route working width to 35m from the previously identified worst case of 50m. As a result, the overall footprint of the onshore cable route required for the duct installation phase is reduced from approx. 300ha to 210ha; • The width of permanent cable easement is also reduced from 25m to 13m; • Removes the requirement for a cable relay station;	Norfolk Boreas Limited has reviewed consultation received and in light of the feedback, has made a number of decisions in relation to the project design. One of these decisions is to deploy HVDC technology as the export system.

Parameter	Mitigation measures embedded into the project design	Notes
	• Reduces the maximum duration of the cable pulling phase from three years down to two years; • Reduces the total number of jointing bays for Norfolk Boreas from 450 to 150; and • Reduces the number of drills needed at trenchless crossings (including landfall).	
Site Selection	The project has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. Considerations include (but are not limited to) adhering to the Horlock Rules for the onshore project substation and National Grid infrastructure, a preference for the shortest route length (where practical) and developing construction methodologies to minimise potential impacts. Key design principles from the outset were followed (wherever practical) and further refined during the EIA process, including; • Avoiding proximity to residential dwellings; • Avoiding proximity to historic buildings; • Avoiding designated sites; • Minimising impacts to local residents in relation to access to services and road usage, including footpath closures; • Utilising open agricultural land, therefore reducing road carriageway works; • Minimising requirement for complex crossing arrangements, e.g. road, river and rail crossings; • Avoiding areas of important habitat, trees, ponds and agricultural ditches; • Installing cables in flat terrain maintaining a straight route where possible for ease of pulling cables through ducts; • Avoiding other services (e.g. gas pipelines) but aiming to cross at close to right angles where crossings are required; • Minimising the number of hedgerow crossings, utilising existing gaps in field boundaries; • Avoiding rendering parcels of agricultural land inaccessible; and • Utilising and upgrading existing accesses where possible to avoid impacting undisturbed ground.	Constraints mapping and sensitive site selection to avoid a number of impacts, or to reduce impacts as far as possible, is a type of primary mitigation and is an inherent aspect of the EIA process. Norfolk Boreas Limited has reviewed consultation received to inform the site selection process (including local communities, landowners and regulators) and in response to feedback, has made a number of decisions in relation to the siting of project infrastructure. The site selection process is set out in Chapter 4 Site Selection and Assessment of Alternatives.
Long HDD at landfall	Use of long HDD at landfall to avoid restrictions or closures to Happisburgh beach and retain open access to the beach during construction. Norfolk Boreas Limited have also agreed to not use the	Norfolk Boreas Limited has reviewed consultation received and in response to feedback, has made a number of

Parameter	Mitigation measures embedded into the project design	Notes
	beach car park at Happisburgh South.	decisions in relation to the project design. One of those decisions is to use long HDD at landfall.
Scenario 1		
Strategic approach to delivering Norfolk Vanguard and Norfolk Boreas	Subject to both Norfolk Vanguard and Norfolk Boreas receiving development consent and progressing to construction, onshore ducts will be installed for both projects at the same time, as part of the Norfolk Vanguard construction works. This would allow the main civil works for the cable route to be completed in one construction period and in advance of cable delivery, preventing the requirement to reopen the land in order to minimise disruption. Onshore cables would then be pulled through the pre-installed ducts in a phased approach at later stages. In accordance with the Horlock Rules, the co-location of Norfolk Vanguard and Norfolk Boreas onshore project substations will keep these developments contained within a localised area and, in so doing, will contain the extent of potential impacts.	The strategic approach to delivering Norfolk Vanguard and Norfolk Boreas has been a consideration from the outset of the project.
Scenario 2		
Duct Installation Strategy	Under Scenario 2 the onshore cable duct installation strategy is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on a short length (approximately 150m section) and once the cable ducts have been installed, the section would be back filled and the top soil replaced before moving onto the next section. This would minimise the amount of land being worked on at any one time and would also minimise disruption.	This has been a very early project commitment. Chapter 5 Project Description provides a detailed description of the process.
Trenchless Crossings	Under Scenario 2 a commitment to trenchless crossing techniques to minimise impacts to the following specific features; • Wendling Carr County Wildlife Site; • Little Wood County Wildlife Site; • Land South of Dillington Carr County Wildlife Site; • Kerdiston proposed County Wildlife Site; • Marriott's Way County Wildlife Site / Public Right of Way (PRoW); • Paston Way and Knapton Cutting County Wildlife Site; • Norfolk Coast Path;	A commitment to a number of trenchless crossings at certain sensitive locations was identified at the outset of the Project. However, Norfolk Boreas Limited has committed to certain additional trenchless crossings as a direct response to stakeholder requests.

Parameter	Mitigation measures embedded into the project design	Notes
	• Witton Hall Plantation along Old Hall Road; • King's Beck; • River Wensum; • River Bure; • Wendling Beck; • Wendling Carr; • North Walsham and Dilham Canal; • Network Rail line at North Walsham that runs from Norwich to Cromer; • Mid-Norfolk Railway line at Dereham that runs from Wymondham to North Elmham; and • Trunk/Principal Roads including A47, A140, A149.	

Table 2.2 Embedded mitigation for traffic and transport

Parameter	Embedded mitigation for traffic and transport	Applicable to Scenario 1	Applicable to Scenario 2	Notes
Mobilisation Areas	Mobilisation areas located close to main A-road and B-roads where possible, minimising impacts upon local communities and utilising the most suitable roads. Mobilisation areas located away from population centres where practical to reduce impact on local communities and population centres.	✗	✓	
Duct Installation	Suitable access points and identification of optimum routes for construction traffic to use. This minimises impacts on sensitive receptors.	✗	✓	Details contained within the OAMP (document reference 8.10)
Cable Pulling and Jointing Stage access	Suitable side accesses and road crossing locations reviewed from initial schedule of 200+ access points to 70+ realistic potential access points to minimise local route impacts.	✓	✓	Details contained within the OAMP (document reference 8.10)
HGV Vehicle Movement	Construction of an (up to) 6m wide running track with a maximum approximate length of 60km. This would reduce the number of access points required and HGV movements on the local road network.	✓ (12km)	✓ (60km)	Details contained within the OAMP (document reference 8.10)
	Consolidating HGVs at mobilisation areas to reduce vehicle movements along more sensitive local routes.	✓ (Ma1b only)	✓	

Parameter	Embedded mitigation for traffic and transport	Applicable to Scenario 1	Applicable to Scenario 2	Notes
	Carefully selected delivery routes utilising predominately A and B-roads acknowledging the sensitive receptors within the traffic and transport study area. Management measures to control timing of deliveries.	✓	✓	
Employee Vehicle Movement	Consolidating onshore cable route section construction employee movements at mobilisation areas. Onward travel along the running track to place of work reducing vehicle movements along local routes.	✓ (Ma1b only)	✓	Details contained within the OTP (document reference 8.9)

3 ENVIRONMENTAL IMPACT CONTROLS

3.1 General Principles

68. Chapter 24 Traffic and Transport of the ES assesses the environmental impact of traffic on the routes within the traffic and transport study area across a range of effects, namely:

- Severance;
- Pedestrian amenity;
- Driver delay; and
- Road Safety

69. The traffic and transport assessment is predicated on the final TMP being implemented as embedded mitigation (as required under DCO Schedule 1, Part 3, Requirement 21) to manage the daily delivery profiles and control movements and routing.

70. 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 final agreed TMP (e.g. to implement temporary speed limits).

3.2 HGV Demand

71. During the development of the EIA, HGV routes were carefully selected (in liaison with highway stakeholders) to minimise the potential for adverse environmental impacts.

72. The EIA sets out the forecast number of construction HGVs distributed across the traffic and transport study area for both scenarios (see Appendix 1 – Scenario 1 HGV Distribution and Appendix 2 – Scenario 2 HGV Distribution).

73. The daily HGV demand set out in Appendix 1 and 2 represents the maximum HGV level for the project alone not to be exceeded by the appointed contractor.

74. Appendix 2 includes refinements to the numbers submitted in ES Chapter 24 Traffic and Transport (document reference 6.1.24) based on the CIA and subsequent agreements with highway stakeholders. For clarity, these are identified in Table 3.1.

Table 3.1 Capped HGV routes Norfolk Boreas in isolation

Link ID	Route	In Isolation Max. Daily NB HGV movements	Notes
13b	A148	379	Refined primary peak
32	B1149	184	In accordance with Norfolk Vanguard OTMP Cap.
34	B1145: High Street	168	In accordance with Norfolk Vanguard OTMP Cap.
36	B1149	184	In accordance with Norfolk Vanguard OTMP Cap.
41	B1436 – Felbrigg Road	287	Refined primary peak

75. These HGV movements would be controlled by the contractor at point of destination on the onshore cable route by monitoring the number of deliveries.

76. The maximum HGV movements will be controlled by the contractor at the point of destination on the onshore cable route by monitoring the number of deliveries. To facilitate this Table 3.2 provides a summary of the peak daily HGV movements to each of the accesses for both Scenario 1 (Stage 1 and 2) and Scenario 2 (Stage 2 and Stage 3). Further details regarding these accesses are set out in the OAMP (document reference 8.8) and the Access to Works Plan (document reference 2.5) submitted as part of the DCO application.

Table 3.2 HGV movements per access

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
AC3	Landfall	34	Cable Section 16	31	Landfall	30	Cable Section 16	31
AC5, AC10	Not required	-	Cable Section 16	31	Crossing only	-	Cable Section 16	31
AC12	Not required	-	Cable Section 16	31	Not required	-	Cable Section 16	31
AC13	Not required	-	Cable Section 15 & 16	33	MA11 (Cable section 17 & 18)	80	Cable Section 15 & 16	33
AC16	Not required	-	Cable Section 15	33	Crossing only	-	Cable Section 15	33
AC18	Not required	-	Cable Section 15	33	Crossing only	-	Cable Section 15	33
AC20	Not required	-	Cable Section 15	33	Not required	-	Cable Section 15	33
AC21, AC22	Not required	-	Cable Section 15	33	Crossing only	-	Cable Section 15	33
AC24	Not required	-	Cable Section 14	33	TC16(e)	72	Cable Section 14	33
AC25	Not required	-	Cable Section 14	30	MA10a Cable Section	72	Cable Section 14	30

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
					17a TC16(w)			
AC28, AC32	Not required	-	Cable Section 14	30	Crossing only	-	Cable Section 14	30
AC34	Not required	-	Cable Section 14	30	TC15(e)	72	Cable Section 14	30
AC35	Not required	-	Cable Section 14	30	TC15(e)	72	Cable Section 14	30
AC37	Not required	-	Cable Section 14	30	TC14(e), TC15(w)	48	Cable Section 14	30
AC38	Not required	-	Cable Section 14	30	MA10 (Cable Section 15 & 16a) TC13(e)	152	Cable Section 14	30
AC47	Not required	-	Cable Section 13	37	MA9 (Cable Section 14) TC12(e)(w), TC13(w)	112	Cable Section 13	37
AC49	Not required	-	Cable Section 13	37	Crossing only	-	Cable Section 13	37

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
AC50, AC51	Not required	-	Cable Section 13	37	Not required	-	Cable Section 13	37
AC55	Not required	-	Cable Section 12	31	TC11(e)	72	Cable Section 12	31
AC57	Not required	-	Cable Section 12	31	TC11(w)	72	Cable Section 12	31
AC58	Not required	-	Cable Section 12	31	Crossing only	-	Cable Section 12	31
AC62	Not required	-	Cable Section 11	34	Crossing only	-	Cable Section 11	34
AC66	Not required	-	Cable Section 11	34	MA8 (Cable section 13) TC10(w)(e), TC9(w)	136	Cable Section 11	34
AC75	Not required	-	Cable Section 11	34	TC9(w)	72	Cable Section 11	34
AC77	Not required	-	Cable Section 10 & 11	37	Crossing only	-	Cable Section 10 & 11	37
AC78	Not required	-	Cable Section 10	37	Not required	-	Cable Section 10	37
AC84	Not required	-	Cable Section 10	37	MA7 (Cable	80	Cable Section 10	37

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
					Section 11 & 12)			
AC85	Not required	-	Cable Section 10	35	Not required	-	Cable Section 10	35
AC88	Not required	-	Cable Section 9	29	Not required	-	Cable Section 9	29
AC89	Not required	-	Cable Section 9	29	Crossing only	-	Cable Section 9	29
AC91	Not required	-	Cable Section 9	29	Not required	-	Cable Section 9	29
AC92, AC96	Not required	-	Cable Section 9	29	Crossing only	-	Cable Section 9	29
AC101	Not required	-	Cable Section 8	32	MA6 (Cable section 9 & 10)	80	Cable Section 8	32
AC103	Not required	-	Cable Section 8	32	TC8(e)	72	Cable Section 8	32
AC104	Not required	-	Cable Section 8	32	Cable Section 9a TC7(e), TC8(w)	112	Cable Section 8	32
AC106	Not required	-	Cable Section 8	32	Crossing only	-	Cable Section 8	32

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
AC107	Not required	-	Cable Section 8	32	Not required	-	Cable Section 8	32
AC109	Not required	-	Cable Section 7	40	Cable Section 8a TC7(w)	72	Cable Section 7	40
AC110	Not required	-	Cable section 7	40	Cable Section 8a TC6(n)	72	Cable section 7	40
AC111	Not required	-	Cable Section 7	40	TC6(s)	72	Cable Section 7	40
AC120	Not required	-	Cable Section 6	34	MA 5b (Cable Section 8)	40	Cable Section 6	34
AC121	Not required	-	Cable Section 6	34	MA5a (Cable Section 7)	40	Cable Section 6	34
AC125	Not required	-	Cable Section 5	30	Crossing only	-	Cable Section 5	30
AC126	Not required	-	Cable Section 5	30	Cable Section 16a TC5(e)	72	Cable Section 5	30

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
AC127	Not required	-	Cable Section 5	30	Not required	-	Cable Section 5	30
AC130	Not required	-	Cable Section 5	30	TC5(w)	72	Cable Section 5	30
AC131	Not required	-	Cable Section 5	30	Not required	-	Cable Section 5	30
AC134	Not required	-	Cable Section 4	29	Not required	-	Cable Section 4	29
AC135	Not required	-	Cable Section 4	29	Crossing only	-	Cable Section 4	29
AC136	Not required	-	Cable Section 4	29	MA4 (Cable section 5 & 6)	80	Cable Section 4	29
AC137	Not required	-	Cable Section 4	29	Crossing only	-	Cable Section 4	29
AC141, AC142	Not required	-	Cable Section 4	29	Not required	-	Cable Section 4	29
AC143	Not required	-	Cable Section 4	29	TC4(w)(e)	96	Cable Section 4	29
AC144	Not required	-	Cable Section 4	29	Crossing only	-	Cable Section 4	29
AC146	Not required	-	Cable Section 3	34	MA4 (Cable	80	Cable Section 3	34

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
					Section 3 & 4)			
AC147	Not required	-	Cables Section 3	34	Not required	-	Cables Section 3	34
AC150	Not required	-	Cable Section 3	34	TC3b(e)	72	Cable Section 3	34
AC151	Not required	-	Cable Section 3	34	TC3b(w)	72	Cable Section 3	34
AC152	Not required	-	Cable Section 3	34	TC3a(w)	72	Cable Section 3	34
AC159	Not required	-	Cable Section 2	34	MA2 (Cable Section 2) TC1(n), TC2(n)(s)	136	Cable Section 2	34
AC160	Not required	-	Cable Section 2	34	Not required	-	Cable Section 2	34
AC162	Not required	-	Cable Section 2	34	MA1b (Cable Section 1) TC1(s)	112	Cable Section 2	34
AC163, AC164	Not required	-	Cable Section 2	34	Crossing only	-	Cable Section 2	34
AC165	Not required	-	Cable Section 2	34	Not required	-	Cable Section 2	34

Access ID	Scenario 1				Scenario 2			
	Stage 1		Stage 2		Stage 2		Stage 3	
	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements	Access function	Peak daily two-way HGV movements
AC166	Not required	-	Cable Section 1	34	Not required	-	Cable Section 1	34
AC178	National Grid Substation Extension	34	Not required	-	National Grid Substation Extension	68	Not required	-
AC179	Not required	-	Not required	-	National Grid Overhead Line Modifications	20	Not required	-
AC180	Onshore project substation	46	Cable Section 1	34	MA1a (Cable Section 0 & 1) Onshore project substation	134	Cable Section 1	34

77. The appointed contractor will be encouraged to validate the access figures based on a greater certainty on supply chain and programming during the preconstruction phase. The number of movements per access may be subject to variance but at all times remaining within the total assessed levels defined on highways links (as set out in Chapter 24 Traffic and Transport of the ES) unless otherwise agreed by the relevant local authority in consultation with NCC and HE.

78. Any potential changes would be submitted to and approved by the relevant local authority, NCC and HE as part of the process of discharging Requirement 21

3.2.1 Cumulative HGV restrictions

79. A number of highway links have been identified as being shared with Hornsea Project Three. Five shared links have been identified as requiring the cumulative peak traffic demand to be managed to ensure that significant impacts are not realised. The preferred method for managing cumulative traffic is to work with Hornsea Project Three to ensure that respective project peak HGV demand does not overlap (see Section 1.6.1). If that is not possible, a cap will be applied to Norfolk Vanguard HGV demand (achieved through a minor programme extension) to ensure that cumulative traffic with Hornsea Project Three remains below the threshold that would constitute a significant impact.

80. Table 3.3 details the routes with capped maximum daily construction HGVs when considered cumulatively with Hornsea Project Three.

Table 3.3 Capped HGV Routes Norfolk Boreas Cumulatively with Hornsea Project Three

		Cumulative			Stipulations
Link ID	Route	Max. Daily NB HGV movements	Max. Daily HP3 HGV movements	Total Max. Daily Cumulative HGV movements	
13b	A148	379	156	535	-
32	B1149	136	153	289	-
34	B1145: High Street	133	127	260	-
36	B1149	136	187	323	-
41	B1436 – Felbrigg Road	287	149	436	A further cap (down to 93 daily HGV movements for Norfolk Boreas) will apply during the six week school summer holidays

3.3 Control of HGV Numbers

81. To ensure compliance with the assessed HGV movements, a booking system for deliveries will be established by the contractor.

82. The booking system will enable a daily profile of deliveries to be maintained within the assessment thresholds (Table 3.2) and allow the contractor to ensure that the required deliveries are regularly forecast and planned.

83. HGVs will be refused access and turned away if they arrive outside of their allocated time slot; a small number of daily slots will be reserved to accommodate any unplanned deliveries.

84. To ensure that compliance with the assessed HGV movements does not impact upon progress, the contractor will where possible plan for maintaining stockpiles of critical path items such as aggregate. These stockpiles will facilitate advanced planning of deliveries, maximise payloads, and enable a smooth import profile to be maintained.

85. The contractor will be required to keep an up to date record of deliveries and exports from the project, this will take the form of delivery receipts. This information will be retained to be provided to the relevant local authority, NCC and HE upon request.

3.4 Delivery Route Compliance

86. Figure 4 details the HGV delivery routes for Scenario 1: Stage 2 and Scenario 2: Stage 3 and Figure 5 details the HGV delivery routes for Scenario 1: Stage 1 and Scenario 2: Stage 2. To ensure compliance with the agreed delivery routes, the following measures are proposed:

- An information pack will be distributed to all individuals involved in the transport of materials and will include key information on delivery routes. The pack will be provided in a convenient format and size so it can be stored in a truck cab;
- Appropriate traffic signage would be installed to direct suppliers and contractor's vehicles along appropriate delivery routes;
- Information signs will also be erected which will include a telephone number for the public to report concerns; and
- Supply chain vehicles will display a unique identifier in the cab of the vehicle.

3.5 Delivery Periods

87. The delivery of materials and plant would typically occur between 7am to 7pm Monday to Friday and Saturday 7am to 1pm, however, further restrictions to HGV movements have been identified for a number of links.

88. Table 3.4 sets out a summary of links which will require a delivery restriction.

Table 3.4 Delivery Period Restrictions Summary (Norfolk Boreas in isolation and cumulatively)

Link Id	Route	Delivery Period Restrictions
32	B1149 Edgefield	7:30am to 9am
34	B1145 Cawston	7:30 am to 9am 3pm to 4pm
36	B1149 – Holt Road	8am to 9am 3pm to 4pm
47c	North Walsham Road - Edingthorpe Green	8am to 9am 3pm to 4pm
49	B1159	8am to 9am 3pm to 4pm
53	A149	8am to 9am 5pm to 6pm
68	The Street – Oulton.	7:30am to 9am

89. The final TMP will include advice to drivers of locations of approved lorry parks, motorway services or other designated parking areas between the source of the delivery and the site compound. This will assist drivers when they may be running early / late in relation to set delivery timeslots to avoid instances where drivers arrive outside of their timeslot and attempt to wait nearby.

90. Table 3.5 sets out further measures to coordinate the timing of HGV deliveries to ensure highway network 'resilience' is maintained.

Table 3.5 Summary of delivery management measures

Potential Event	Mitigation Measures
Managing traffic demand during major events on the highway (e.g. bike races, parades, etc.) and around public holidays	The Contractor will ensure that a stockpile of materials is maintained to allow HGV movements to be reduced during planned major events whilst not impacting upon the construction programme. The Contractor will also work closely with the local liaisons groups to identify the dates of local planned events, (e.g. harvests) that could impact upon the project and seek to effectively manage deliveries during these events. Special provisions will be made in the Communications Plan for events relating to the Blickling Estate (Link 75).
Managing traffic demand during major incidents such as accidents on the highway.	The Contractor will monitor traffic conditions. Should the Contractor be notified of an incident then the Contractor will liaise directly with suppliers to suspend HGV deliveries along affected routes. If the obstruction is likely to be longer term, in the first instance the programme would be reviewed to ascertain if resource could be diverted to an alternative onshore cable route section. Failing that, the Contractor would liaise with NCC and other relevant authorities to identify and assess alternative temporary access arrangements.
Incidents involving HGV traffic blocking the highway, such as, breakdowns, accidents, etc.	The Contractor and their suppliers' fleets will have arrangements with recovery companies to allow breakdowns and accidents to be cleared as quickly as possible.

Potential Event	Mitigation Measures
A47 Corridor improvement programme	The current programme of construction works for the A47 Corridor improvement is programmed for commencement of construction in 2020 and completion by 2022. The works are likely to finish before the main construction works of the project commence, however this does not allow for slippage in the programme. It is therefore proposed that, should the two projects overlap, Norfolk Boreas Limited and its Contractors would engage with HE to establish opportunities to co-ordinate activities and avoid peak traffic impacts.

3.6 Abnormal Loads

91. The importing of large Abnormal Indivisible Loads (AILs) may lead to delays on the highway network. The construction of the onshore project substation is likely to require the delivery of up to eight supergrid Transformers to the onshore project substation near Necton. Appendix 3 contains an AIL report which sets out the type of management measures which could be employed to minimise disruption to traffic during AIL delivery.

92. The movement of Abnormal Loads is outside of the restrictions (routes, times) contained within this OTMP and will be subject to separate agreement with the relevant highway authorities and police through the Electronic Service Delivery for Abnormal Loads (ESDAL) system.

93. The Contractor will notify stakeholders through ESDAL (to be completed 10 weeks before the scheduled date of move) and agree appropriate timings and AIL routes (with the relevant highway authorities and police) appropriate to the type of load.

3.7 Road Safety

94. The EIA identified three cluster locations (Cluster Sites 11, 13 and 17) with a pattern of collisions. The locations and the proposed mitigation measures are identified within Table 3.6

Table 3.6 Specific mitigation measures related to road safety

Location	Identified Pattern	Mitigation
Four-arm roundabout of the A47 and Cucumber Lane north of Brundall.	Collisions involving rear end shunts and poor positioning for vehicles approaching the roundabout from the west.	Introduce high friction surfacing on the A47 eastern approach arm. Advanced line delineators to be provided on all approaches to the roundabout.

Location	Identified Pattern	Mitigation
Four-arm roundabout of the A47 and A1064 to the east of Acle.	Collisions involving rear end shunts approaching the roundabout from the east. A review of forward visibility to the give-way line identified that existing vegetation is overgrown. Drivers approaching from the east could therefore fail to see a vehicle stopped at the give-way line, potentially contributing to the pattern of rear end shunts.	It is strongly recommended that the local highway authority increase the frequency of vegetation clearance in this location. Notwithstanding, Norfolk Boreas Limited would also ensure that the appointed contractor is made aware of this risk and require them to trim and maintain the vegetation in this location throughout construction.
A12 Yare Bridge	Collisions involving rear end shunts.	Proposed to introduce 'Queues Likely' signage making drivers aware of the potential for queuing traffic.

95. To further address road safety, it is proposed that a series of 'enhanced' mitigation measures are provided within the finalised TMP (as outlined in Table 3.7). The measures detailed are additional to those contained in a 'typical' TMP and are included to minimise impacts and enable construction vehicle drivers to understand the policies, procedures and regulations proposed for the safe and efficient movement of plant, materials and employees.

Table 3.7 Enhanced TMP measures

Enhanced TMP Measures
Driver training and toolbox talks
Driver information packs to include: • Delivery timing constraints (e.g. school arrival/departure times); • HGV delivery routes; • Diversion routes; and • Identify safe areas to pull over to reduce the effect of slow moving platoons of vehicles.
Safety Awareness – Educate drivers to report 'near misses'
Day time parking controls and stewardship (where a need is identified)
Engagement structure – to provide clear governance and reporting (stakeholders) structure
Monitoring and Reporting – To monitor traffic flows at mobilisation areas, jointing pit locations and the onshore project substation
Contact information at all roadwork sites and robust complaint response standards (as soon as practicable)

96. The measures are designed to familiarise drivers with the identified sensitivities within the traffic and transport study area delivery routes. The 'enhanced' measures will help to mitigate the effects of pedestrian severance and amenity (and associated fear and intimidation factors) and are expected to reduce the potential for significant road safety impacts associated with the increase of HGV movements within the area.

97. An induction for contractor HGV drivers will also help to establish a clear set of responsibilities that drivers will be required to follow including:

- Timings, pre-booked slots;
- Clarification of approved HGV routes;
- Awareness of highway safety concerns;
- Adherence to speed limits;
- Instructions on when to pull over safely to alleviate platoons;
- Safe driving techniques for over-taking manoeuvres; and
- Details of reporting accidents and 'near misses'.

3.8 Other Measures

98. To prevent dust and dirt being tracked on to the highway the following measures will be adopted:

- Accesses will be metalled surface within the adopted highway boundary;
- Road sweepers will be used to regularly sweep the highway as required; and
- Wheel washing facilities will be provided as required and dependant on weather conditions.

99. To avoid the need for parking or waiting on the highway, appropriate loading/unloading and parking areas for construction vehicles will be designated. The pre-booking of deliveries will assist the Contractor to allocate sufficient space to accommodate the planned number of deliveries.

3.9 Highway Asset Management

100. A highway condition survey would be undertaken by the contractor before the commencement of construction and after the substantial completion of construction works. Any damage to the existing road network or public highway as a consequence of the construction activities, will be made good to the reasonable satisfaction of NCC.

101. The survey would most likely comprise of a Coarse Visual Inspection survey (in accordance with the UK Pavement Management System standard) of all Minor Local Routes. The exact extent and specification of surveys required would be agreed within a Method Statement between the contractor and NCC prior to commencement.

4 TRAFFIC MANAGEMENT

102. This section sets out the processes for managing the interaction between construction traffic and existing highway users. Figure 6 and Figure 7 detail the highway links referred to in this section.

4.1 General Principles - Managing HGV Demand

103. To ensure that the identified road links are suitable to accommodate the forecast HGV demand, a detailed review of the highway geometry has been undertaken. This review has provided an initial assessment to identify those routes that allow two-way HGV traffic.

104. The routes that do not allow two-way HGV traffic require mitigation to ensure that the project's traffic demand would not have an adverse impact upon the free flow of traffic.

105. The guiding principle in developing the route mitigation strategy is to minimise impact on the surrounding environment. Recognising the temporary nature of the onshore project construction period, opportunities will be sought to pursue management measures in preference to 'hard engineering' solutions only, such as road widening.

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

107. It is envisaged that mobile traffic management would comprise of a suitably marked pilot vehicle (with flashing ambers) with two-way radio communication with the HGV driver. The pilot vehicle would exit the access and travel to a designated layby/passing place. The pilot vehicle would then temporarily stop oncoming traffic and radio to the HGV driver to exit the site and traverse to the designated passing place. Appendix 4 visually depicts this traffic measure.

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

109. Table 4.1 details the locations where pilot vehicle traffic management would be employed noting that the maximum peak HGV demand would be <14 two-way HGV

movements per hour, i.e. 7 arrivals and 7 departures. Where possible HGVs would be escorted in platoons to minimise delays to the travelling public.

110. During Scenario 2 Stage 2, links would typically experience hourly flows of 7 movements. Links would typically experience 4 movements or less during Scenario 1 – Stage 2 and Scenario 2 – Stage 3.

111. The pilot vehicle routes would be appropriately signed to indicate to motorists the presence of mobile construction traffic and potential delays.

112. Suitable scale plans of pilot control routes with any proposed widening would be submitted with the final TMP pursuant to the discharge of Requirement 21 of the DCO.

Table 4.1 Proposed mobile traffic management routes

Link ID	Route	AADT Base Flows	Scenario 1				Scenario 2			
			Stage 1 HGV movements (two-way)		Stage 2 HGV movements (two-way)		Stage 2 HGV movements (two-way)		Stage 3 HGV movements (two-way)	
			Max. Daily	Hourly peak*	Max. Daily	Hourly peak*	Max. Daily	Hourly peak*	Max. Daily	Hourly peak*
42	B1145: Reepham Road	2,265	n/a	n/a	40	4	72**	8	40	4
67	Happisburgh Road	1,000	n/a	n/a	33	~ 4	80	8	33	~ 4
68	Heydon Lane	1,000	n/a	n/a	37	~ 4	80	8	37	~ 4
69	Little London Road	500	n/a	n/a	30	~ 4	48**	5	30	~ 4
70	Plantation Road (230m south of North Walsham Road junction)	1,000	n/a	n/a	31	~ 4	72**	8	31	~ 4
71	Vicarage Road / Whimpwell Street	2,000	34	~ 4	31	~ 4	30	~ 4	31	~ 4
72	Dereham Road / Longham Road - Dillington	1,000	n/a	n/a	34	~ 4	136	14	34	~ 4
73	Hoe Road South	800	n/a	n/a	29	~ 3	96	10	29	~ 3
74	Mill Street, Elsing Road – Swanton Morley	800	n/a	n/a	30	~ 4	72	7	30	~ 4
75	B1354 - Blickling	2,000	n/a	n/a	37	~ 4	72	7	37	~ 4
76	High Noon Road / Church Road	500	n/a	n/a	31	~ 4	72	7	31	~ 4
77	Hall Lane – North Walsham	500	n/a	n/a	30	~ 4	72**	7	30	~ 4
78	Bylaugh	500	n/a	n/a	30	~ 4	72	7	30	~ 4
79	B1145 / Suffield Road***	2,000	n/a	n/a	31	~ 4	72	7	31	~ 4
A to V	Local Access routes	Varies	n/a	n/a	29 - 37	~ 4	n/a	n/a	29 - 37	~ 4
Notes										
*	Daily HGV flows divided by 10									
**	Proposed mitigation flows identified in the ES									
***	Localised widening may be required at the junction between the A140/B1145 to accommodate the largest HGVs.									

4.2 General Principles – Roadworks

113. Where the onshore cable route crosses roads, tracks and Public Rights of Way (PRoW), via 'open cut' methods, traffic management would be employed to allow construction activities to continue safely within the road. Where appropriate, single lane operation of roads would be utilised during installation, typically with signal controls to allow movements to continue. Where the normal width of the road is less than 7.2m kerb to kerb (typical width for two way traffic) then it may not be possible to undertake works in the road and maintain a single lane open for traffic. In these cases, alternative methods such as temporary road closure or diversion could be required.

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

115. Under Scenario 2, it should be noted that trenchless crossing methods have been agreed for the following roads where standard traffic management techniques are not deemed to be suitable:

- A47;
- A1067;
- A140; and
- A149.

4.3 Highways Mitigation Schemes

4.3.1 Link 34 - Cawston

116. Link 34 will require a range of additional traffic management (in addition to enhanced TMP measures) to mitigate the effects on pedestrian amenity including timing deliveries to avoid school pick up and drop off times during term time, enhanced pedestrian facilities, managed parking and road safety measures.

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

- Enhanced traffic management plan measures (including the prohibition of deliveries during term time school pick up and drop off times.)
- Managed cumulative traffic demand to no greater than 260 daily HGV deliveries; and

- Commitment to deliver a scheme of highway mitigation to include enhanced pedestrian facilities, managed parking and road safety measures (to be captured in an update to the final TMP and agreed with NCC)

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

119. Norfolk Boreas Limited is continuing to engage with Hornsea Project Three and NCC to further understand the details of this highway mitigation scheme for cumulative construction traffic with a view to adopting those measures if appropriate. The first project to proceed to construction would deliver the full scheme of traffic mitigation and the second project would be responsible for removing the measures once both project's construction phases are complete.

4.3.2 Link 68 – The Street, Oulton

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

121. Link 68 serves Norfolk Boreas Scenario 2 Mobilisation Area 7 (west and east) during the duct installation period and access points AC84, AC85 and AC88 during the Scenario 1 and Scenario 2 cable pull works.

122. There has been extensive consultation between Hornsea Project Three and NCC with regards to a highways mitigation scheme to address the cumulative impacts. NCC has confirmed a preferred scheme option, which is summarised in Table 4.2.

Table 4.2 The Street, Oulton Proposed Highway Mitigation Scheme

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

Components
Temporary signage along the B1145 and The Street as agreed with the Highway Authority to provide driver awareness and enforcement.
Regrading of existing road hump on The Street in the vicinity of the Old Railway Gatehouse to minimise noise and vibration impacts on the Old Railway Gatehouse.
Filter trench drainage of The Street along the regrading of the existing road hump.

123. In addition to the above, Norfolk Boreas Limited has committed to not routing HGV construction traffic along Oulton Street north of the junction between the Street and Heydon Road.

124. Norfolk Boreas Limited support the implementation of the above preferred scheme option, as agreed between Hornsea Project Three and NCC, as mitigation for the cumulative flows on the shared part of link 68.

125. Norfolk Boreas Limited is committed to adopting the preferred mitigation scheme option if appropriate for Norfolk Boreas Scenario 2 in isolation to ameliorate the potential disruption relating to the temporary roadworks required to implement the project. In effect this scheme of mitigation, on the shared part of Link 68, would be sufficient to mitigate impacts for Norfolk Boreas Scenario 2 alone, Hornsea Project Three alone or for both projects together. The first project to proceed to construction would deliver the full scheme of mitigation and the second project would be responsible for removing the measures once both project's construction phases are complete.

4.3.3 Mitigation Summary

126. Table 4.3 details the link specific traffic management measures require for Norfolk Boreas under Scenario 1 and Scenario 2. Cumulative management measures are also presented for Norfolk Boreas Scenario 2 and Hornsea Project Three.

Table 4.3 Specific Traffic Management Measures Summary

Link	Link description	Scenario 1 Mitigation measures In isolation	Scenario 2 Mitigation measures In isolation	Scenario 2 Mitigation measures Cumulatively
13b	A148	n/a	Managed Traffic Demand (Table 3.1)	Managed Traffic Demand (Table 3.3) Enhanced TMP measures.
17	B1145 - Billingford Road	n/a	Enhanced TMP measures.	n/a
21	B1147 – Etling Green	n/a	Enhanced TMP measures.	n/a
22	B1147 – Dereham Road	n/a	Enhanced TMP measures.	n/a
32	B1149 - Edgefield	HGV Delivery Restrictions (7:30am to 9am).	Managed Traffic Demand (Table 3.1) HGV Delivery Restrictions (7:30am to 9am).	Managed Traffic Demand (Table 3.3) Enhanced TMP measures HGV Delivery Restrictions (7:30am to 9am)
34	B1145 – west of Cawston	Enhanced TMP measures. HGV Delivery Restrictions (7:30am to 9am and 3pm to 4pm). Highway Mitigation Scheme (undertaken by Norfolk Vanguard).	Managed Traffic Demand (Table 3.1) Enhanced TMP measures. HGV Delivery Restrictions (7:30am to 9am and 3pm to 4pm). Highway Mitigation Scheme (undertaken by Norfolk Boreas).	Managed Traffic Demand (Table 3.3) Enhanced TMP measures. HGV Delivery Restrictions (7:30am to 9am and 3pm to 4pm). Highway Mitigation Scheme (undertaken by Norfolk Boreas/ Hornsea P3).
35a	B1159	n/a	Enhanced TMP measures.	n/a
35b	B1159	n/a	Enhanced TMP measures.	n/a

Link	Link description	Scenario 1 Mitigation measures In isolation	Scenario 2 Mitigation measures In isolation	Scenario 2 Mitigation measures Cumulatively
36	B1149 – Holt Road	n/a	Managed Traffic Demand (Table 3.1) Enhanced TMP measures. HGV Delivery Restrictions (8am to 9am and 3pm to 4pm).	Managed Traffic Demand (Table 3.3). Enhanced TMP measures. HGV Delivery Restrictions (8am to 9am and 3pm to 4pm).
41	B1436 - Felbrigg	n/a	Managed Traffic Demand (Table 3.1). Enhanced TMP measures.	Managed Traffic Demand (Table 3.3). Managed Traffic Demand. Enhanced TMP measures.
42	B1145: Reepham Road	Mobile Traffic Management.	Mobile Traffic Management. Enhanced TMP measures. Managed Traffic Demand as identified in ES Chapter 24 and to include: - No concurrent Infrastructure components construction. - Extend TC 6 peak construction period.	n/a
47c	North Walsham Road - Edingthorpe Green	Enhanced TMP measures. HGV Delivery Restrictions (8am to 9am and 3pm to 4pm).	Enhanced TMP measures. HGV Delivery Restrictions (8am to 9am and 3pm to 4pm). Managed Traffic Demand as identified in ES Chapter 24 and to include: - No concurrent Infrastructure components construction. - Extend TC 16 peak construction period.	n/a

Link	Link description	Scenario 1 Mitigation measures In isolation	Scenario 2 Mitigation measures In isolation	Scenario 2 Mitigation measures Cumulatively
49	B1159	HGV Delivery Restrictions (8am to 9am and 3pm to 4pm).	HGV Delivery Restrictions (8am to 9am and 3pm to 4pm). Managed Traffic Demand as identified in ES Chapter 24 and to include: - No concurrent Infrastructure components construction. - Extend TC 16 peak construction period.	n/a
53	A149	HGV Delivery Restrictions (8am to 9am and 5pm to 6pm)	HGV Delivery Restrictions (8am to 9am and 5pm to 6pm)	n/a
67	North Walsham Road / Happisburgh Road	Mobile Traffic Management.	Mobile Traffic Management.	n/a
68	The Street / Heydon Road	Highway Mitigation Scheme (undertaken by Norfolk Vanguard). HGV Delivery Restrictions (7:30am to 9am)	Highway Mitigation Scheme (undertaken by Norfolk Boreas). HGV Delivery Restrictions (7:30am to 9am)	Managed Traffic Demand. Highway Mitigation Scheme (Undertaken by Norfolk Boreas/ Hornsea P3). HGV Delivery Restrictions (7:30am to 9am)

Link	Link description	Scenario 1 Mitigation measures In isolation	Scenario 2 Mitigation measures In isolation	Scenario 2 Mitigation measures Cumulatively
69	Little London Road	Mobile Traffic Management. Enhanced TMP measures. Managed Traffic Demand as identified in ES Chapter 24 and to include: - Splitting HGV payloads into smaller 10t vehicles.	Mobile Traffic Management. Enhanced TMP measures. Managed Traffic Demand as identified in ES Chapter 24 and to include: - No concurrent Infrastructure component construction. - Increase construction programme for Route Section 16a of duct installation. - Locate reception sides of TCs to area served by Link 69. - Splitting HGV payloads into smaller 10t vehicles.	n/a
70	Plantation Road (230m south of North Walsham Road junction)	Mobile Traffic Management.	Mobile Traffic Management.	n/a
71	Vicarage Road / Whimpwell Street	Mobile Traffic Management.	Mobile Traffic Management.	n/a
72	Dereham Road / Longham Road - Dillington	Mobile Traffic Management.	Mobile Traffic Management. Enhanced TMP measures.	n/a
73	Hoe Road South	Mobile Traffic Management.	Mobile Traffic Management.	n/a

Link	Link description	Scenario 1 Mitigation measures In isolation	Scenario 2 Mitigation measures In isolation	Scenario 2 Mitigation measures Cumulatively
74	Mill Street, Elsing Road – Swanton Morley	Mobile Traffic Management.	Mobile Traffic Management.	n/a
75	B1354 - Blickling	Mobile Traffic Management.	Mobile Traffic Management.	n/a
76	High Noon Road / Church Road	Mobile Traffic Management.	Mobile Traffic Management.	n/a
77	Hall Lane – North Walsham	Mobile Traffic Management.	Mobile Traffic Management. Managed Traffic Demand.	n/a
78	Bylaugh	Mobile Traffic Management.	Mobile Traffic Management.	n/a
79	B1145 / Suffield Road	Mobile Traffic Management. Potential localised highway widening.	Mobile Traffic Management. Potential localised highway widening.	n/a
A	Dale Road	Not to be used.	Not to be used.	n/a
B	Bradenham Lane	Enhanced TMP measures. Mobile Traffic Management.	Enhanced TMP measures. Mobile Traffic Management.	n/a
C to F	Local routes	Mobile Traffic Management.	Mobile Traffic Management.	n/a
G	B1145 - Cawston road	Enhanced TMP measures. Mobile Traffic Management.	Enhanced TMP measures. Mobile Traffic Management.	n/a
H	Wood Dalling Road	Enhanced TMP measures. Mobile Traffic Management.	Enhanced TMP measures. Mobile Traffic Management.	n/a

Link	Link description	Scenario 1 Mitigation measures In isolation	Scenario 2 Mitigation measures In isolation	Scenario 2 Mitigation measures Cumulatively
I to L	Local routes	Mobile Traffic Management.	Mobile Traffic Management.	n/a
M	North Walsham Road / Happisburgh Road	Enhanced TMP measures. Mobile Traffic Management.	Enhanced TMP measures. Mobile Traffic Management.	n/a
N to V	Local Access routes	Mobile Traffic Management.	Mobile Traffic Management.	n/a

4.4 A47 Access and Associated Traffic Management Measures

127. A traffic management strategy has been developed for each of the accesses required off the A47 to onshore project area. The final details of which are being discussed with HE and will be included into the final TMP. Details and the locations of all accesses are set out within the OAMP (document reference 8.10).

4.4.1 Access AC159

128. Access AC159 will be required for the following Norfolk Boreas scenarios:

- Scenario 1 Stage 2 / Scenario 2 Stage 3 for any potential jointing bay locations; and
- Scenario 2 Stage 2 to access MA2-E, TC1 (north) and TC2.

129. Access AC159 will be upgraded to a DMRB compliant rural simple junction with a 'no right turn' traffic management plan.

130. The 'no right turn' traffic management plan for AC159 at the A47/Bushy Common Road, will utilise a left turn in / left turn out only. This will require any potential right turning construction vehicles either entering or exiting the junction to divert and perform the following 'u-turn' manoeuvres:

1. Westbound traffic to utilise the 'McDonalds Roundabout' located on the A47 / Norwich Road roundabout junction approximately 7.1 miles west of AC159 near Swaffham. Figure 8 shows the construction vehicle diversion route; and
2. Eastbound traffic to utilise the eastbound offramp off the A47 (approximately 2.9 miles west of AC159) and turning right onto Tavern Lane. At the traffic signal-controlled junction with the A1075 (Yaxham Road) at Dereham, construction vehicles would turn right and proceed south east under the A47 taking the westbound onramp back onto the A47. Figure 9 shows the construction vehicle diversion route.

4.4.2 Access AC162 (TC1 (south))

131. Access AC162 will be required for the following Norfolk Boreas scenarios:

- Scenario 1 Stage 2 / Scenario 2 Stage 3 for any potential jointing bay locations.
- Scenario 2 Stage 2 to access MA1b and TC1 (south).

132. Vehicle demand associated with the TC1 southern compound off the A47 / Dale Road / Bushy Common Road staggered junction is to be diverted to the MA1b compound (AC162) access on Dereham Road (Link 66). Once construction vehicles

have arrived at MA1b, they would travel 450m north along the running track to the TC1 southern compound.

133. Access AC160 off Dale Road is not to be used to access TC1 southern compound.

134. The proposed diversion route is shown in Figure 10.

4.4.3 Access AC178 and AC179 (National Grid works)

135. Access AC178 will be required for the following Norfolk Boreas scenarios:

- Scenario 1 Stage 1 for construction of the National Grid substation extension; and
- Scenario 2 Stage 2 for construction of the National Grid substation extension.

136. Access AC179 will be required for the following Norfolk Boreas scenario:

- Scenario 2 Stage 2 for construction of the overhead line modification works (see Section 4.5 for details).

137. Both Accesses AC 178 and AC179 will be DMRB compliant rural simple junctions with a 'no right turn' temporary traffic management strategy. The temporary traffic management strategy proposed for Access AC178 and Access AC179 will be to utilise a left turn in / left turn out only. This will require any potential right turning construction vehicles to divert and perform the following 'u-turn' manoeuvres:

1. Westbound traffic to utilise the 'McDonalds Roundabout' located on the A47 / Norwich Road roundabout junction approximately 2.8 miles west of Access AC178 near Swaffham. Figure 11 graphically depicts the construction vehicle diversion route; and
2. Eastbound traffic to utilise the eastbound offramp off the A47 (approximately 7.4 miles east of AC178) and turning right onto Tavern Lane. At the traffic signal-controlled junction with the A1075 (Yaxham Road) at Dereham, construction vehicles would turn right and proceed south east under the A47 taking the westbound onramp back onto the A47. Figure 12 graphically depicts the construction vehicle diversion route.

138. It is not possible to provide two-way HGV entry/exit at Access AC179 due to land constraints and therefore further traffic management measures are required to ensure two HGVs do not meet in the 'bell mouth' and obstruct the flow of traffic on the A47. All site bound HGVs destined for Access AC179 will temporarily park at a segregated layby approximately two miles west of the site. From here, the drivers will communicate with a designated contact at the site to ascertain that no HGVs are

leaving the site. Once, confirmed the driver will continue their journey and enter access AC179 unopposed. The location of the layby is detailed in Figure 11.

139. AC179 will not be required for Scenario 1 as all works would have been undertaken within the Norfolk Vanguard project.

4.4.4 Access AC180 (Onshore project substation, MA1a-West and MA1a-East)

140. A DMRB compliant right turn ghost island junction will be constructed allowing all movements. No temporary traffic management (including diversion manoeuvres) is required to support the access strategy for this location.

141. Full details of each of the required A47 access designs are detailed in the OAMP (document reference 8.10) in accordance with DCO Requirement 21.

4.5 National Grid overhead line modifications

142. Necton National Grid substation would need to accommodate circuit breakers and associated busbar (metal bar that conducts electricity within a substation) structures which allow connection onto the existing 400kV overhead line for generation to be transmitted onto the wider National Grid system. In addition to the Necton National Grid substation itself, modifications to the existing overhead line structures adjacent to the substation would be required.

143. Under Scenario 1 the overhead line modification works will have been completed by Norfolk Vanguard to accommodate both projects. Under Scenario 2 these works will be undertaken by Norfolk Boreas.

144. Two new overhead line towers will be required to accommodate Norfolk Boreas in close proximity to the existing corner tower (to the north east of the existing Necton National Grid substation) with a maximum height of 55m. The existing corner tower will be demolished such that the net new number of towers is one.

145. Under Scenario 2 it will be necessary to oversail the A47 to facilitate the connection to the wider national grid system. To undertake this operation safely, it will be necessary to construct two scaffold towers adjacent to the carriageway and erect netting. Whilst the scaffold towers can be constructed with limited disturbance to the free flow of traffic, the netting must be installed during a temporary full road closure (for a matter of hours).

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

5 MONITORING AND ENFORCEMENT

5.1 Introduction

147. The HGV movements associated with the works will be continuously monitored through the use of the booking system. As part of this monitoring process, the contractor would be required to keep an up to date record of deliveries and exports associated with the construction works.

148. The information will be made available upon request to the relevant Local Authority, in the form of a report validating the project HGV demand.

5.2 Local Community Liaison

149. Norfolk Boreas Limited will ensure effective and open communication with local residents and businesses that may be affected by noise or other amenity aspects caused by the construction works. Communications will be co-ordinated on site by a designated member of the construction management team. A proactive public relations campaign will be maintained, keeping local residents informed of the type and timing of works involved, the transport routes associated with the works, the hours of likely construction traffic movements and key traffic management measures that would be provided. A combination of communication mechanisms such as posters and parish meetings will be employed to keep local residents informed.

150. A designated Norfolk Boreas Limited local community liaison officer will respond to any public concerns, queries or complaints in a professional and diligent manner as set out in a project community and public relations procedure which will be submitted for comment to the Local Authorities.

151. Parish Councils in the relevant area will be contacted (in writing) in advance of the proposed works and ahead of key milestones. This information will include, as far as possible, an outline timetable of works, a schedule of working hours, the extent of the works, and a contact name, address and telephone number in case of complaint or query. Enquiries will be dealt with in an expedient and courteous manner. Any complaints will be logged, investigated and, where appropriate, rectifying action will be taken.

152. The above will be captured in a communications plan as part of the final CoCP (DCO Requirement 20).

5.3 Co-ordination

153. The contractor will establish the role of a Traffic Management Plan Coordinator (TMPCo). Their key responsibilities include:

- Managing the implementation of the plan;

- Reporting monitoring to Norfolk Boreas Limited and relevant stakeholders (i.e. local authorities, NCC and HE);
- Inputting into and attending community liaison as required by Norfolk Boreas Limited;
- Providing details of any complaint investigations to Norfolk Boreas community liaison;
- First point of contact for construction workers and sub-contractors.

5.4 Potential Plan Breaches

154. To ensure that the OTMP can be effectively enforced, it is important to define what would constitute a breach. The following non- compliances of the OTMP would constitute a breach whereby corrective measures would be required:

1) Failure to implement or use the agreed traffic management measure;
2) Failure to follow the agreed delivery routes;
3) Failure of the HGV to display its unique identifier;
5) Dangerous driving; and
7) Failure to record deliveries and departures for plant and materials within the booking system.

5.5 Corrective Process

155. On receipt of a report of a potential breach, Norfolk Boreas Limited would investigate the circumstances and compile a report to the relevant authorities as soon as practicable. The report would outline the outcome of the investigation and what corrective action (if necessary) had been implemented.

156. If the breach is found to be material, Norfolk Boreas Limited would take appropriate action within the jurisdiction of the contract and report back to the relevant local authority and the highway authority.

157. Individual employee breaches would be addressed through UK employment law whereby the process outlined above would form the basis for disciplinary proceedings.

6 REFERENCES

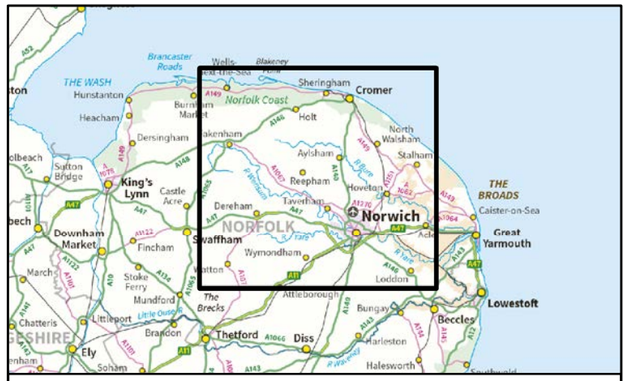
Norfolk Boreas Limited (2018). Norfolk Boreas Offshore Wind Farm Preliminary Environmental Information Report. Available online at https://corporate.vattenfall.co.uk/projects/wind-energy-projects/vattenfall-in-norfolk/norfolkboreas/documents/preliminary-environmental-information-report/. Accessed 16/01/2019.
Royal HaskoningDHV (2017). Norfolk Boreas Offshore Wind Farm Scoping Report.
Royal HaskoningDHV (2018). Norfolk Boreas Offshore Wind Farm Traffic and Transport Method Statement. Unpublished.

7 FIGURES

590000 600000 610000 620000 630000 640000

340000 330000 320000 310000 300000

N



Legend:

Norfolk Boreas onshore red line boundary

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Onshore Project Study Area

Figure: 1 | Drawing No: PB5640-007-009-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	15/05/2019	JT	CD	A3	1:200,000
01	24/04/2019	JT	CD	A3	1:200,000

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

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0 5 10 km

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340000 330000 320000 310000 300000

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Map 1
Map 2
Map 3
Map 4
Map 5
Map 6
Map 7
Map 8
Map 9

Landfall

Kings Lynn 25km

Kings Lynn 30km

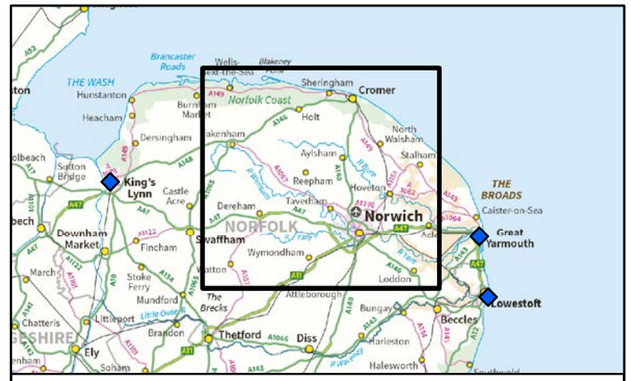
Great Yarmouth 18km

Great Yarmouth 13km

Lowestoft 24km

Substation Sites

0 5 10 km



Legend:

- Norfolk Boreas onshore red line boundary
- Location of cable route sections - see figure 2a
- Port location[1]

NOTE: Distances to towns measured from edge of map.
[1] DECC, 2012.

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Scenario 1 - Onshore Infrastructure

Figure: 2 | Drawing No: PB5640-007-009-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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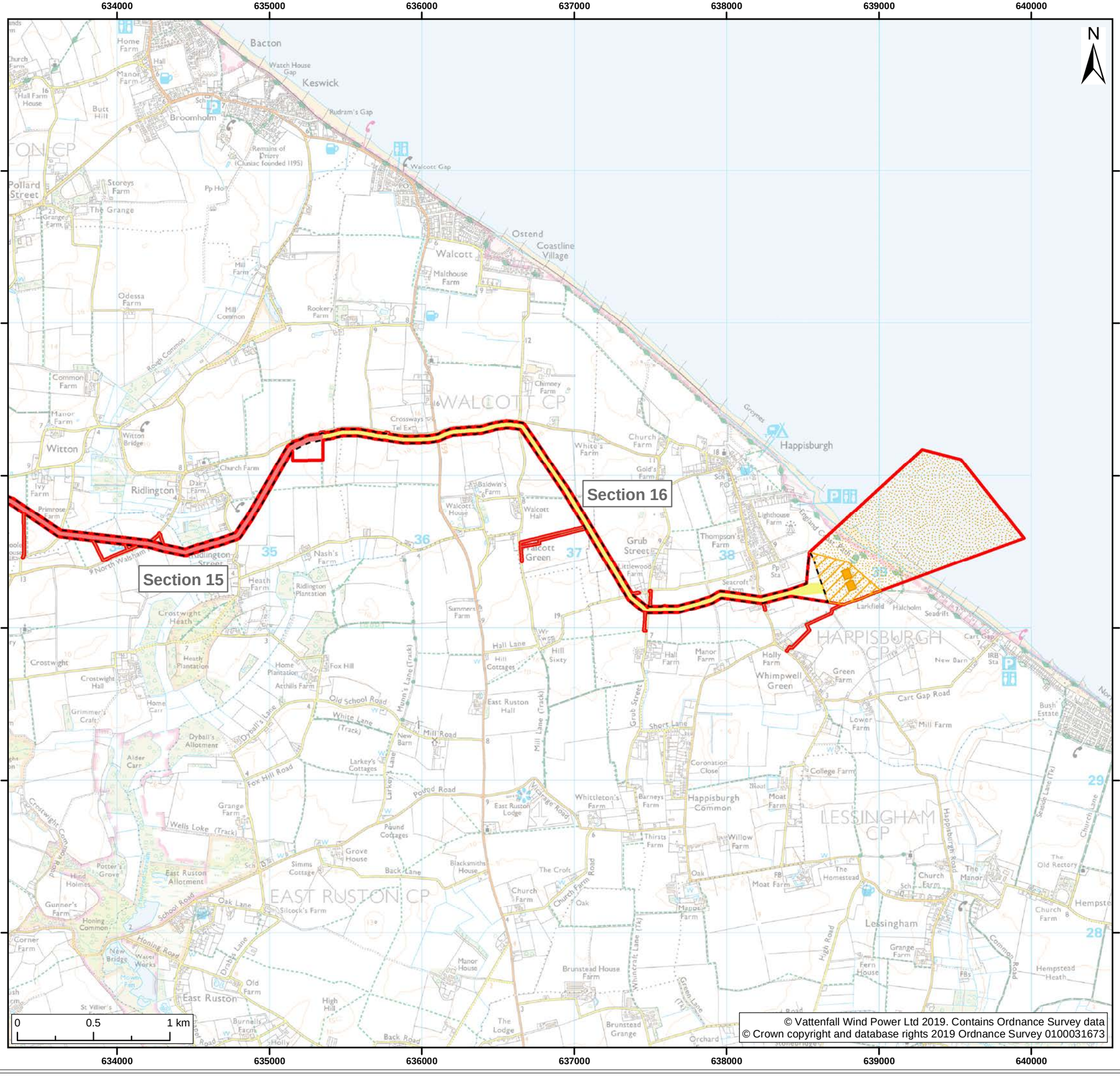

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Landfall zone
- Landfall compound zone
- Indicative landfall compound
- Onshore cable route
- Construction access
- Operational access

Cable Route Sections

- Section 15
- Section 16

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 1 - Onshore Infrastructure (1:25,000) (Map 1 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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627000 628000 629000 630000 631000 632000 633000 634000

333000 332000 331000 330000 329000 328000

N

Section 13

Section 14

Section 15

Legend:

Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

Onshore cable route

Construction access

Operational access

Cable Route Sections

Section 13

Section 14

Section 15

0 0.5 1 km

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 1 - Onshore Infrastructure (1:25,000) (Map 2 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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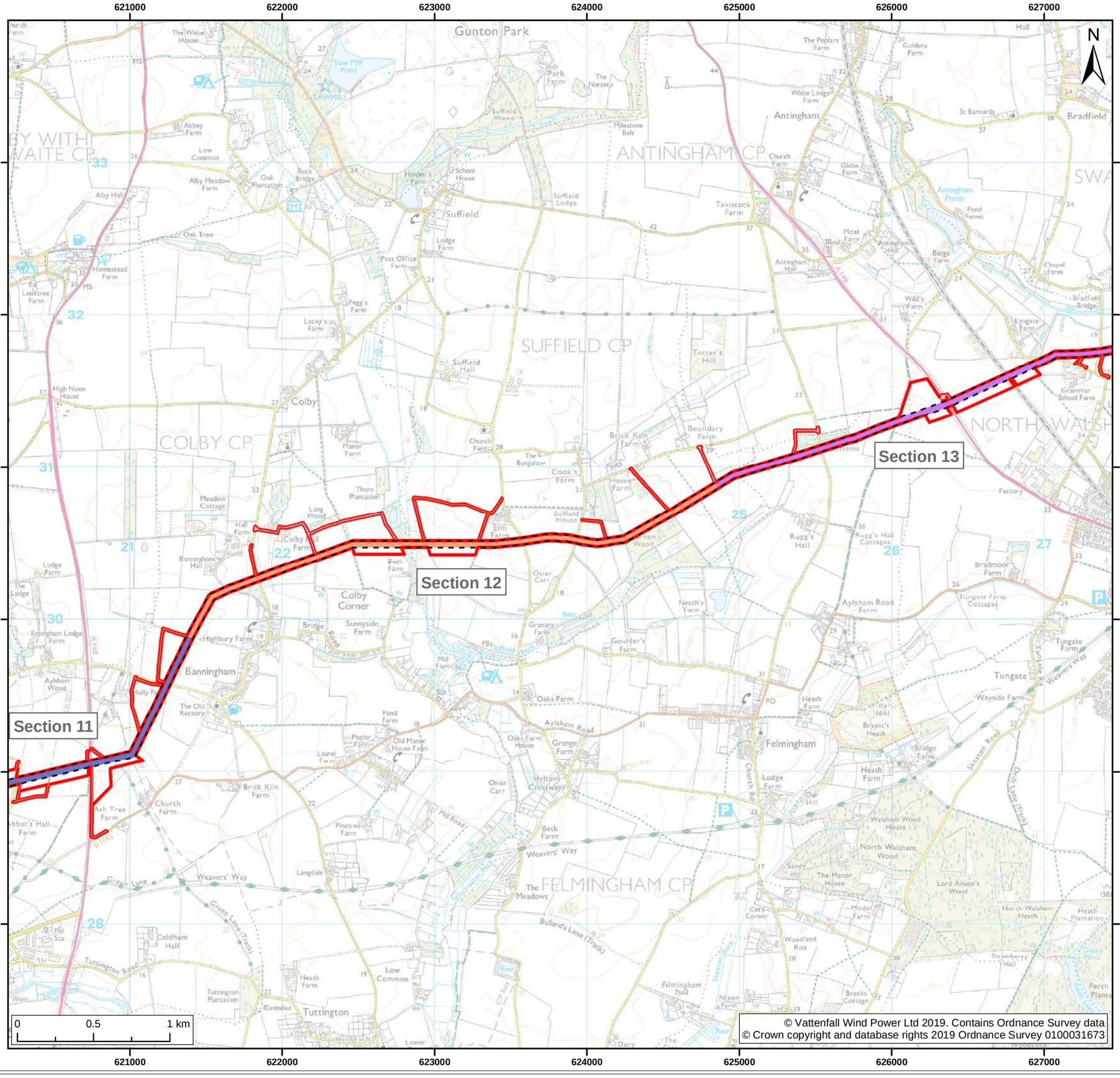

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Construction access
- Operational access

Cable Route Sections

- Section 11
- Section 12
- Section 13

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 1 - Onshore Infrastructure (1:25,000) (Map 3 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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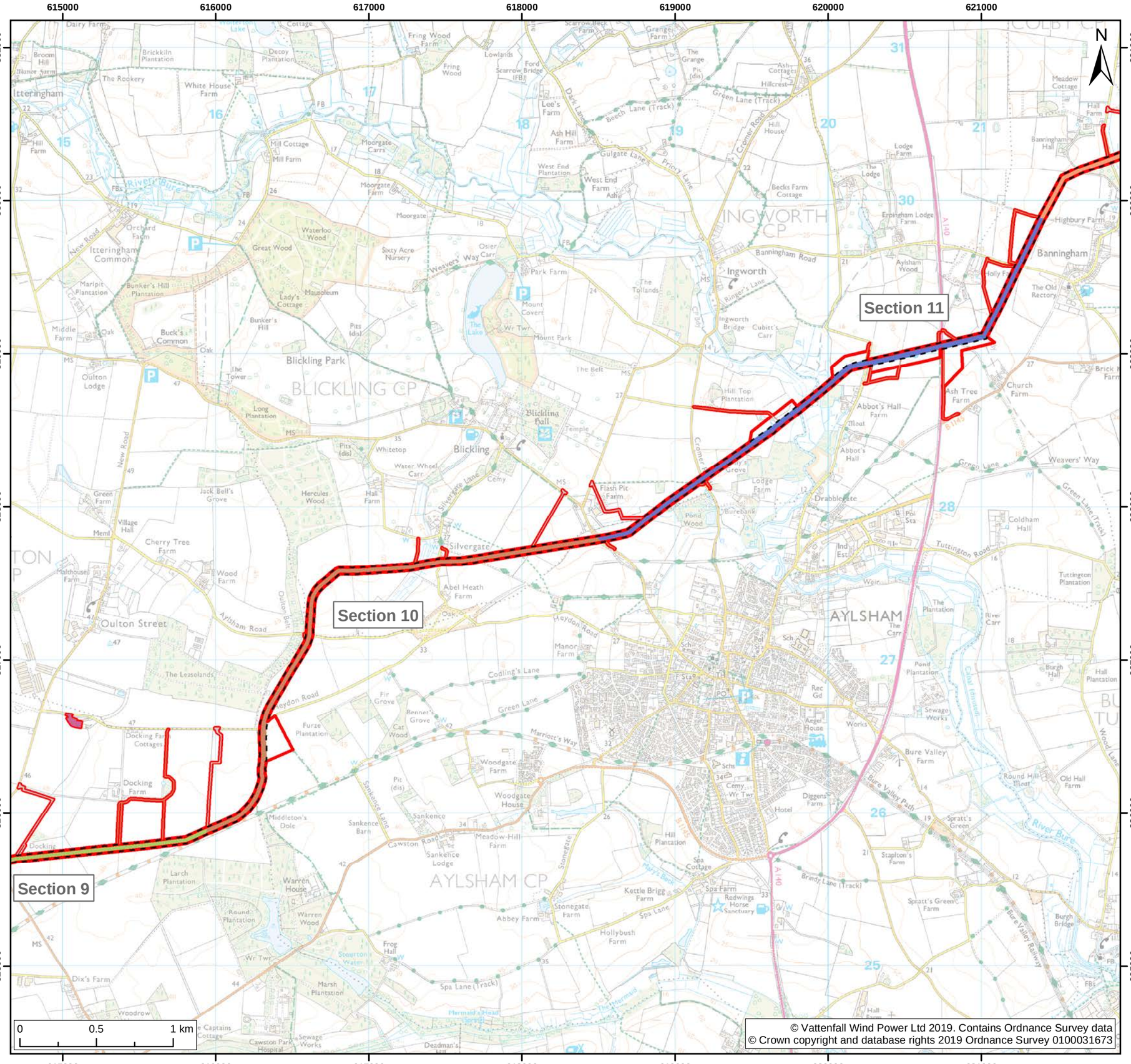
Royal HaskoningDHV
Enhancing Society Together



Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Cable Route Sections

- Section 9
- Section 10
- Section 11
- Section 12

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 1 - Onshore Infrastructure (1:25,000)
(Map 4 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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609000 610000 611000 612000 613000 614000 615000

327000 326000 325000 324000 323000 322000

Section 9

Section 8

Section 7

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Cable Route Sections

- Section 7
- Section 8
- Section 9

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 1 - Onshore Infrastructure (1:25,000)
(Map 5 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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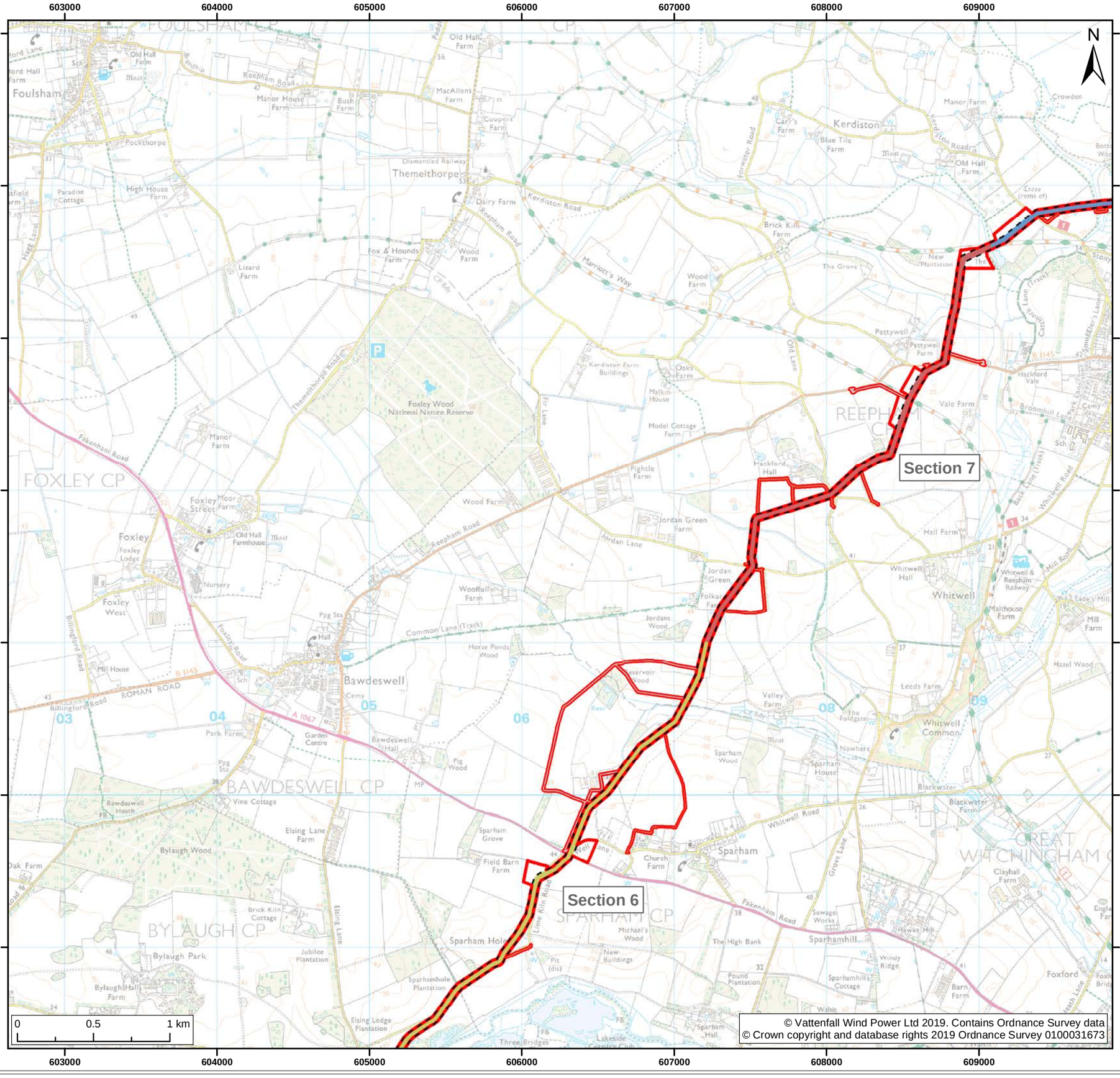

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Legend:

▭ Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

┅ Onshore cable route

⬜ Construction access

🟧 Operational access

Cable Route Sections

🟨 Section 6

🟥 Section 7

🟦 Section 8

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 1 - Onshore Infrastructure (1:25,000)
(Map 6 of 9)

Figure: 2a
Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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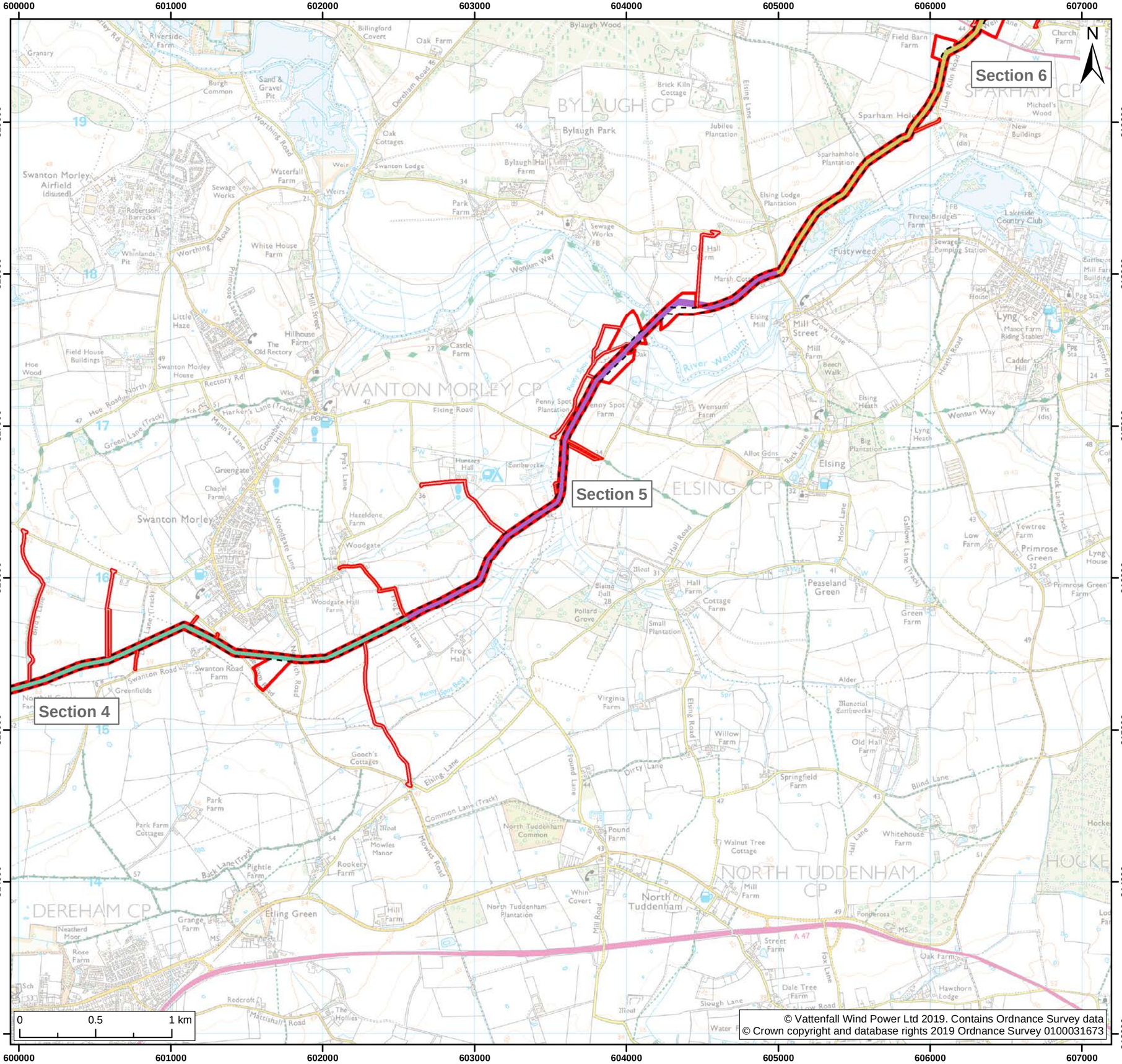

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Construction access
- Operational access

Cable Route Sections

- Section 4
- Section 5
- Section 6

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 1 - Onshore Infrastructure (1:25,000)
(Map 7 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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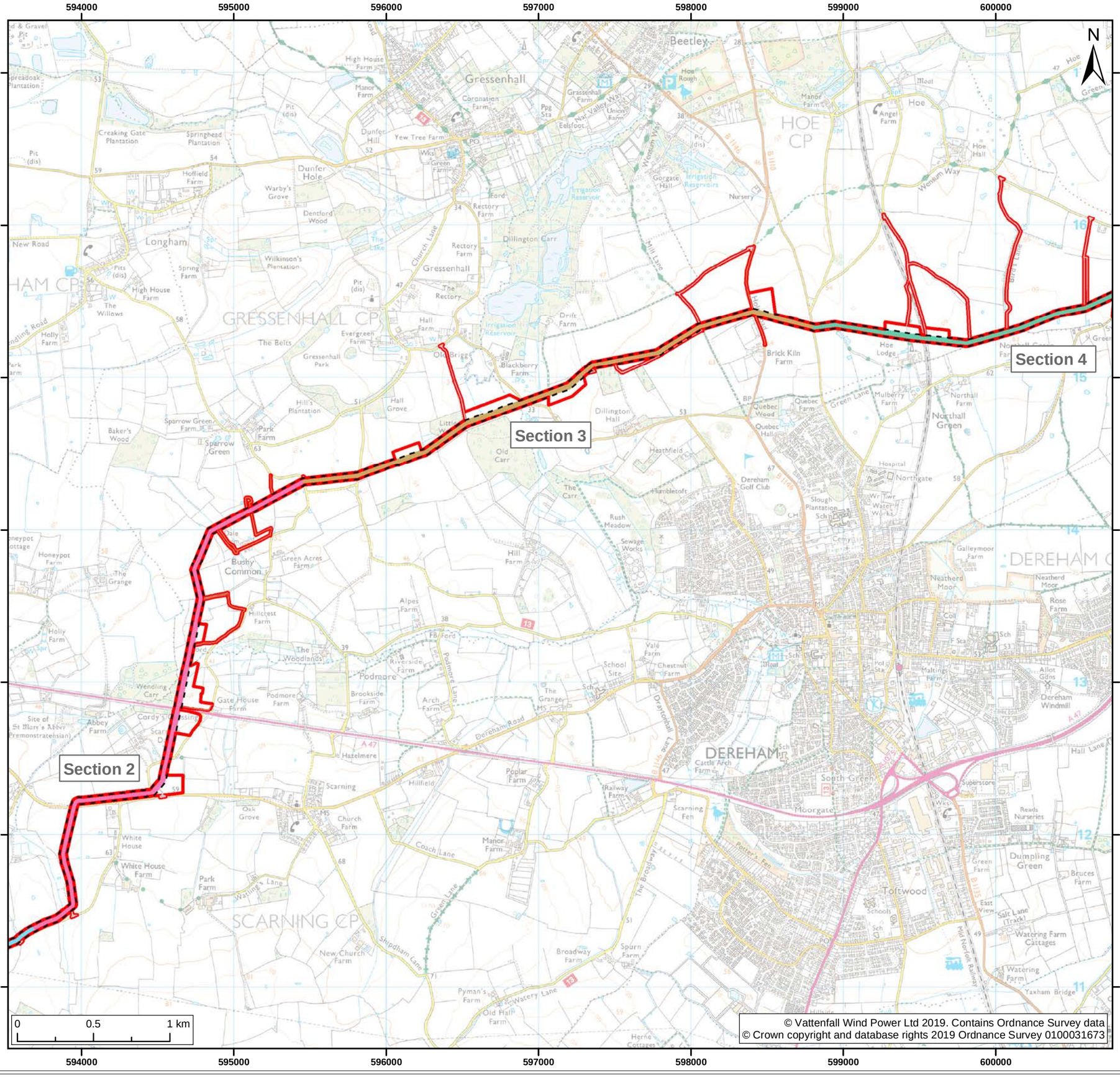

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Construction access
- Operational access

Cable Route Sections

- Section 1
- Section 2
- Section 3
- Section 4

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 1 - Onshore Infrastructure (1:25,000) (Map 8 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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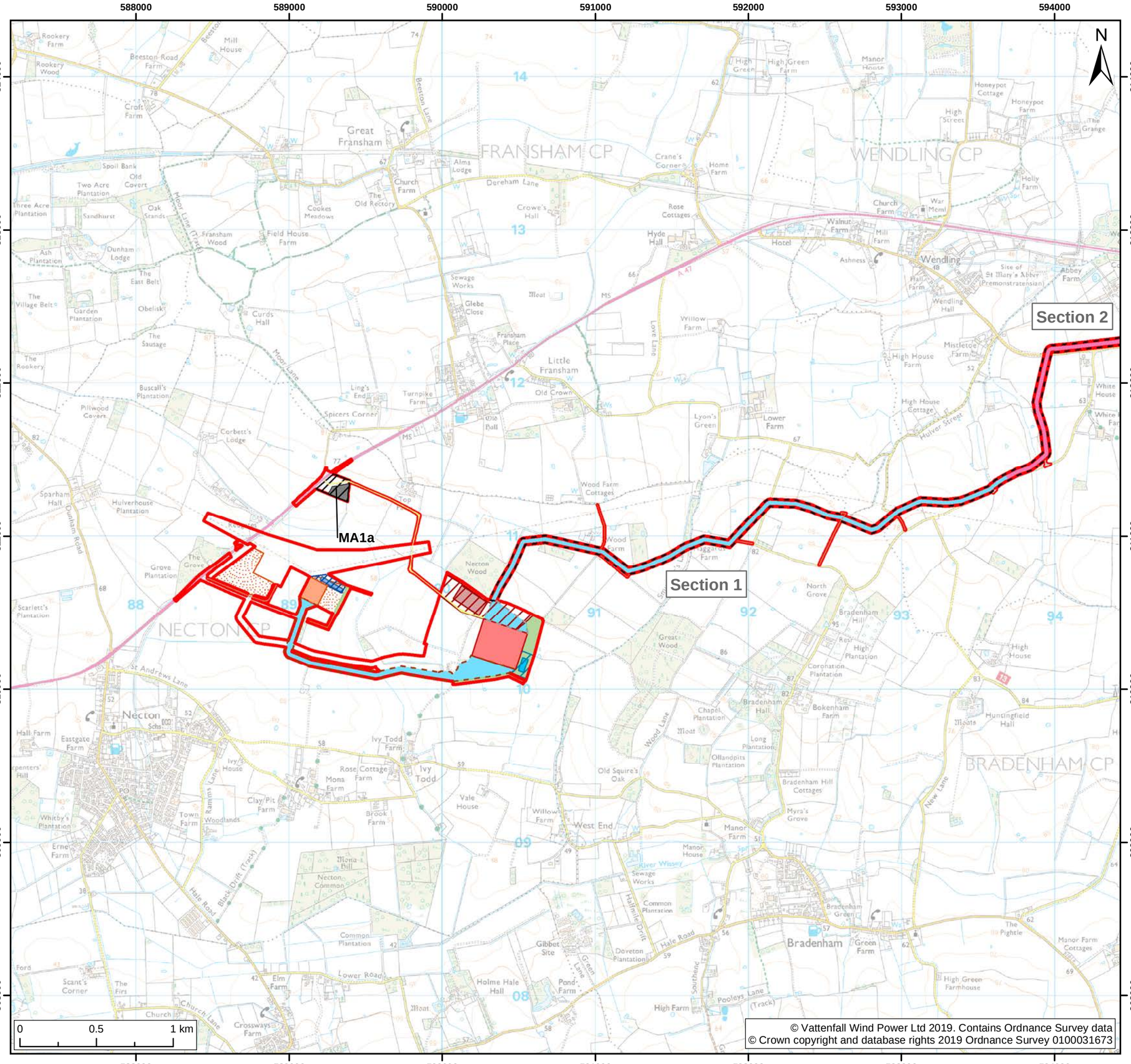

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond

Cable Route Sections

- Section 1
- Section 2

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 1 - Onshore Infrastructure (1:25,000) (Map 9 of 9)

Figure: 2a | Drawing No: PB5640-007-009-002a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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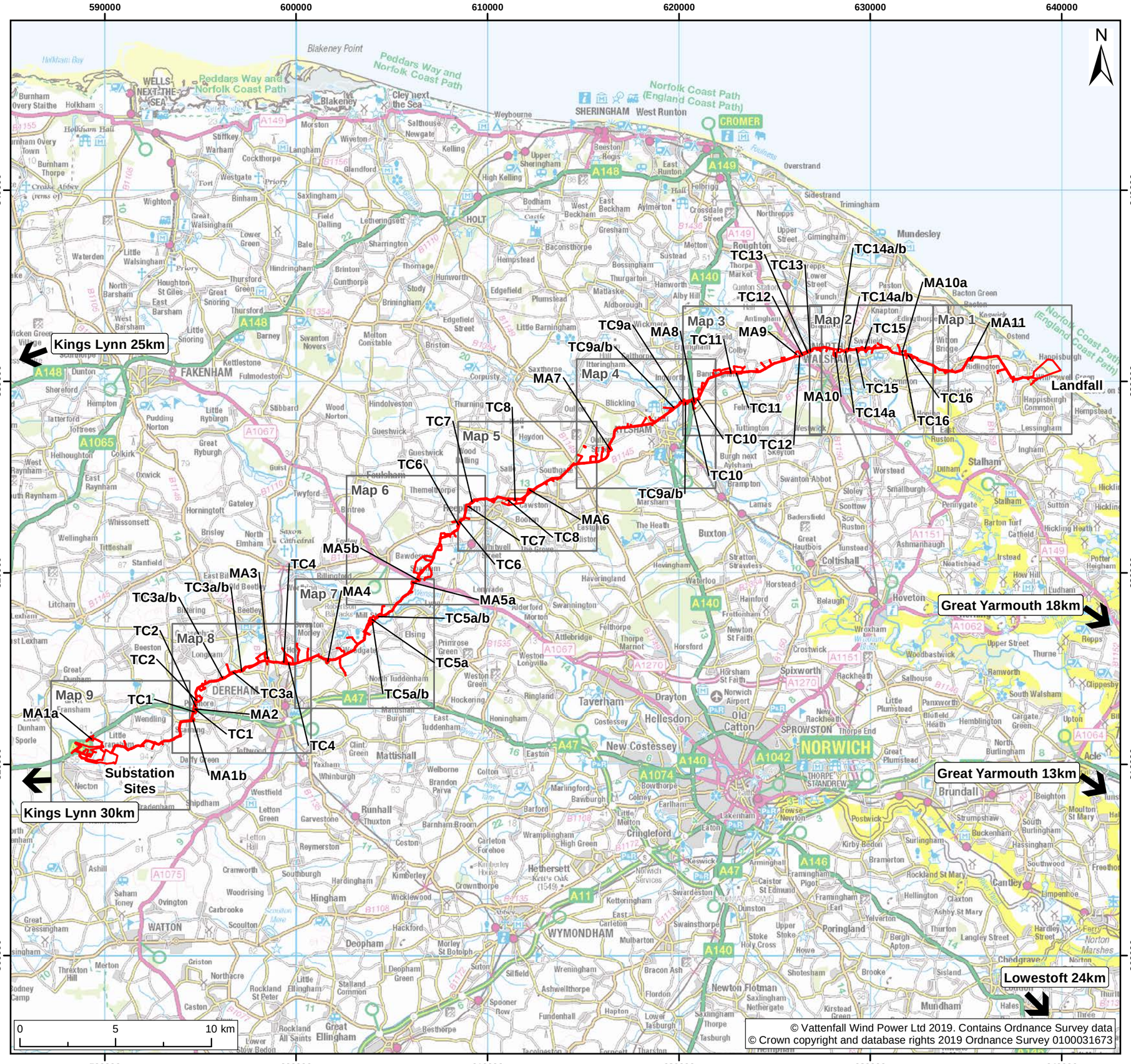

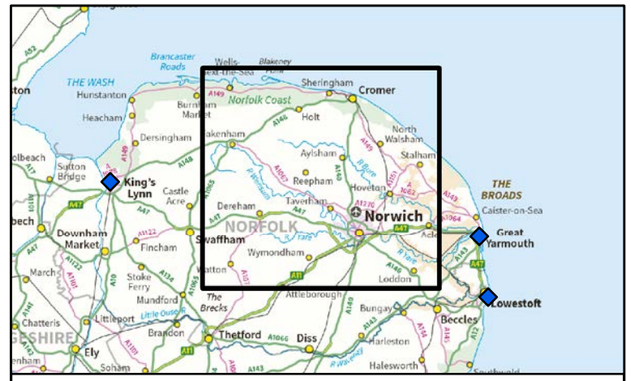

Legend:

- Norfolk Boreas onshore red line boundary
- Location of cable route sections - see figure 3a
- Port location[1]

NOTE: Distances to towns measured from edge of map.
MA = Mobilisation Area; TC = Trenchless Crossing
[1] DECC, 2012.

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Scenario 2 - Onshore Infrastructure

Figure: 3 | Drawing No: PB5640-007-009-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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634000 635000 636000 637000 638000 639000 640000

333000 332000 331000 330000 329000 328000

N

Section 18: MA11-E

Section 17: MA11-W

MA11

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Landfall zone
- Landfall compound zone
- Indicative landfall compound
- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access

Cable Route Sections

- Section 17: MA11-W
- Section 18: MA11-E

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000)
(Map 1 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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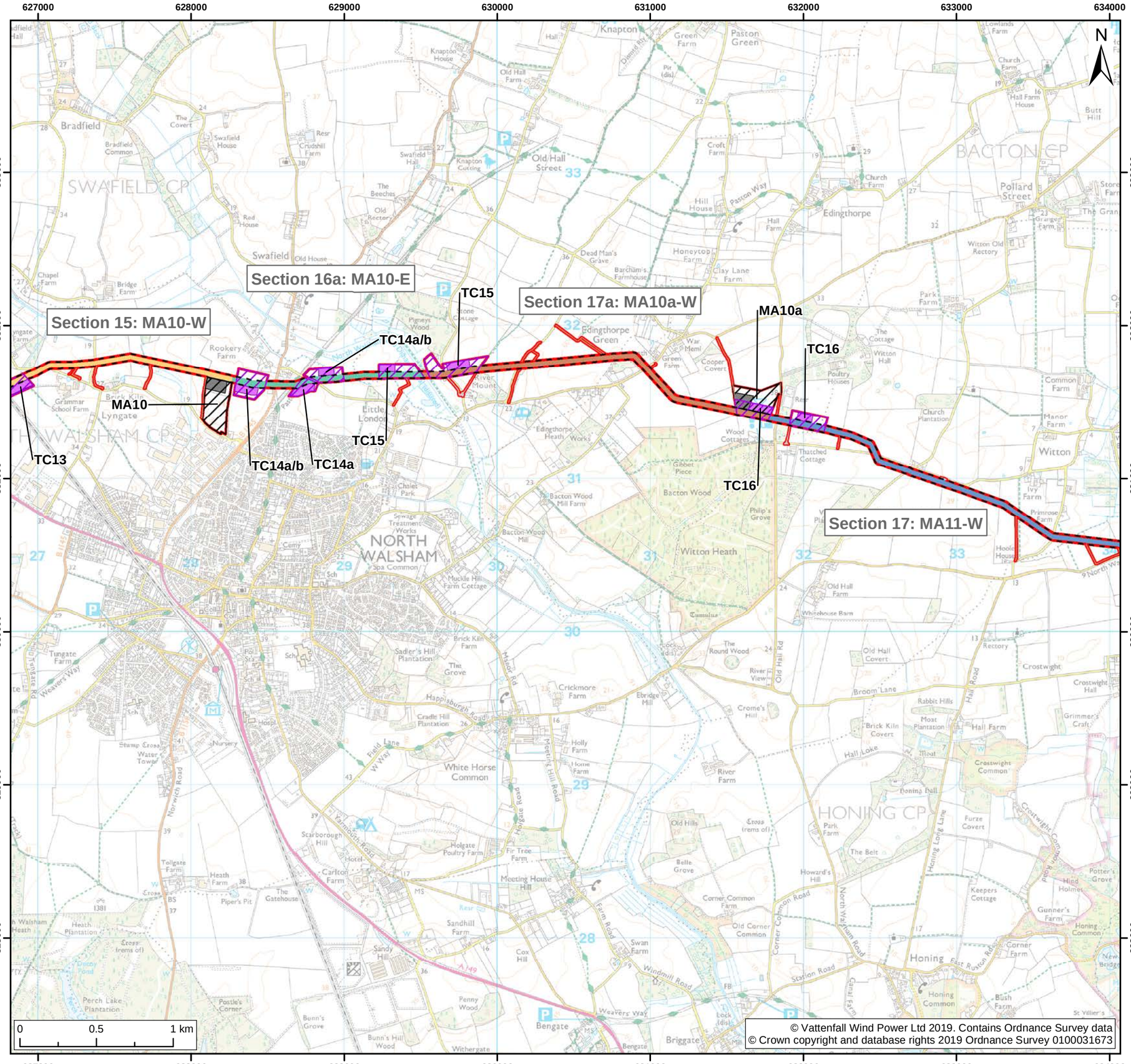

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access

Cable Route Sections

- Section 15: MA10-W
- Section 16a: MA10-E
- Section 17: MA11-W
- Section 17a: MA10a-W

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000) (Map 2 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	24/04/2019	JT	CD	A3	1:25,000

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

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621000 622000 623000 624000 625000 626000 627000

333000 332000 331000 330000 329000 328000

N

Section 14: MA9-W

Section 13: MA8-E

MA9

MA8

TC13

TC12

TC11

TC10

TC9a/b

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access

Cable Route Sections

- Section 12: MA7-E
- Section 13: MA8-E
- Section 14: MA9-W
- Section 15: MA10-W

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000)
(Map 3 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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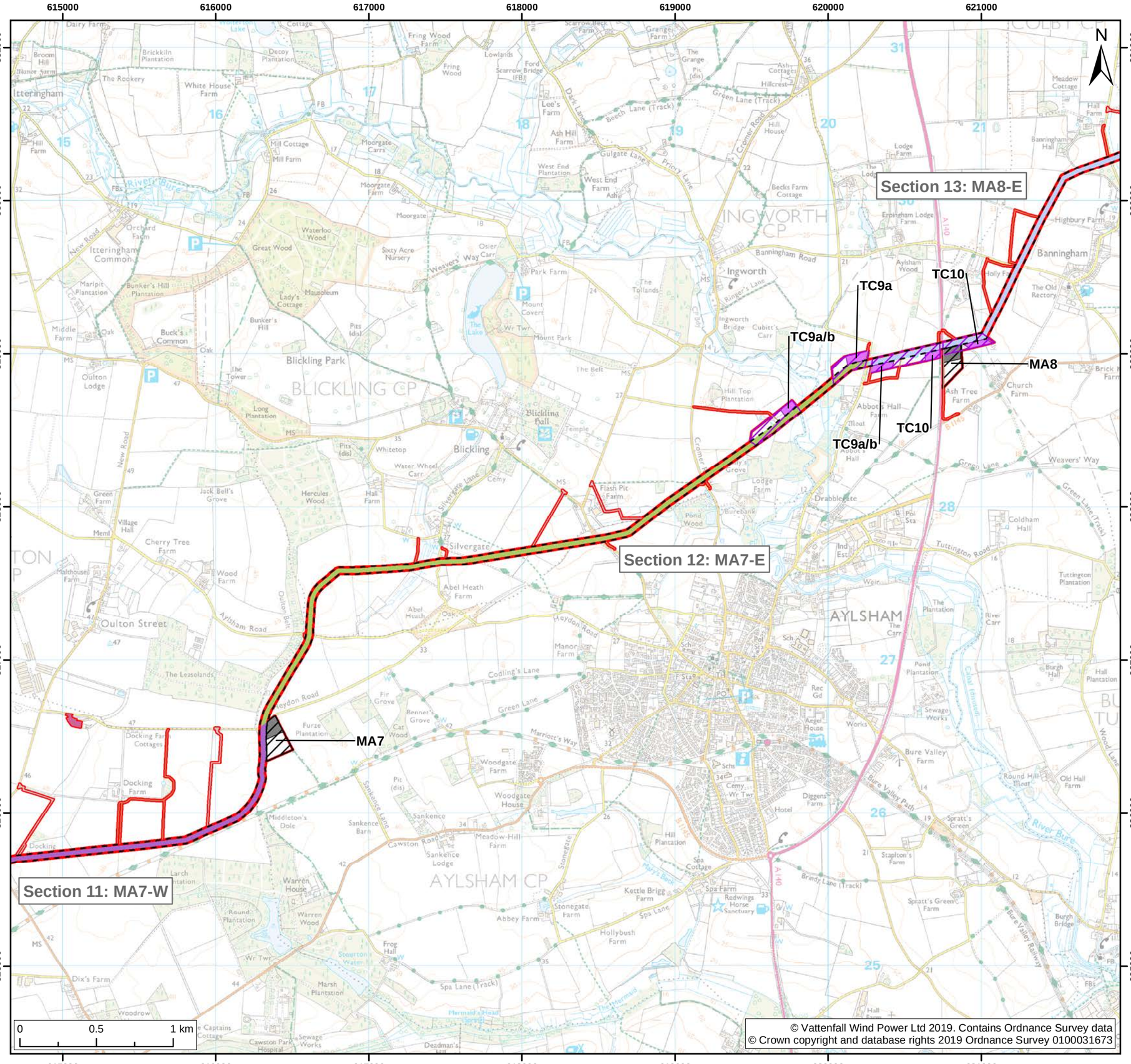

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Cable logistics area
- Construction access
- Operational access

Cable Route Sections

- Section 11: MA7-W
- Section 12: MA7-E
- Section 13: MA8-E

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 2 - Onshore Infrastructure (1:25,000) (Map 4 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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609000 610000 611000 612000 613000 614000 615000

327000 326000 325000 324000 323000 322000

N

Section 11: MA7-W

Section 10: MA6-E

MA6

Section 9a: MA6-W

TC7

TC7

Section 9: MA6-W

TC8

TC8

Section 8a: MA5b-E

TC6

TC6

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Cable logistics area
- Construction access
- Operational access

Cable Route Sections

- Section 8: MA5b-E
- Section 8a: MA5b-E
- Section 9: MA6-W
- Section 9a: MA6-W
- Section 10: MA6-E
- Section 11: MA7-W

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000)
(Map 5 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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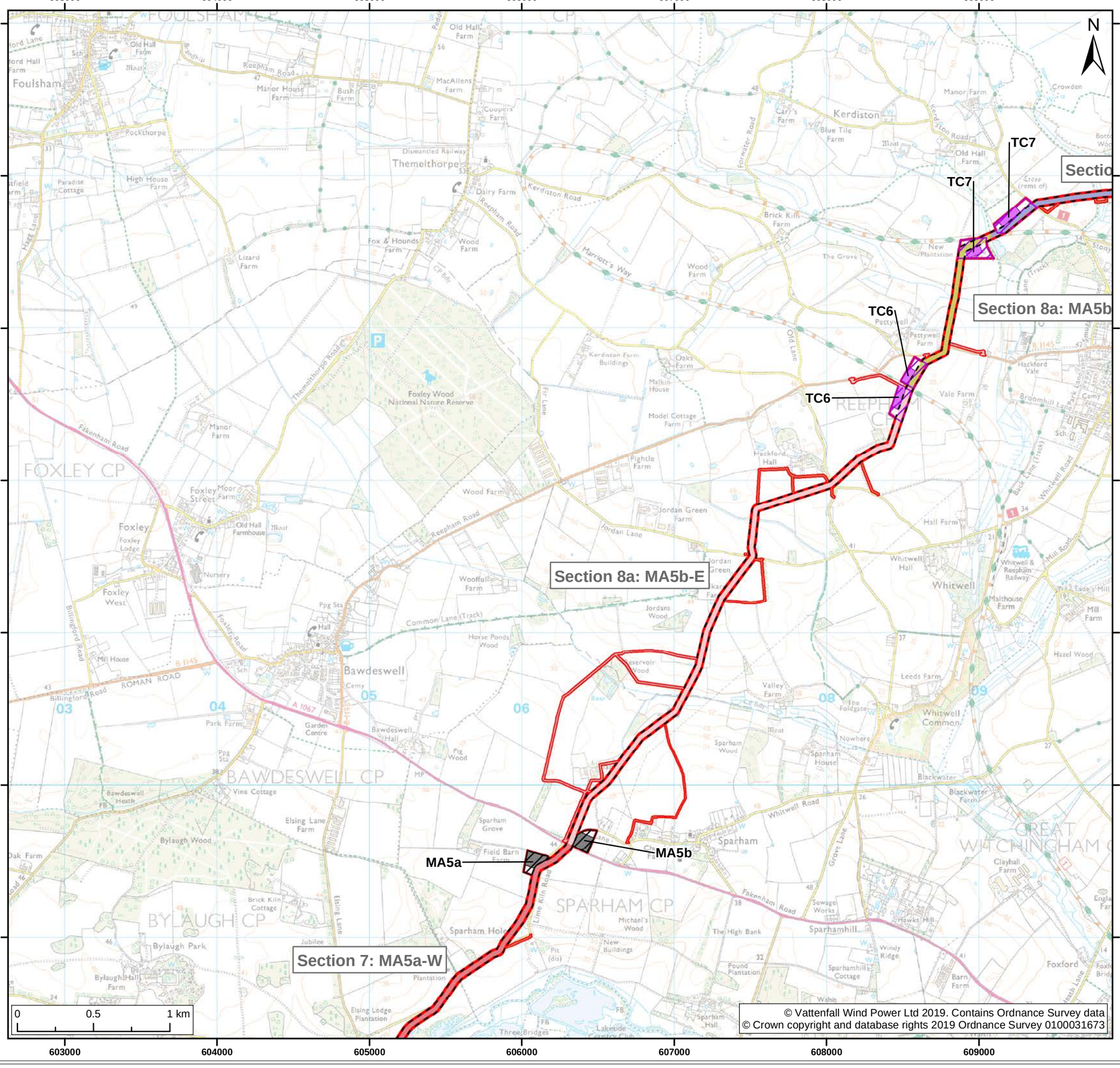

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access

Cable Route Sections

- Section 7: MA5a-W
- Section 8: MA5b-E
- Section 8a: MA5b-E
- Section 9a: MA6-W

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000)
(Map 6 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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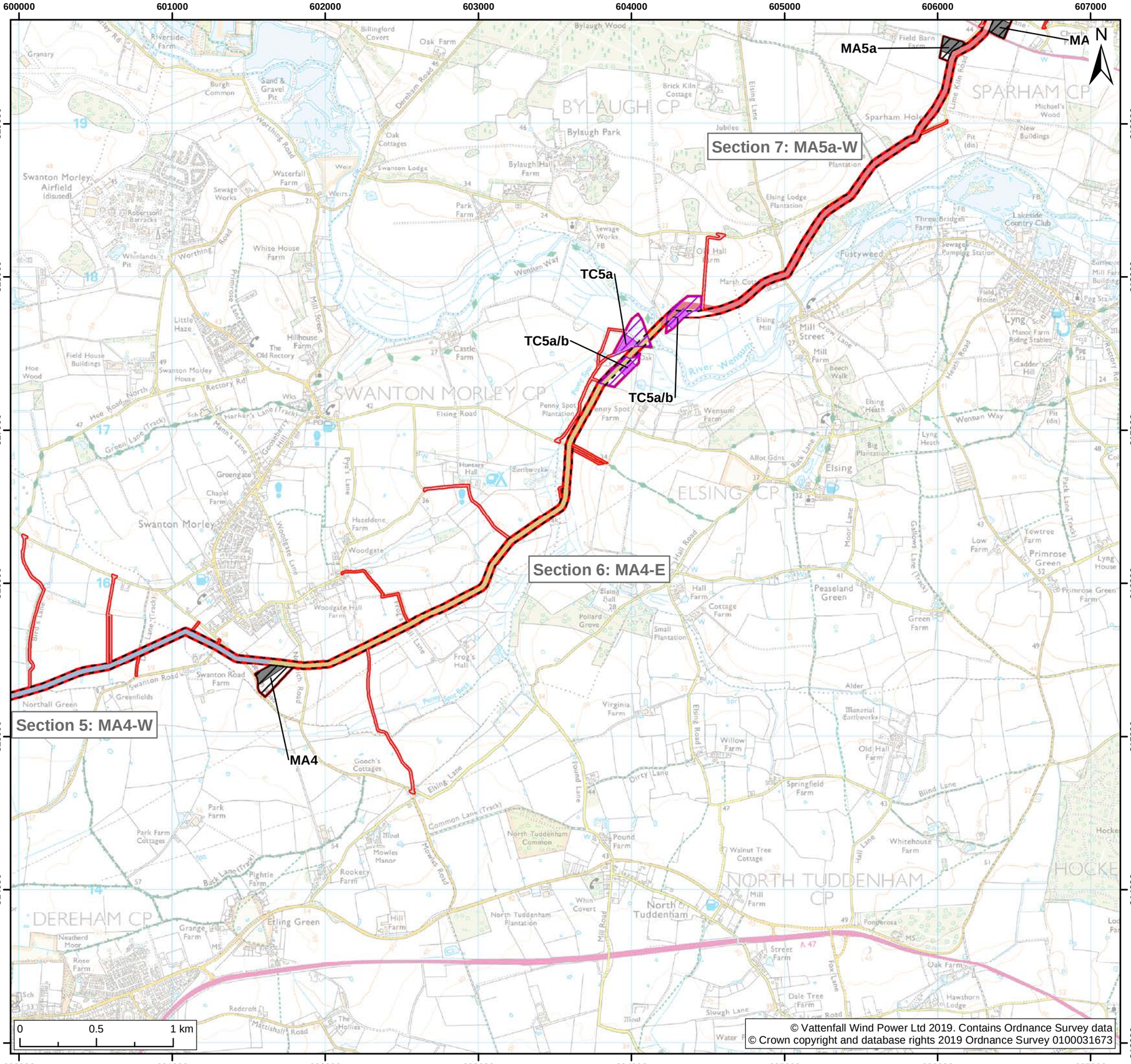

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access

Cable Route Sections

- Section 5: MA4-W
- Section 6: MA4-E
- Section 7: MA5a-W
- Section 8: MA5b-E

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000) (Map 7 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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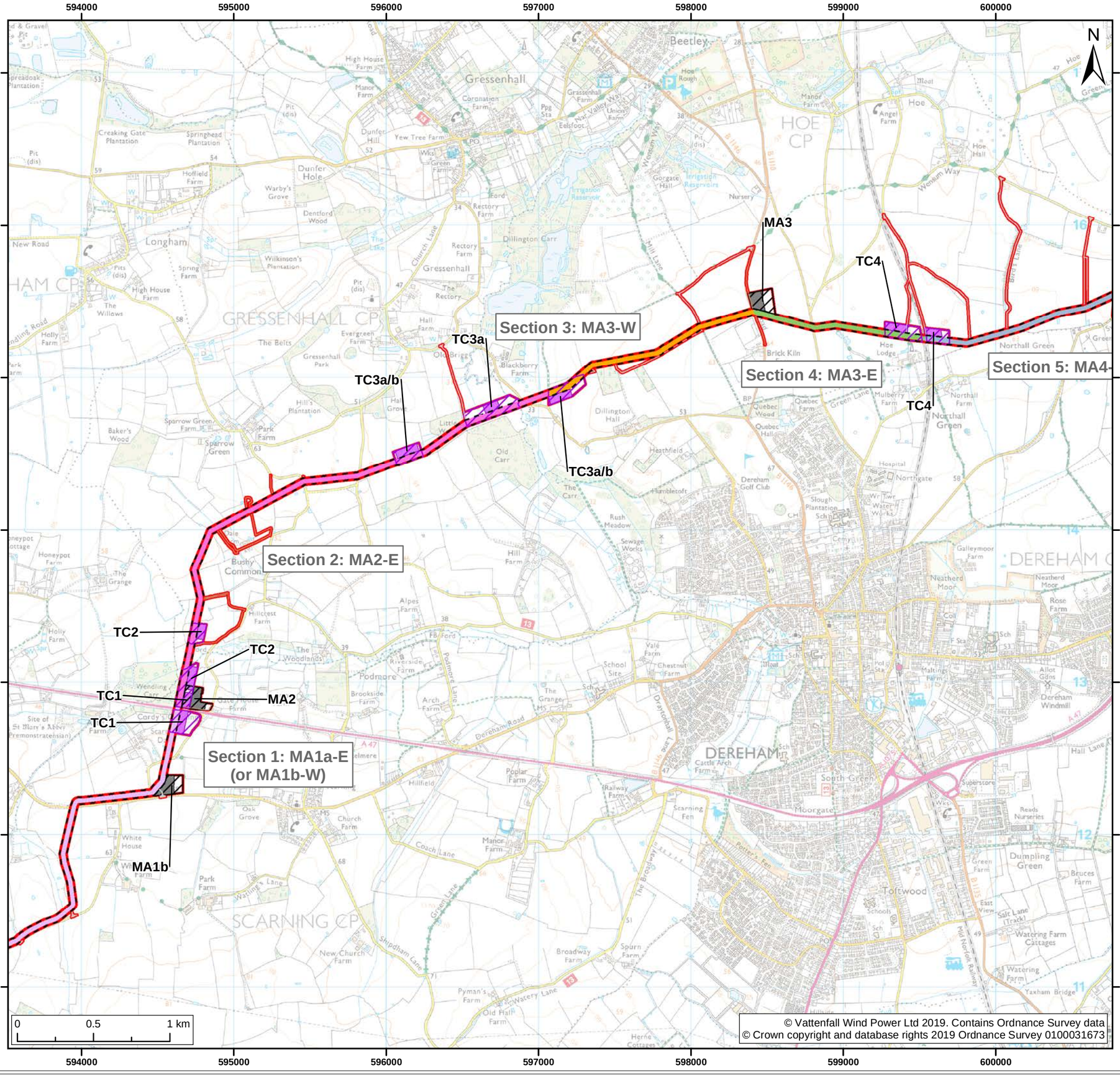

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access

Cable Route Sections

- Section 1: MA1a-E (or MA1b-W)
- Section 2: MA2-E
- Section 3: MA3-W
- Section 4: MA3-E
- Section 5: MA4-W

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000)
(Map 8 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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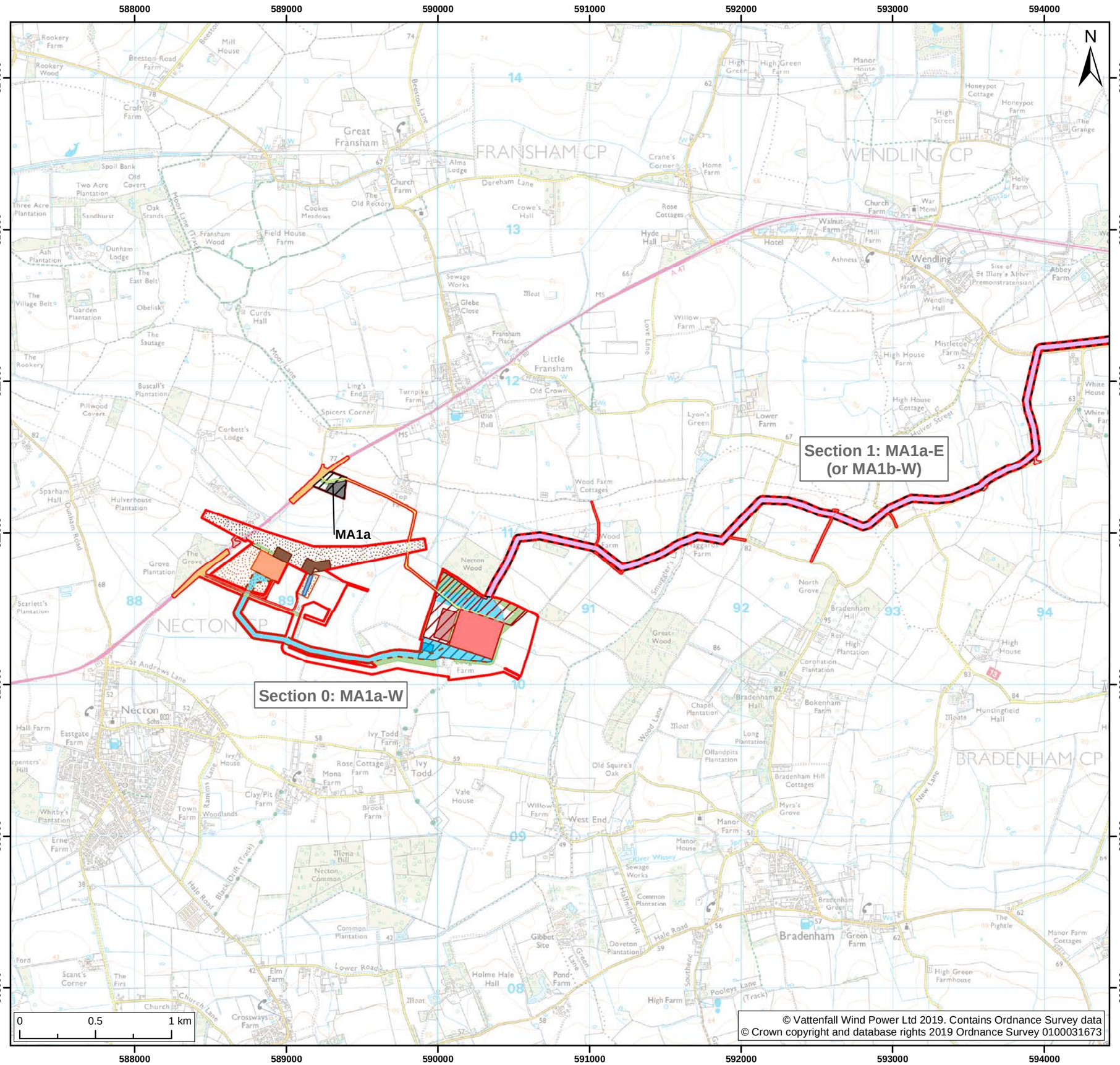

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond

Cable Route Sections

- Section 0: MA1a-W
- Section 1: MA1a-E (or MA1b-W)

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 2 - Onshore Infrastructure (1:25,000)
(Map 9 of 9)

Figure: 3a | Drawing No: PB5640-007-009-003a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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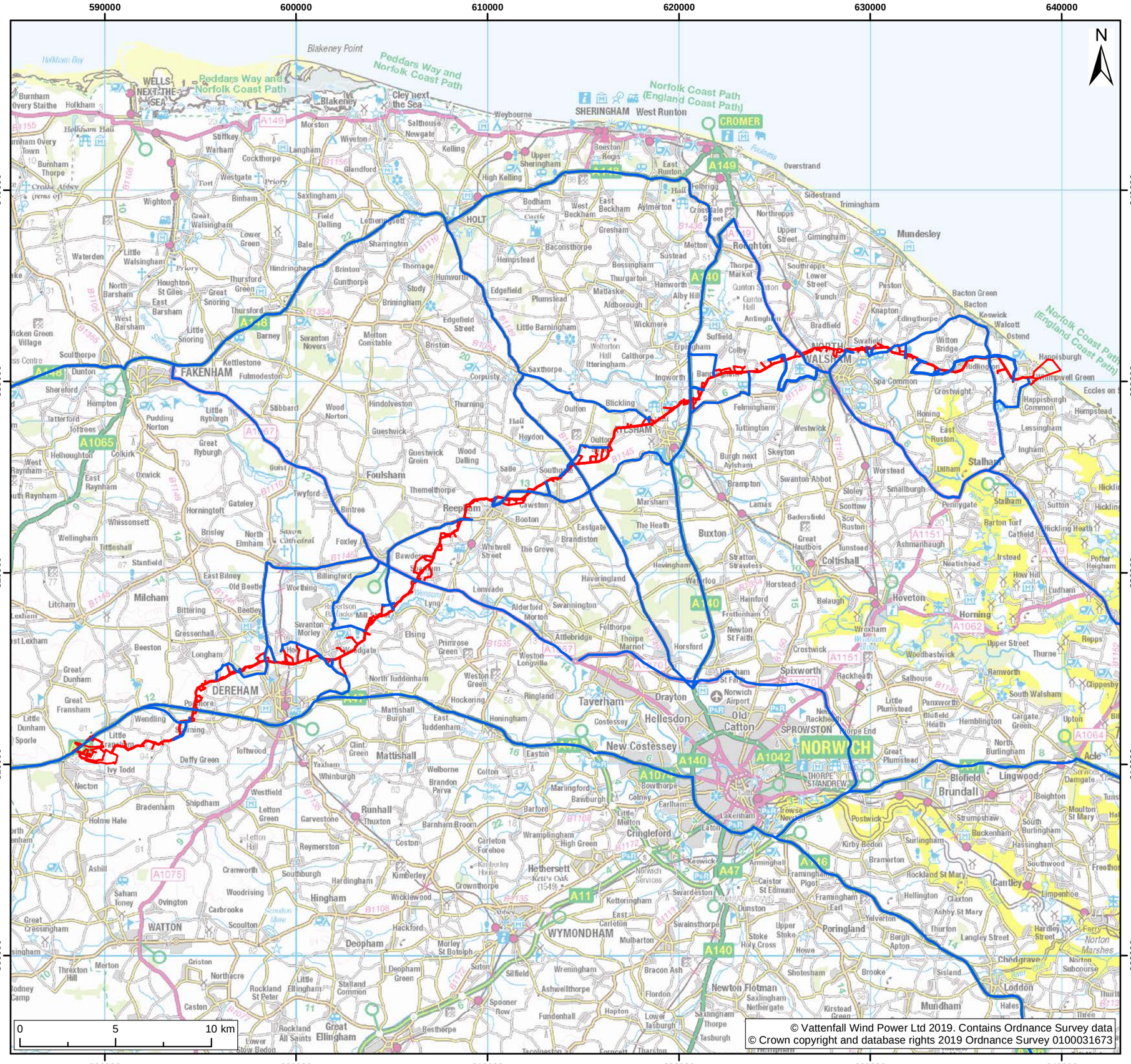

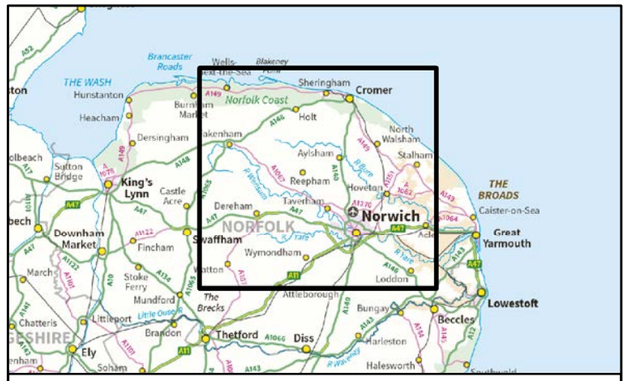

Legend:

- Norfolk Boreas onshore red line boundary
- HGV Route

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Scenario 1: Stage 2; Scenario 2: Stage 3 HGV Delivery Routes

Figure: 4 | Drawing No: PB5640-007-009-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	10/05/2019	JT	CD	A3	1:200,000

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

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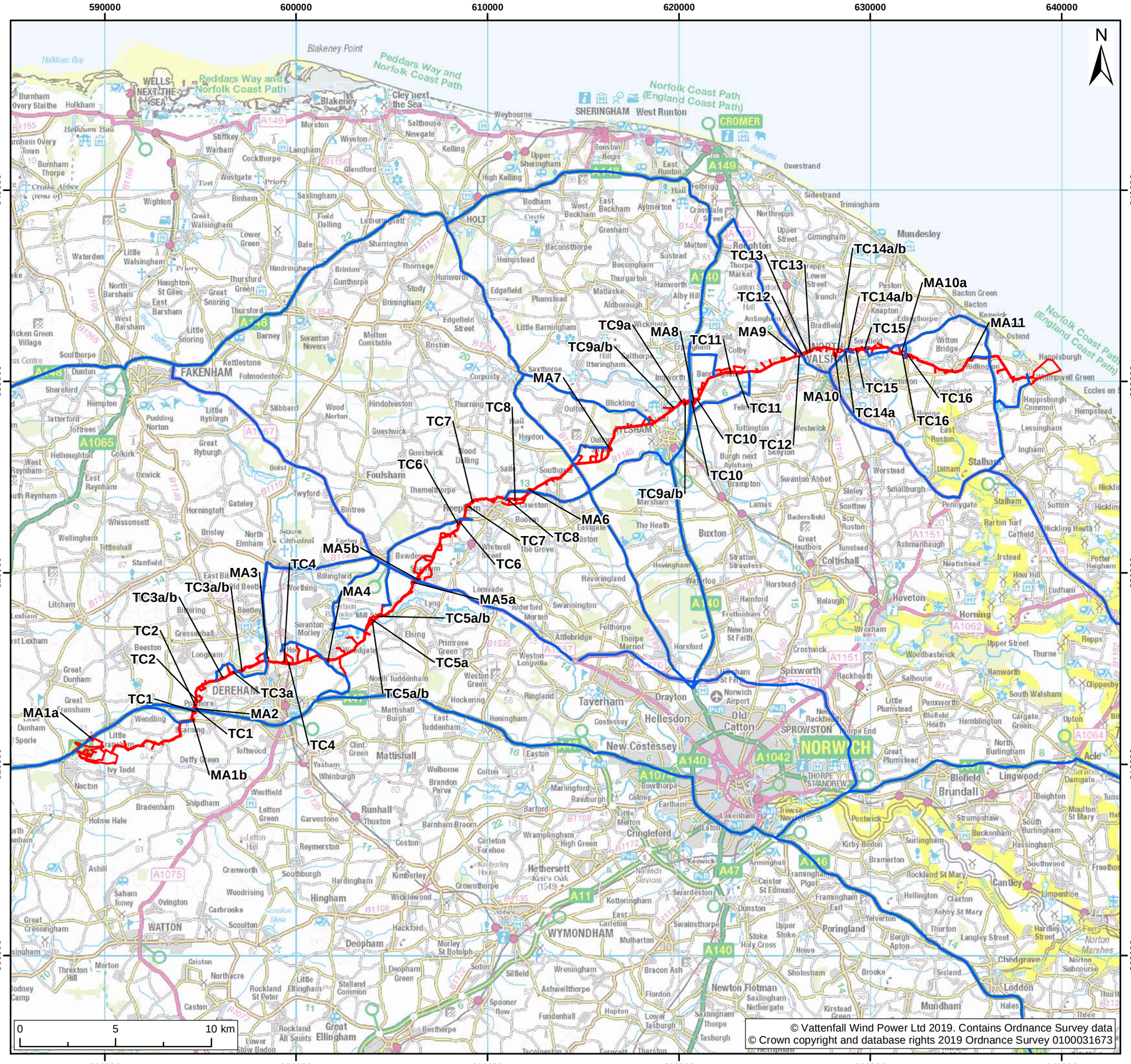

Legend:

- Norfolk Boreas onshore red line boundary
- HGV Route

MA = Mobilisation Area; TC = Trenchless Crossing

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Scenario 1: Stage 1; Scenario 2: Stage 2
HGV Delivery Routes

Figure: 5 | Drawing No: PB5640-007-009-005

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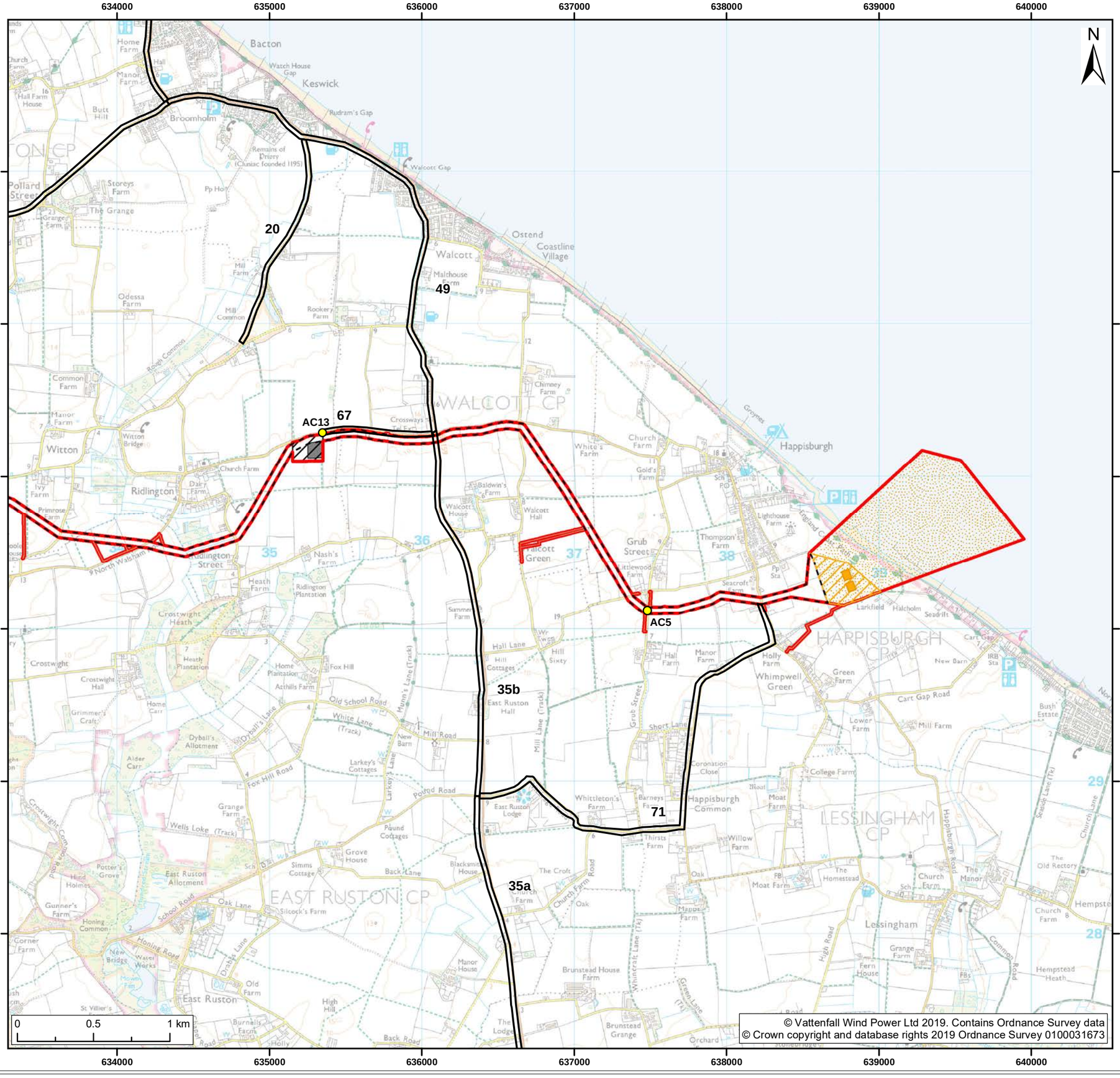

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Landfall zone
- Landfall compound zone
- Indicative landfall compound
- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 1 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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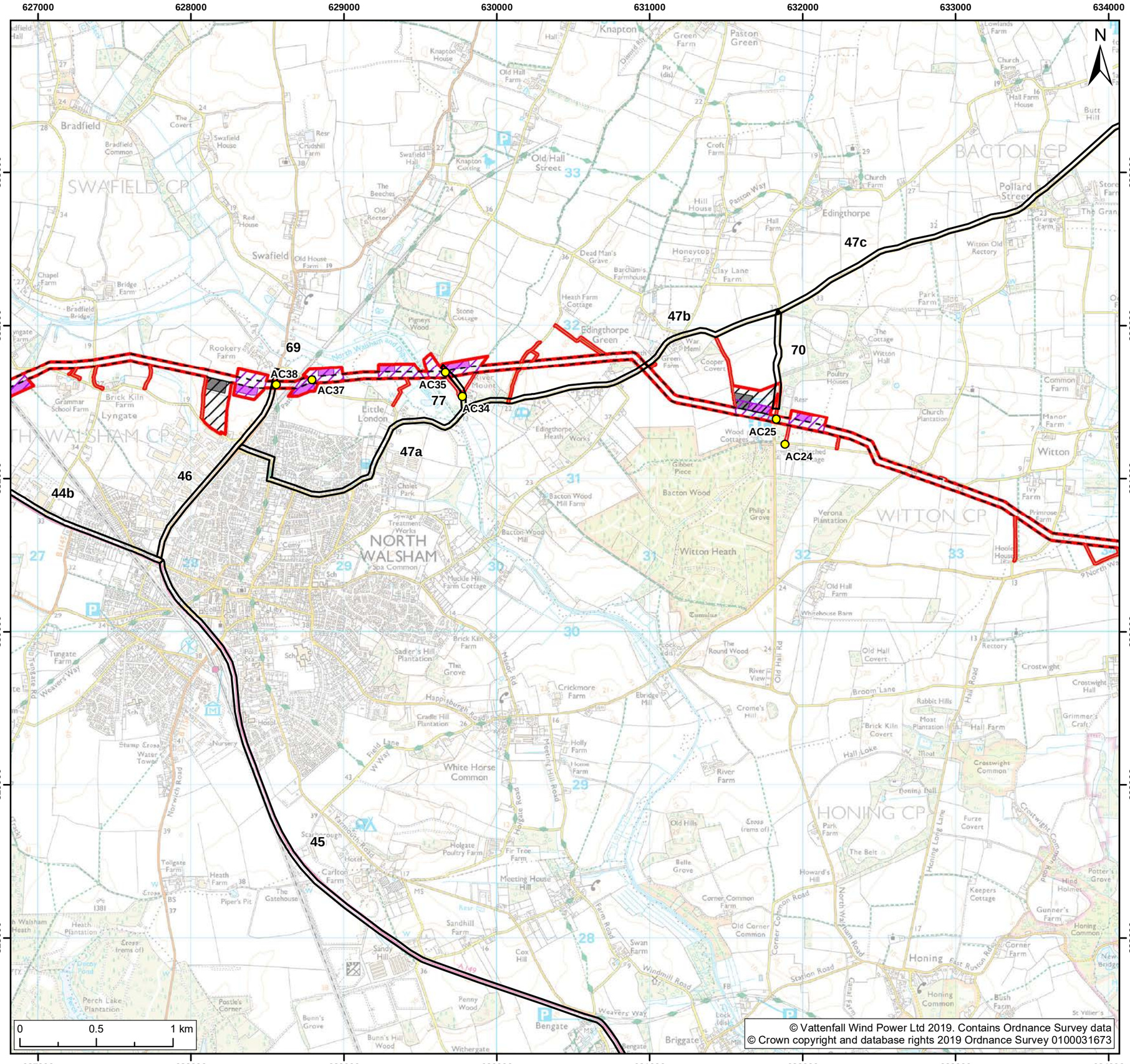

Legend:

🟥 Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- - - Onshore cable route

▨ Construction access

▨ Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

▨ Trenchless crossing zone (e.g. HDD)

▨ Indicative trenchless crossing compound

▨ Mobilisation zone

▨ Indicative mobilisation area compound

Highway links

☐ Major highway links

● Access point ID

Project:

Norfolk Boreas

Report:

Outline Traffic Management Plan

Title:

Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 2 of 9)

Figure: 6

Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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05	15/05/2019	JT	CD	A3	1:25,000

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

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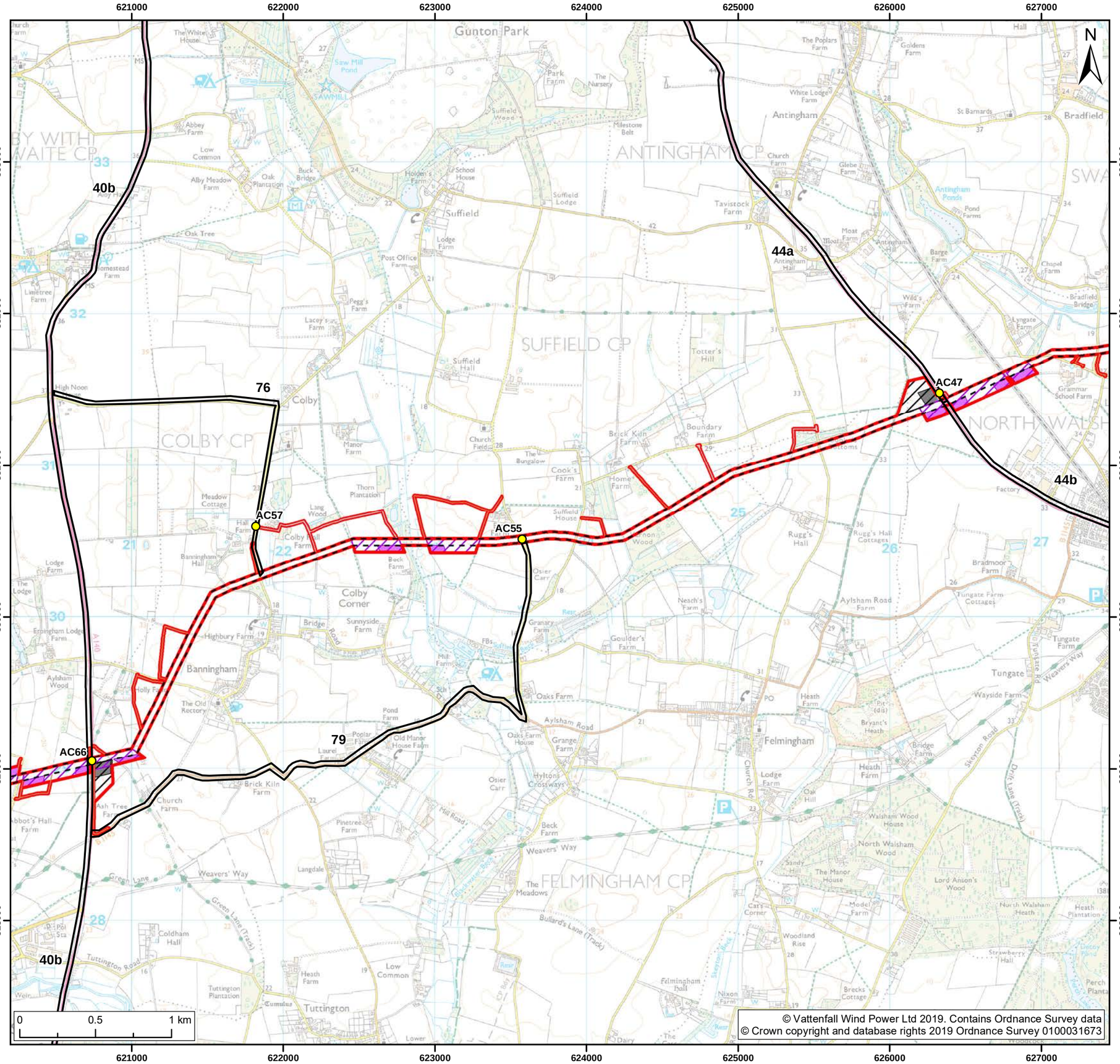

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 3 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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05	15/05/2019	JT	CD	A3	1:25,000

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

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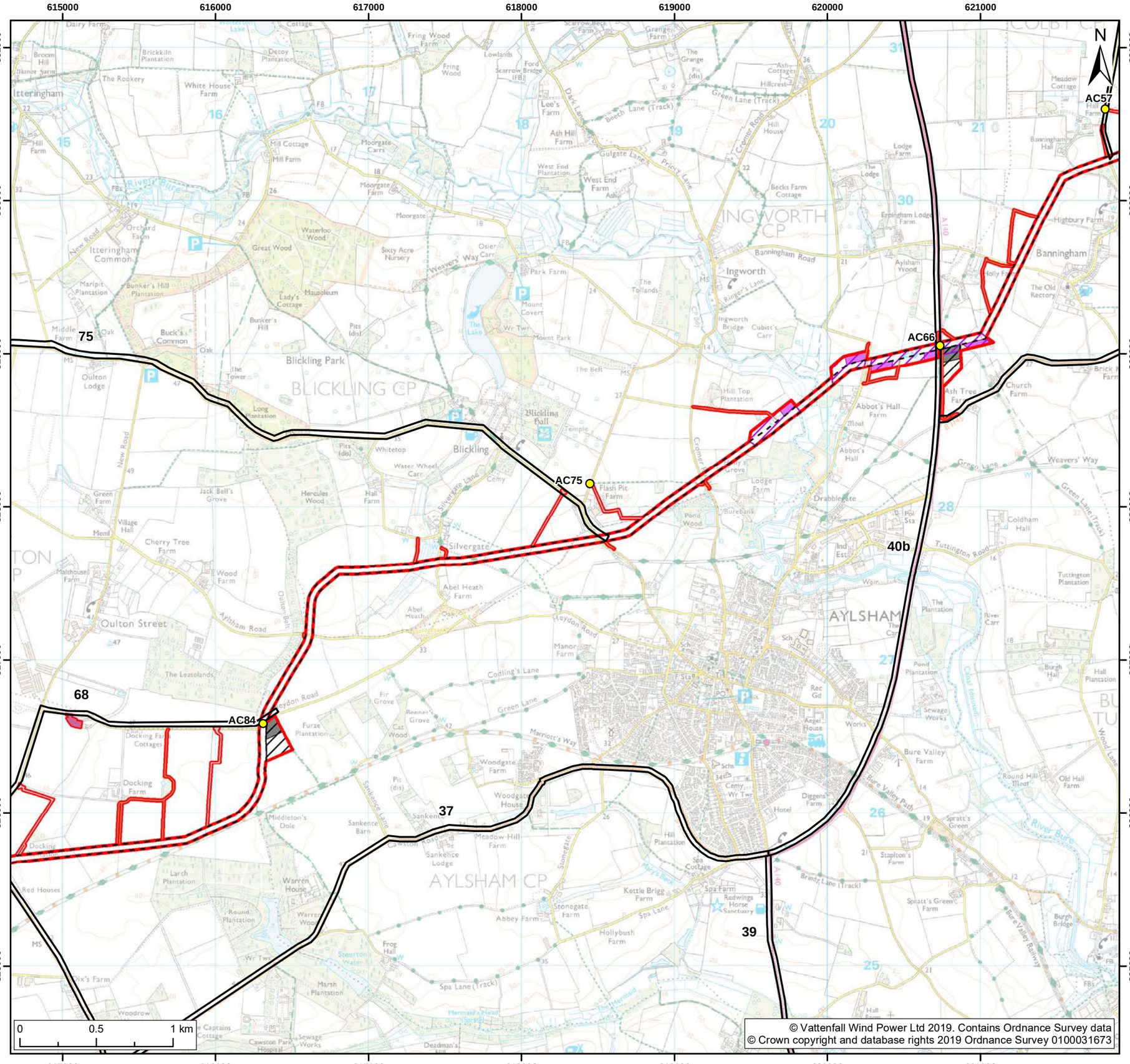

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 4 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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05	15/05/2019	JT	CD	A3	1:25,000

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

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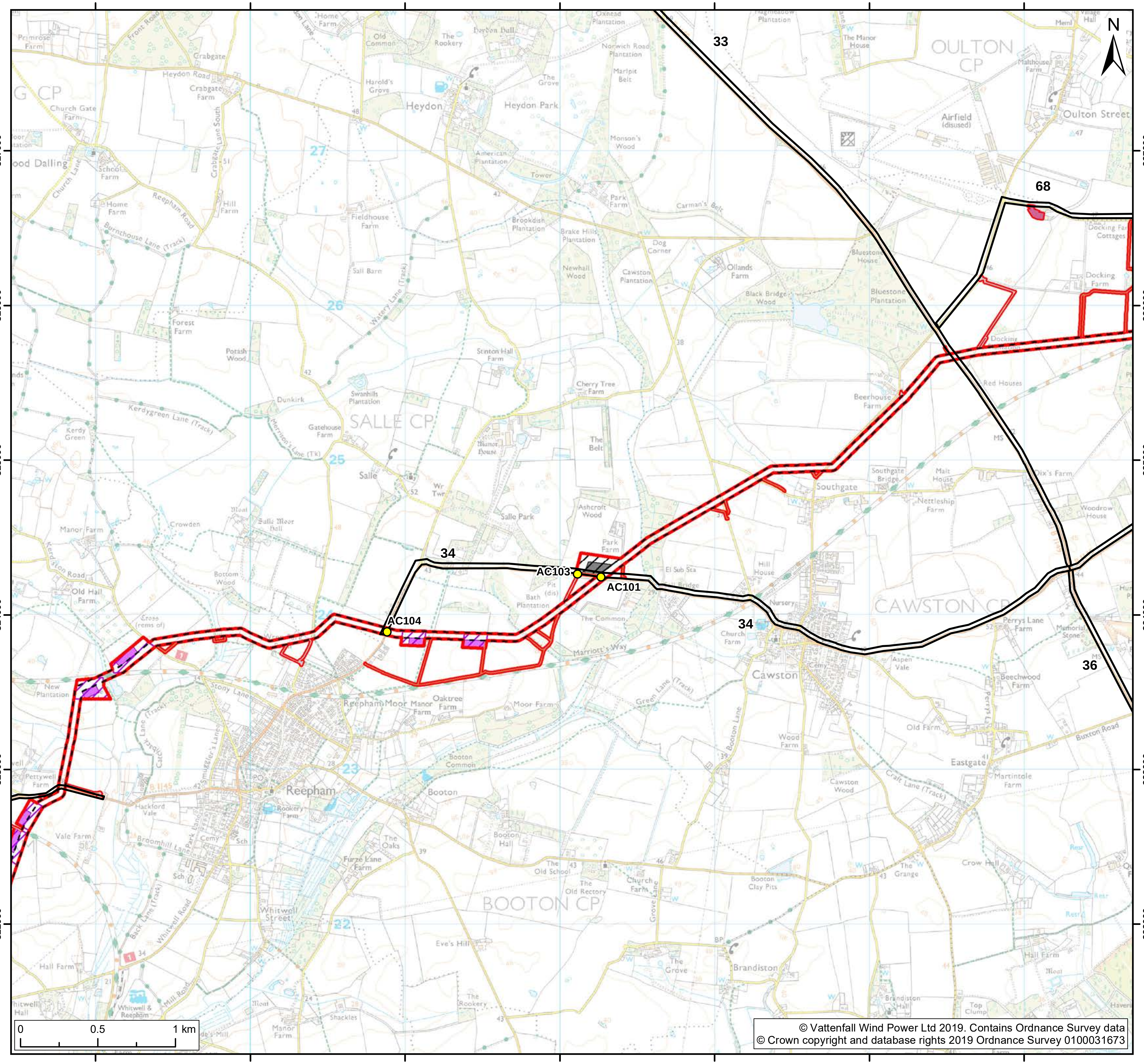

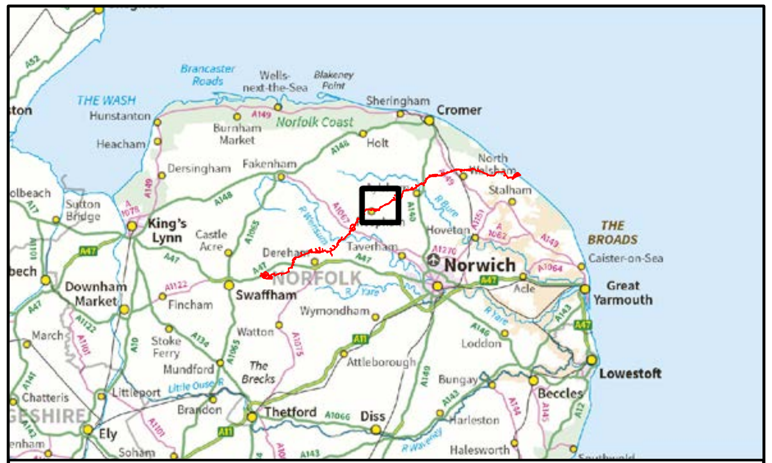

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 5 of 9)

Figure: 6 Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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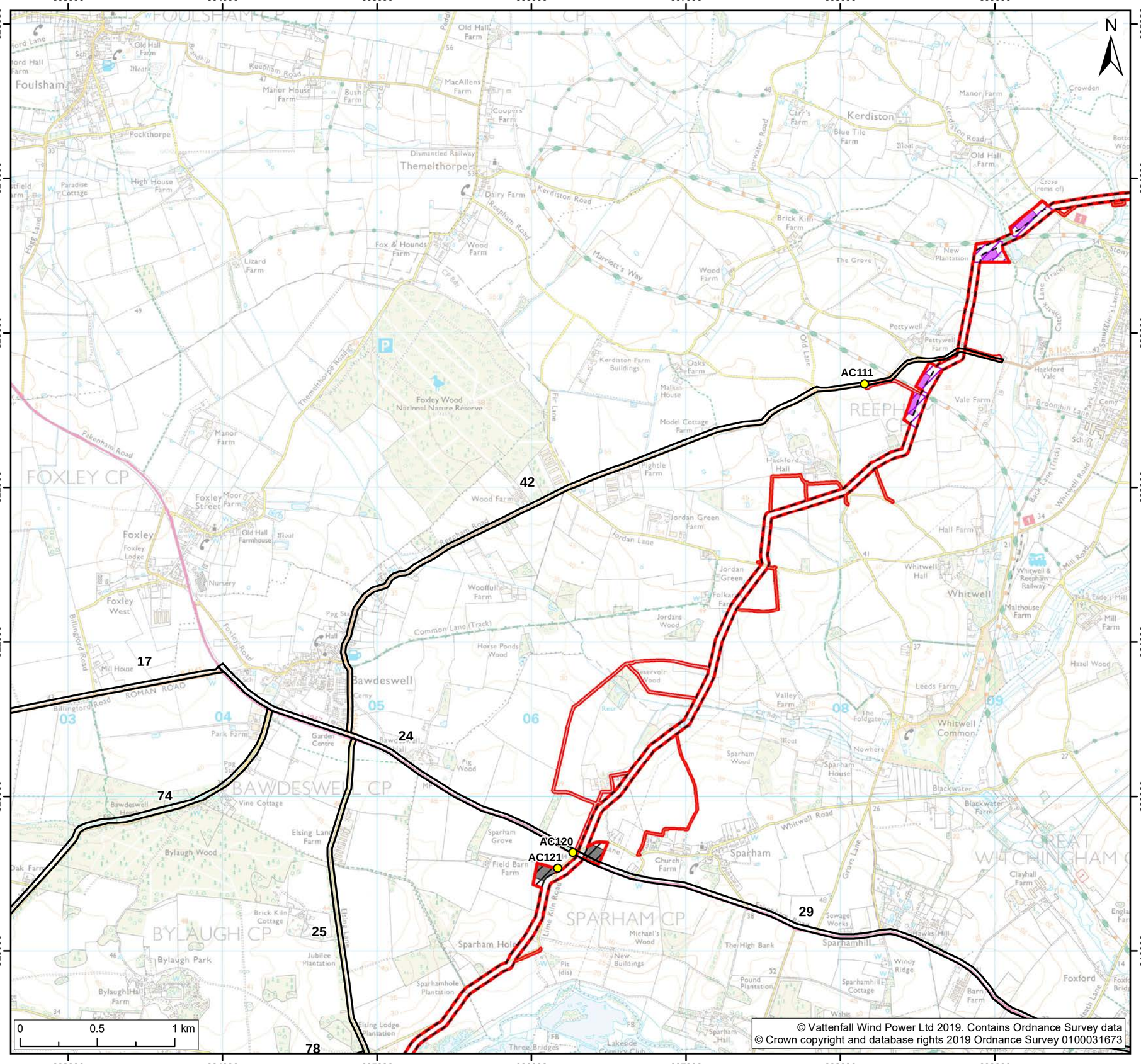

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 6 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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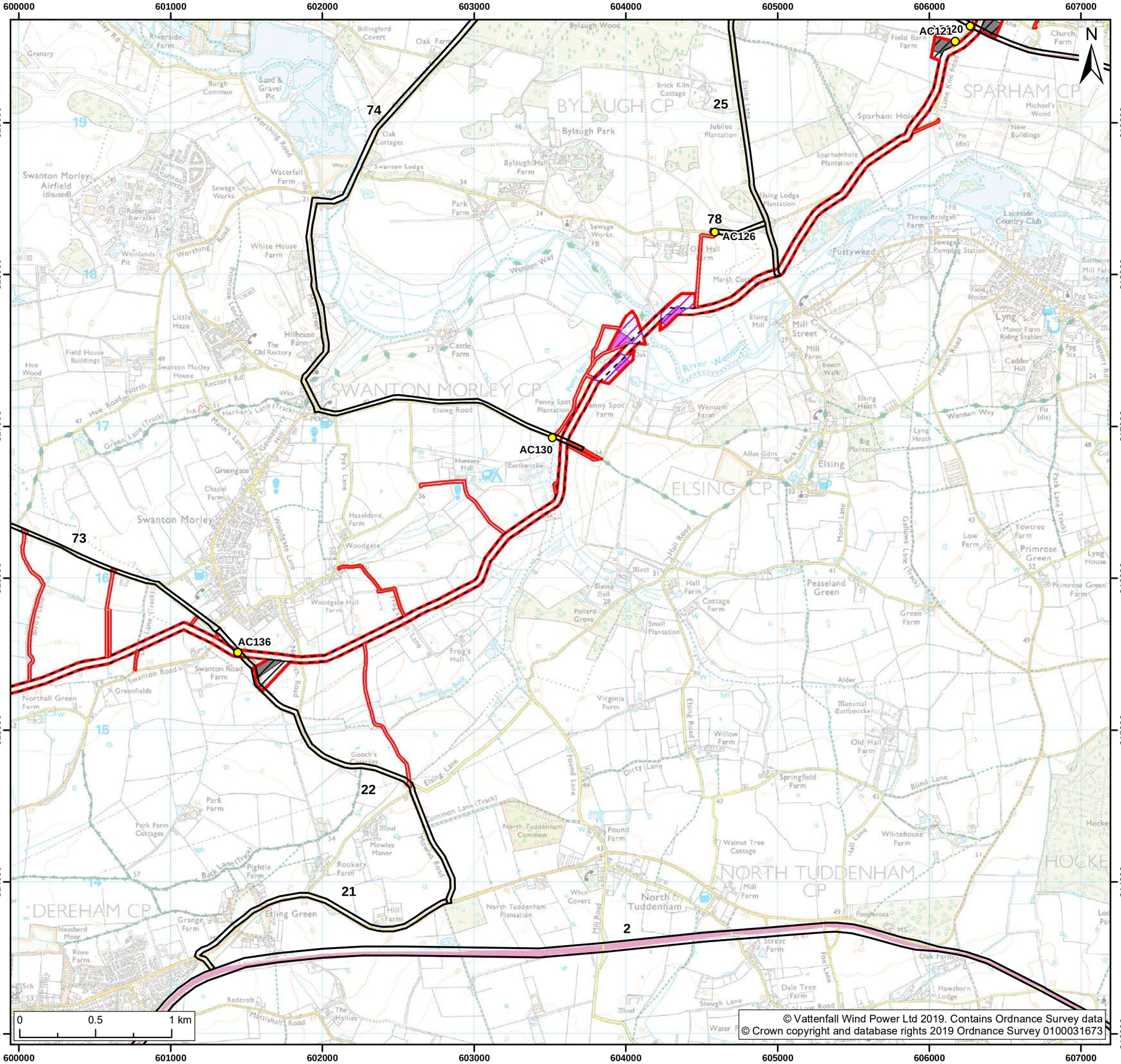

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 7 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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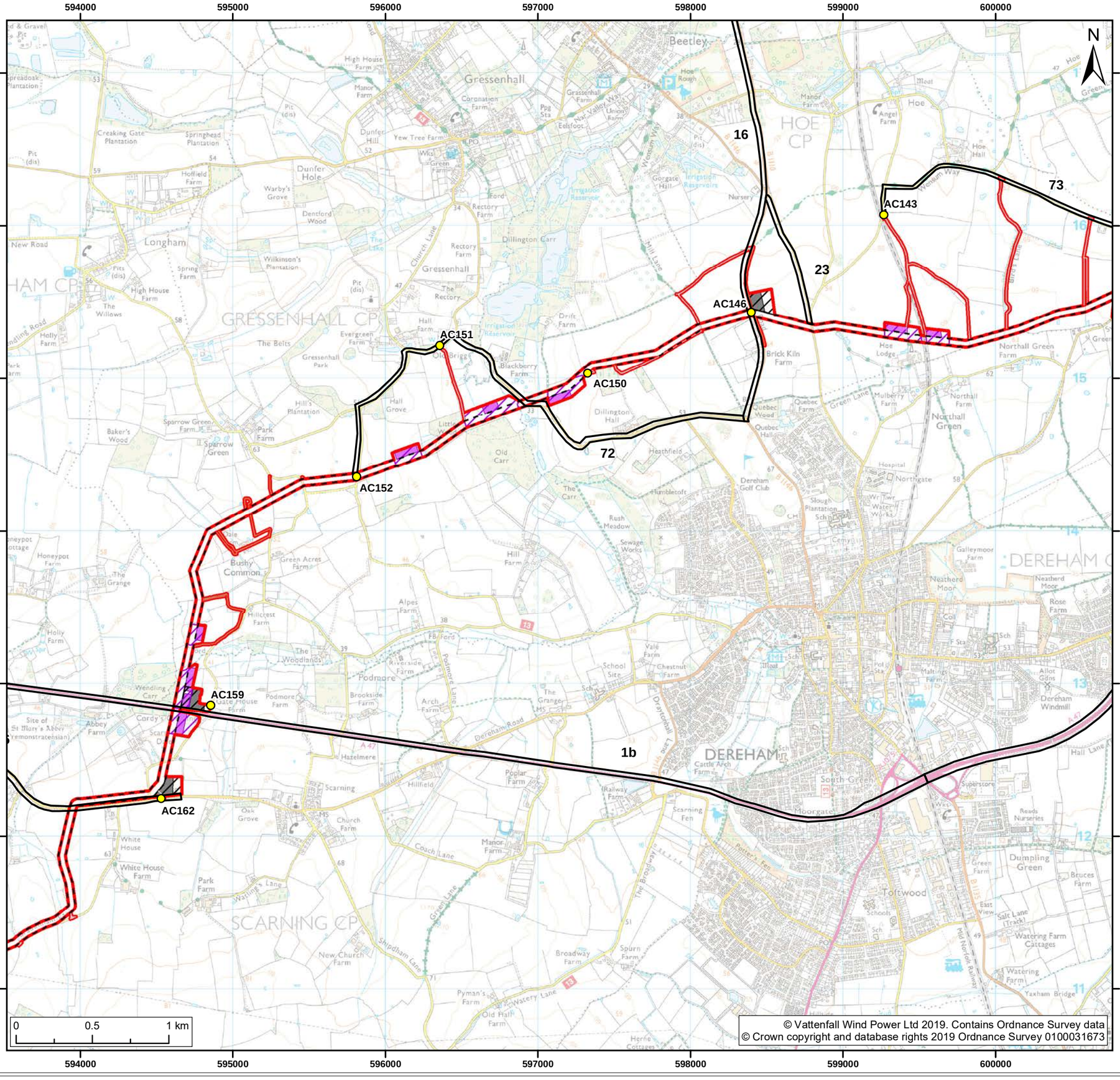

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 8 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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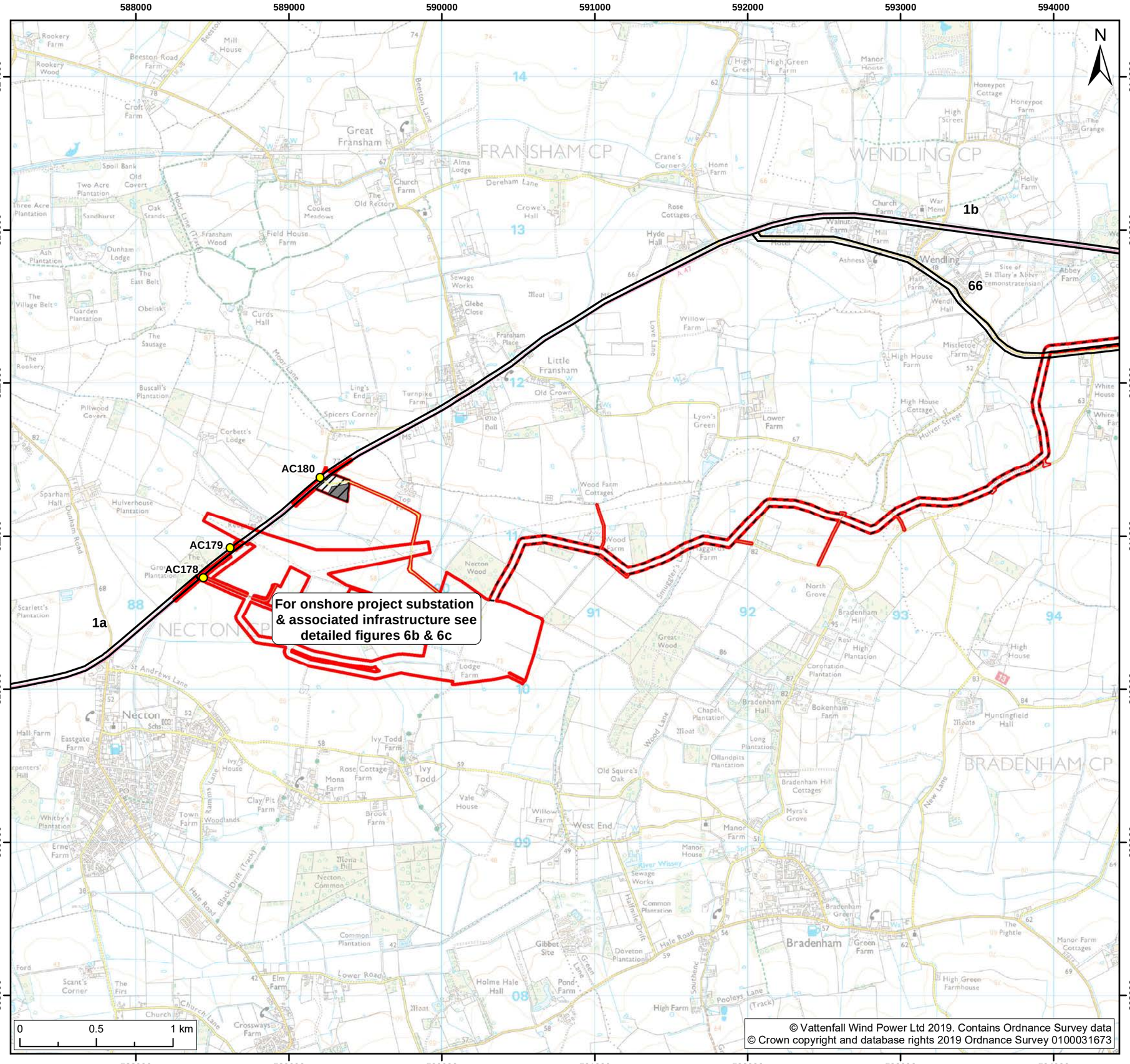

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access

Highway links

- Major highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2) (Map 9 of 9)

Figure: 6 | Drawing No: PB5640-007-009-006a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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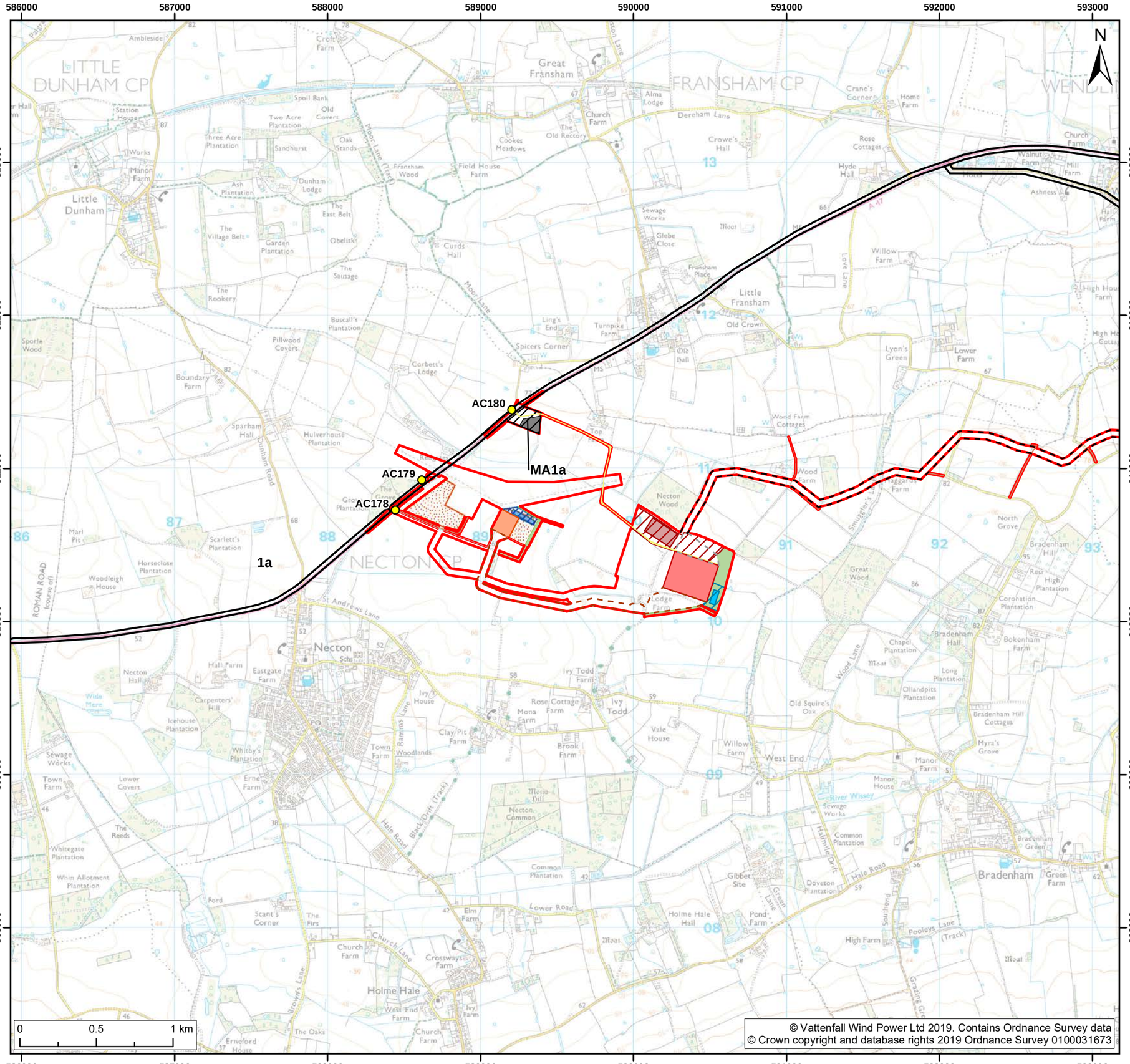

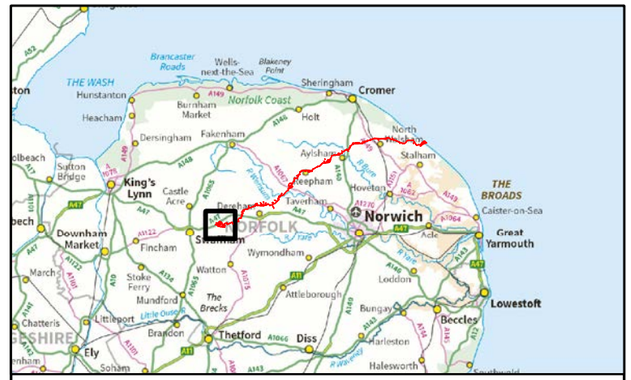

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond

Highway links

- Major highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2)

Figure: 6 | Drawing No: PB5640-007-009-006b

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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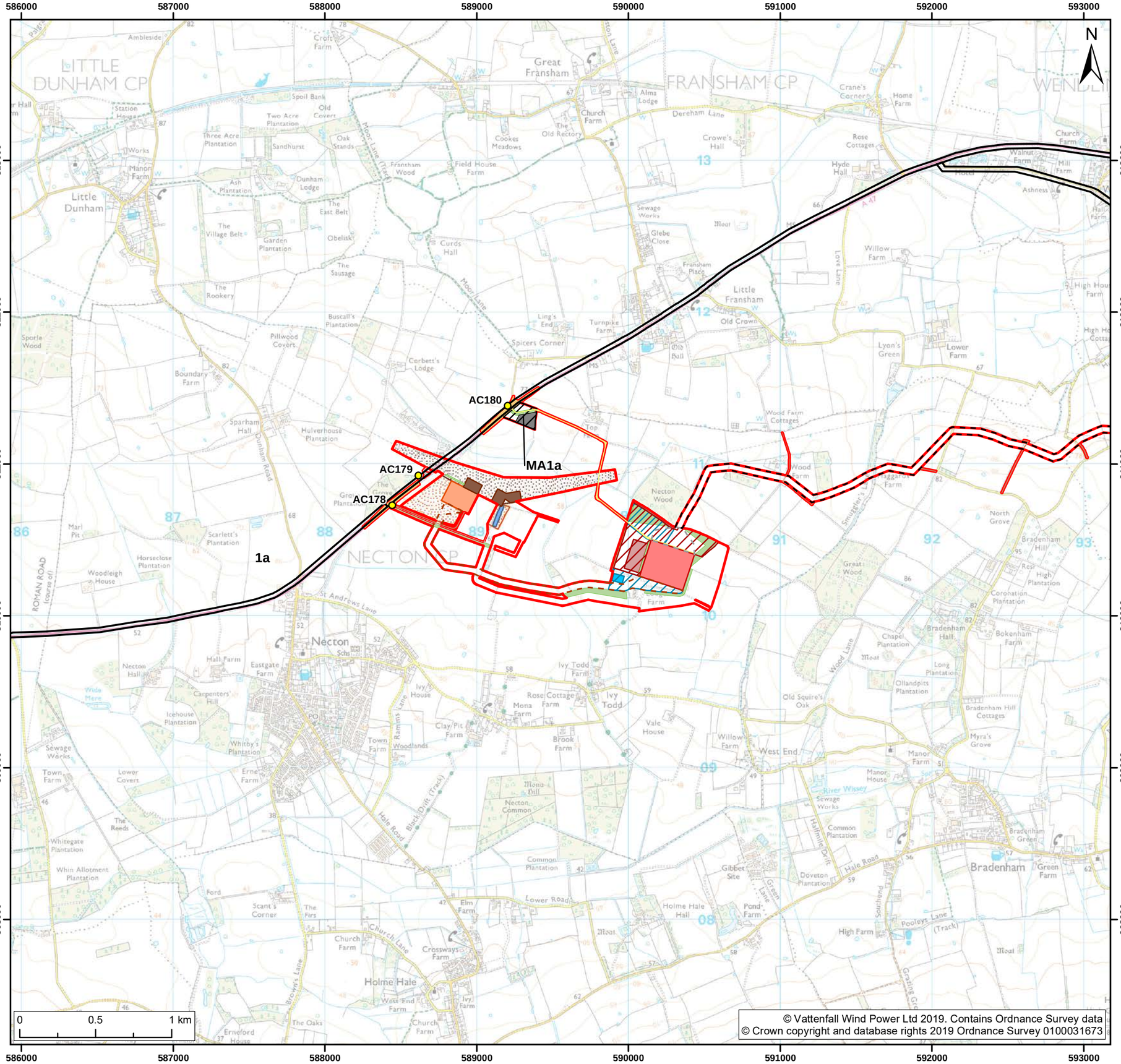

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower search area
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond

Highway links

- Major highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Highways Links – Scenario 1 (Stage 1) and Scenario 2 (Stage 2)

Figure: 6 | Drawing No: PB5640-007-009-006c

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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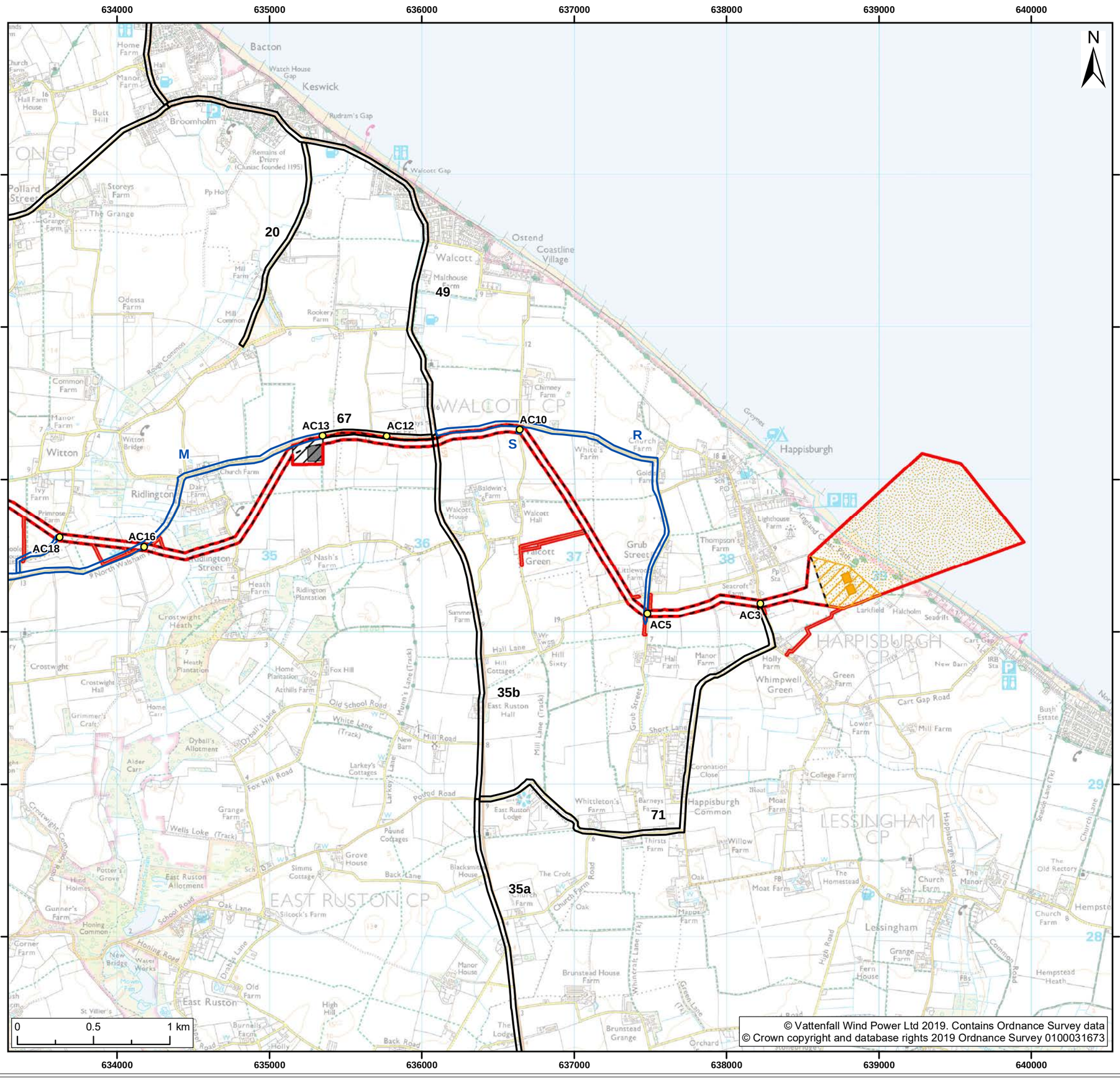

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Landfall zone
- Landfall compound zone
- Indicative landfall compound
- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 1 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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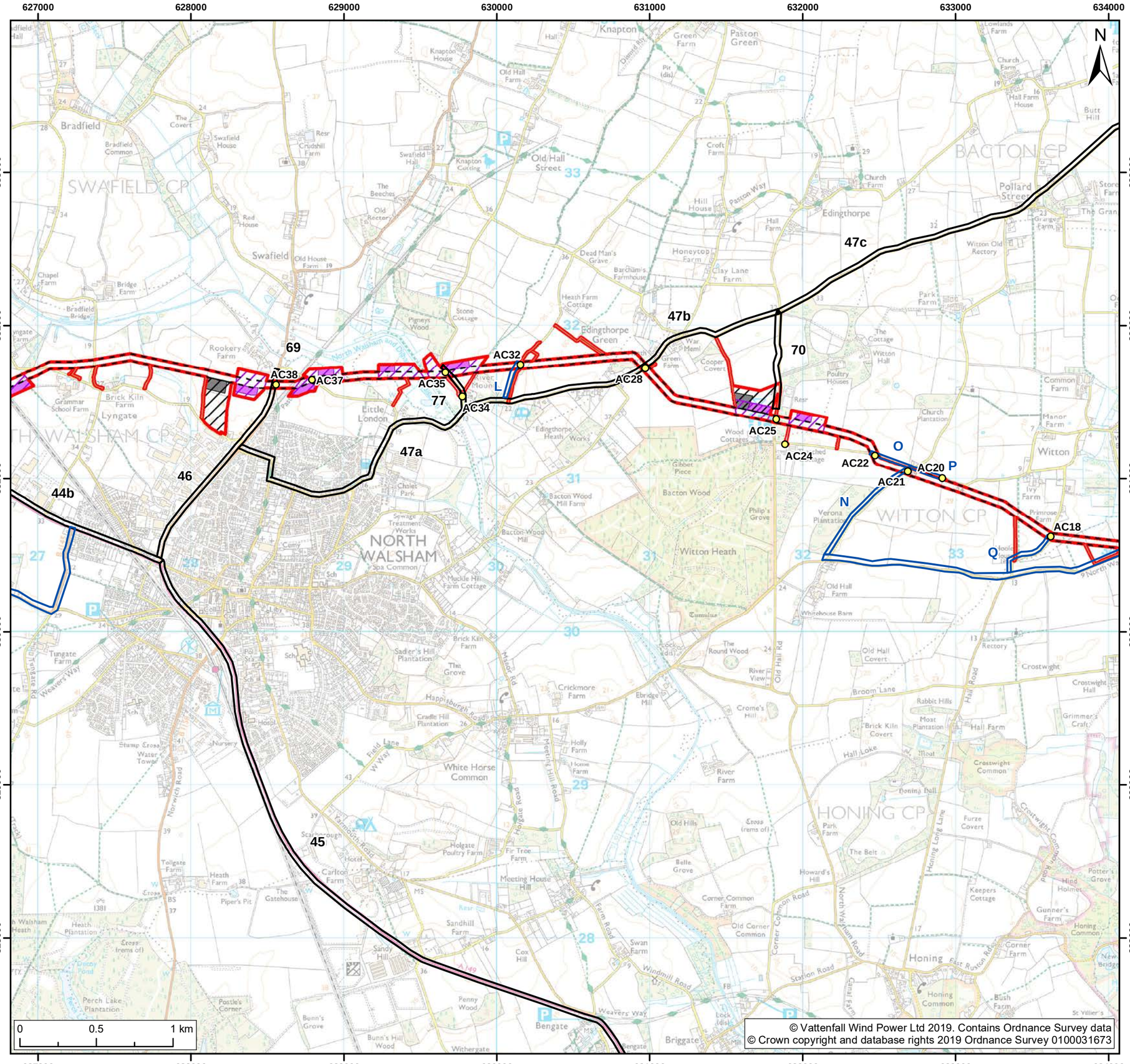

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 2 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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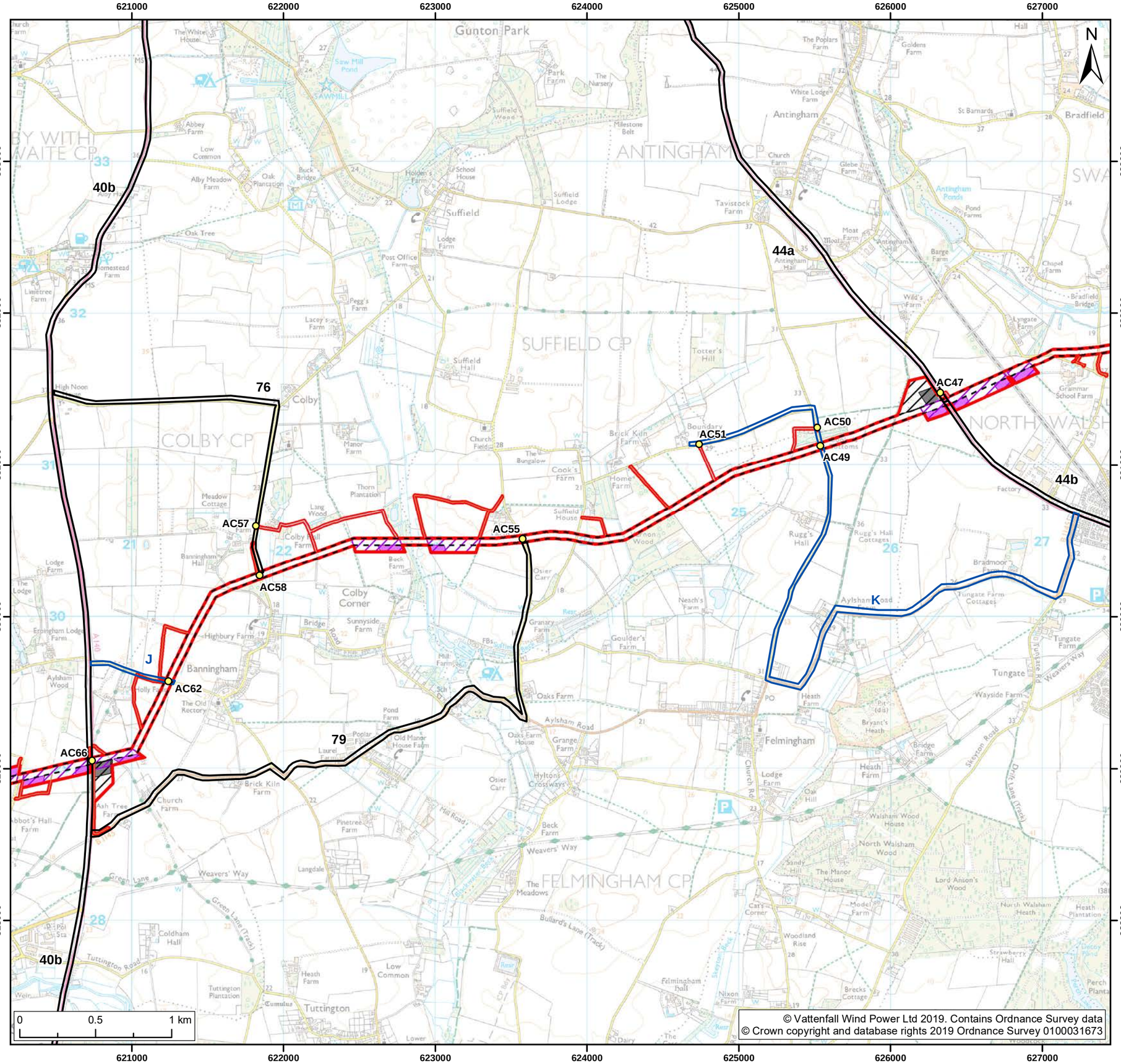

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 3 of 9)

Figure:	Drawing No:
7	PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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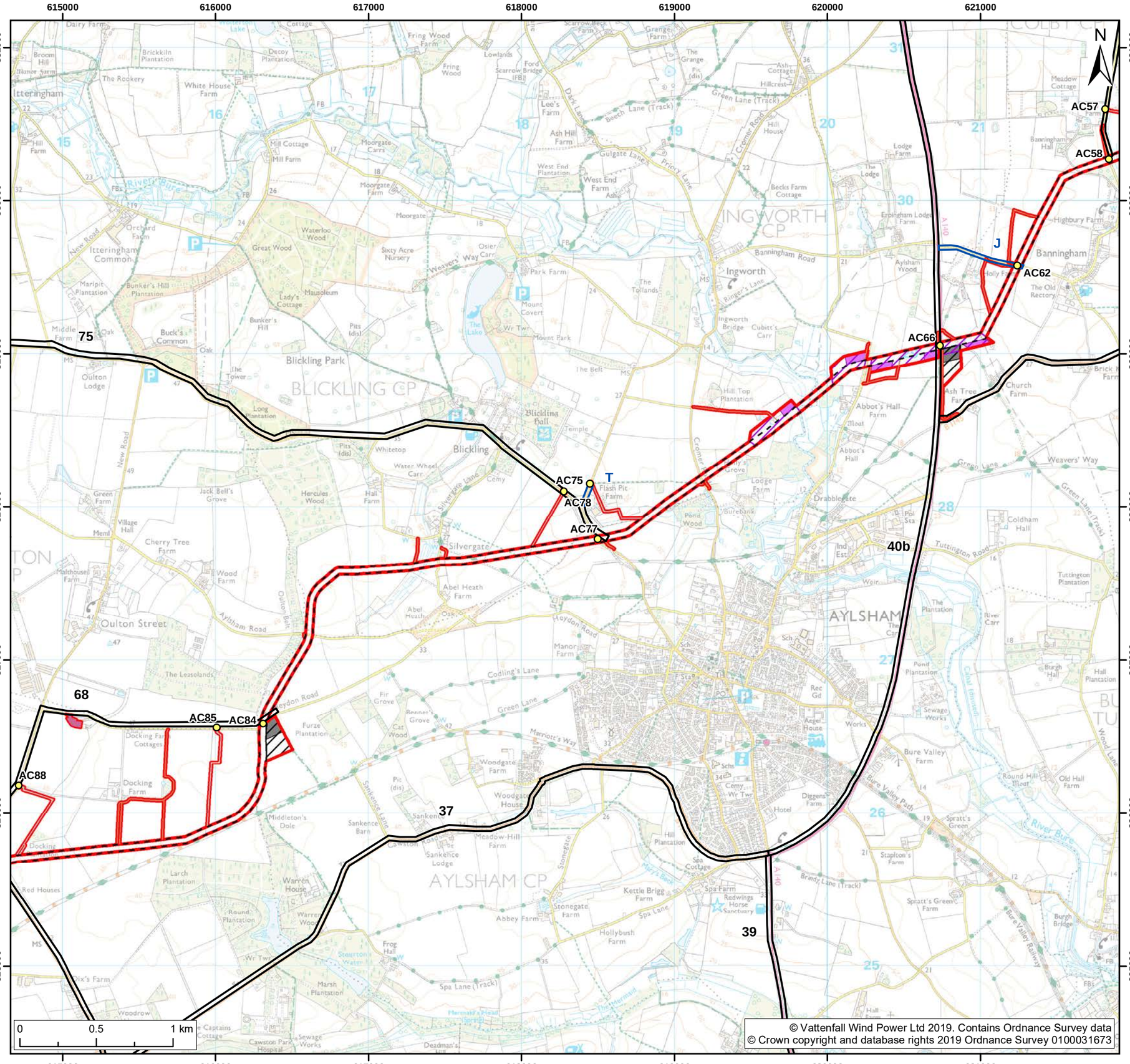

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 4 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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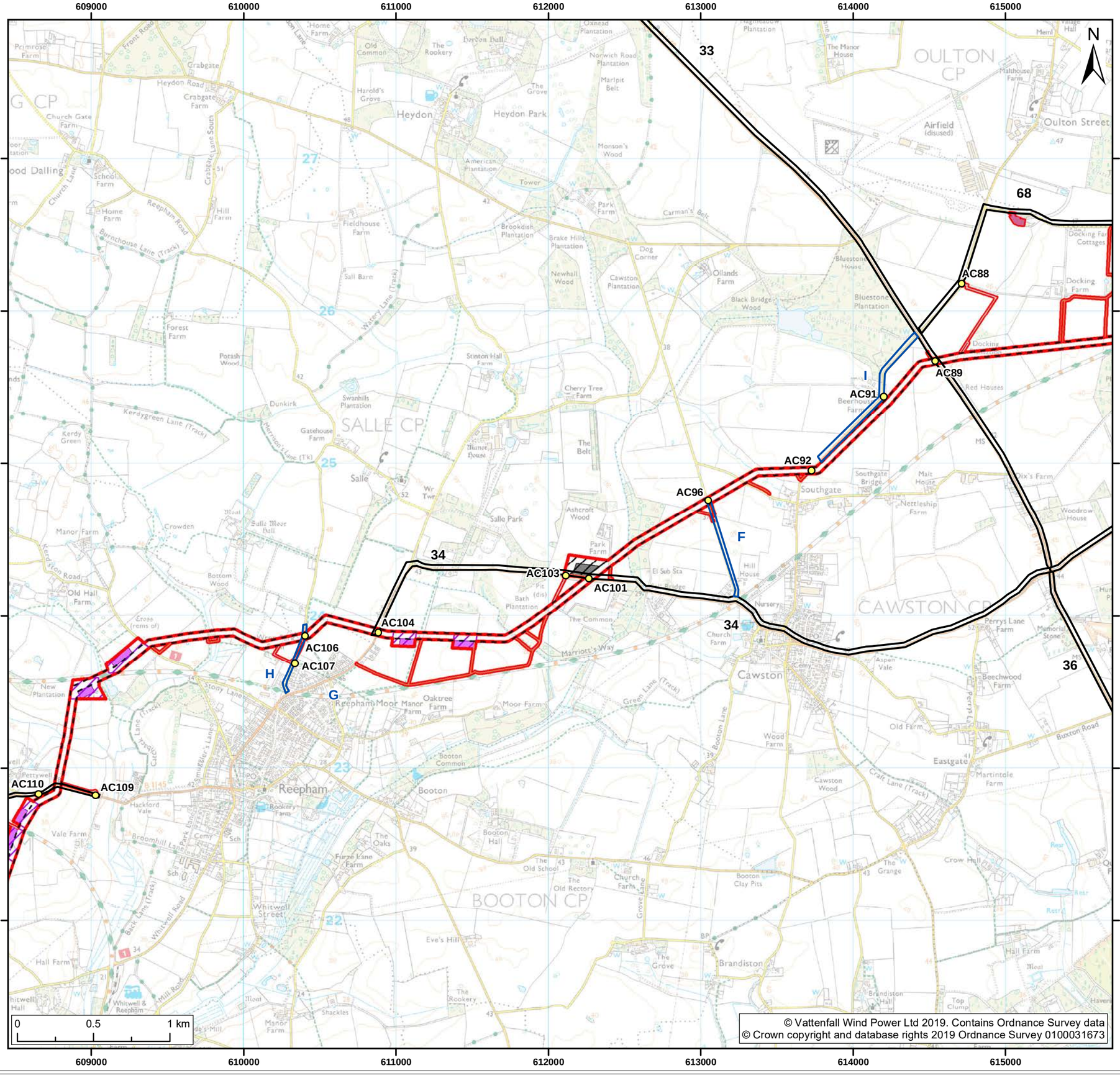

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 5 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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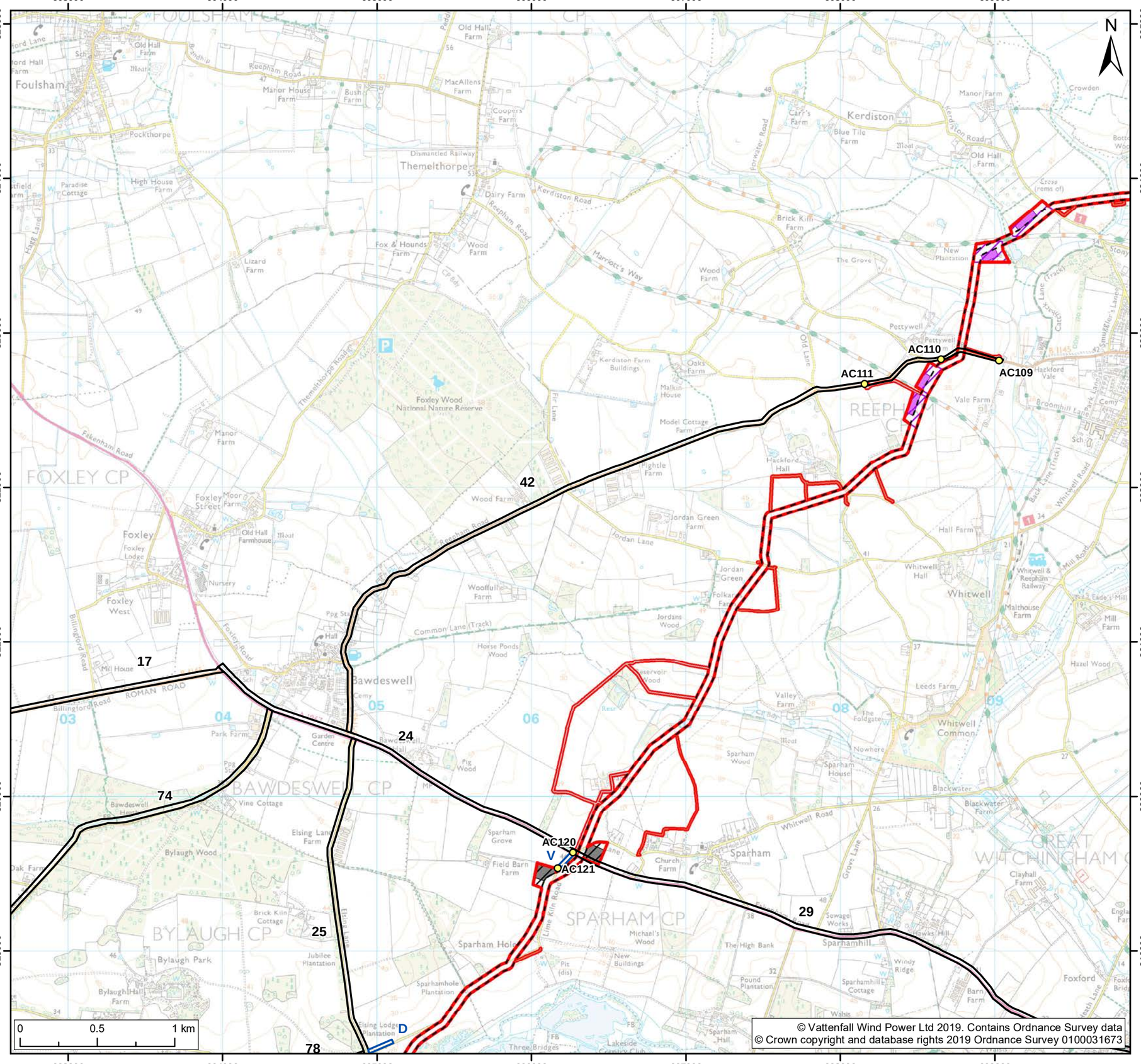

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 6 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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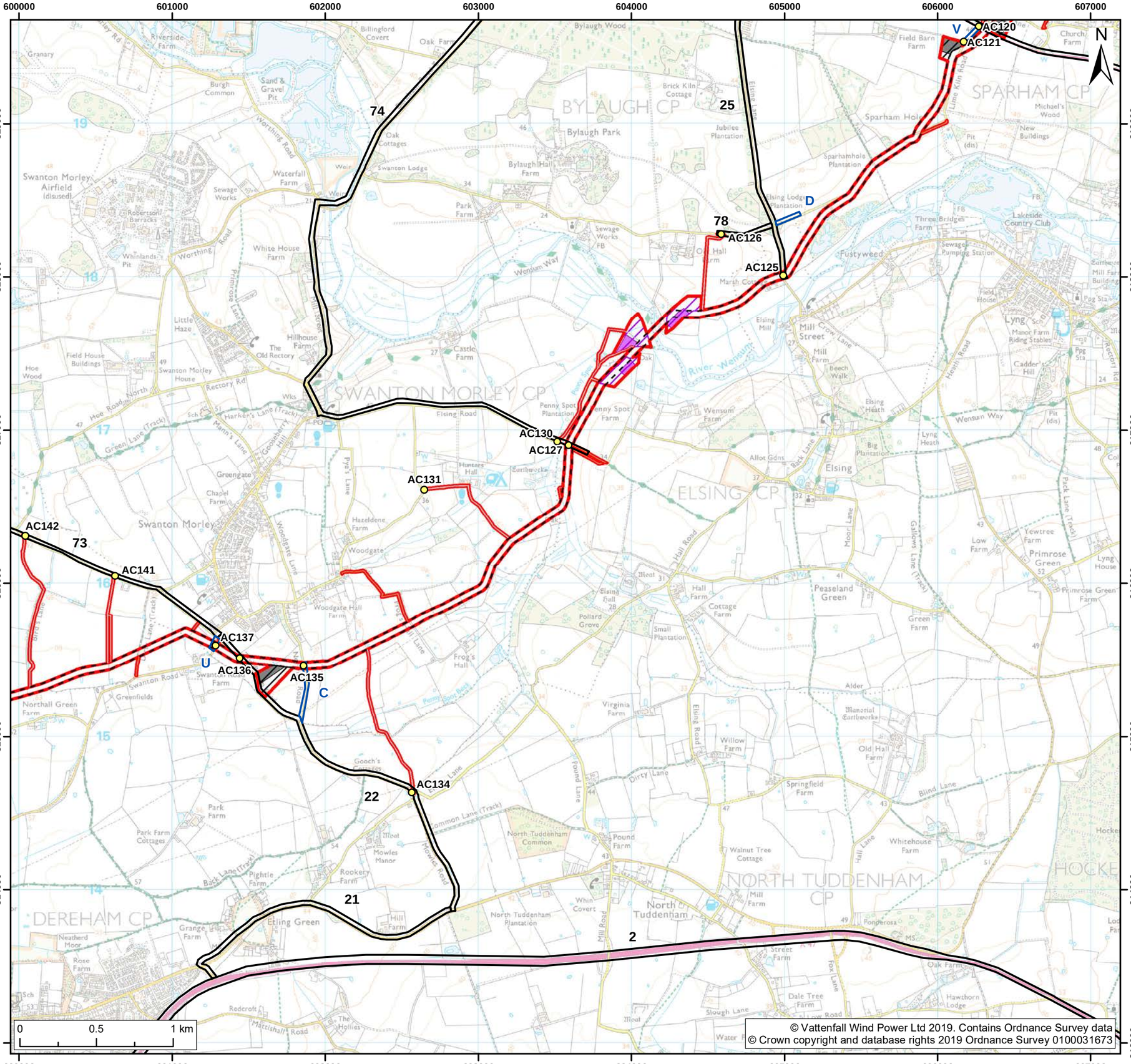

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 7 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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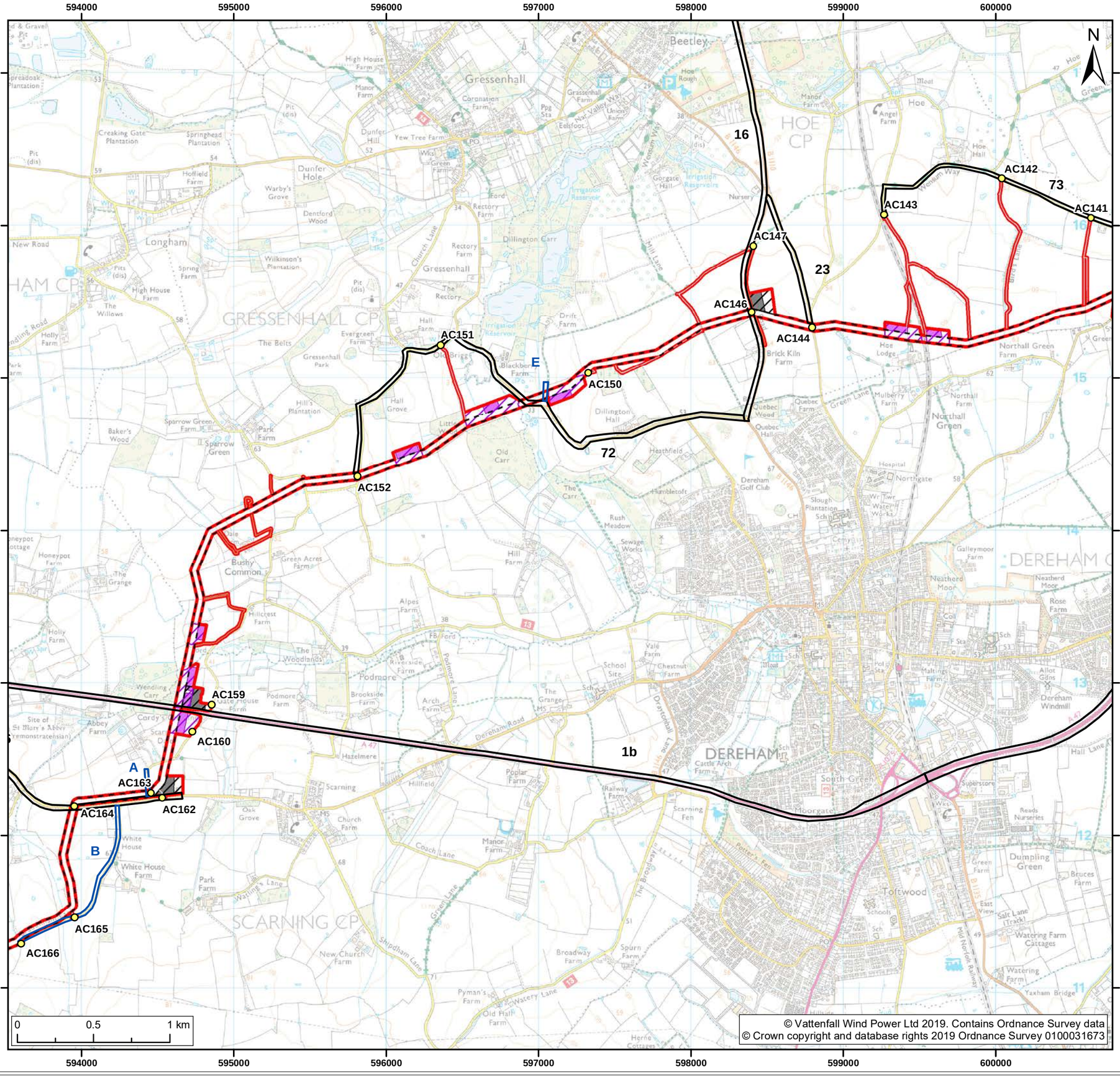

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 8 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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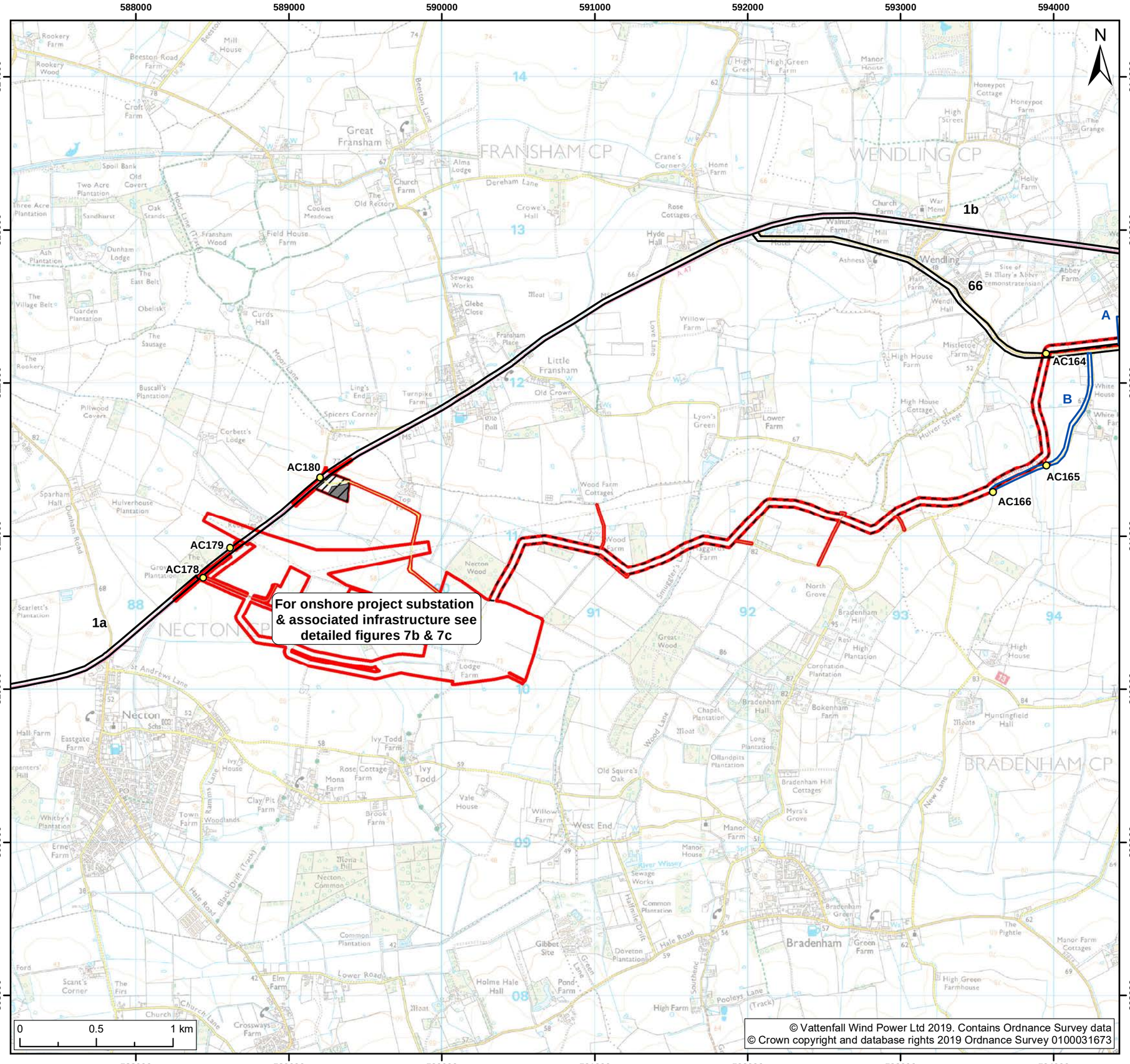

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access

Highway links

- Major highway links
- Minor highway links
- Access point ID

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3) (Map 9 of 9)

Figure: 7 | Drawing No: PB5640-007-009-007a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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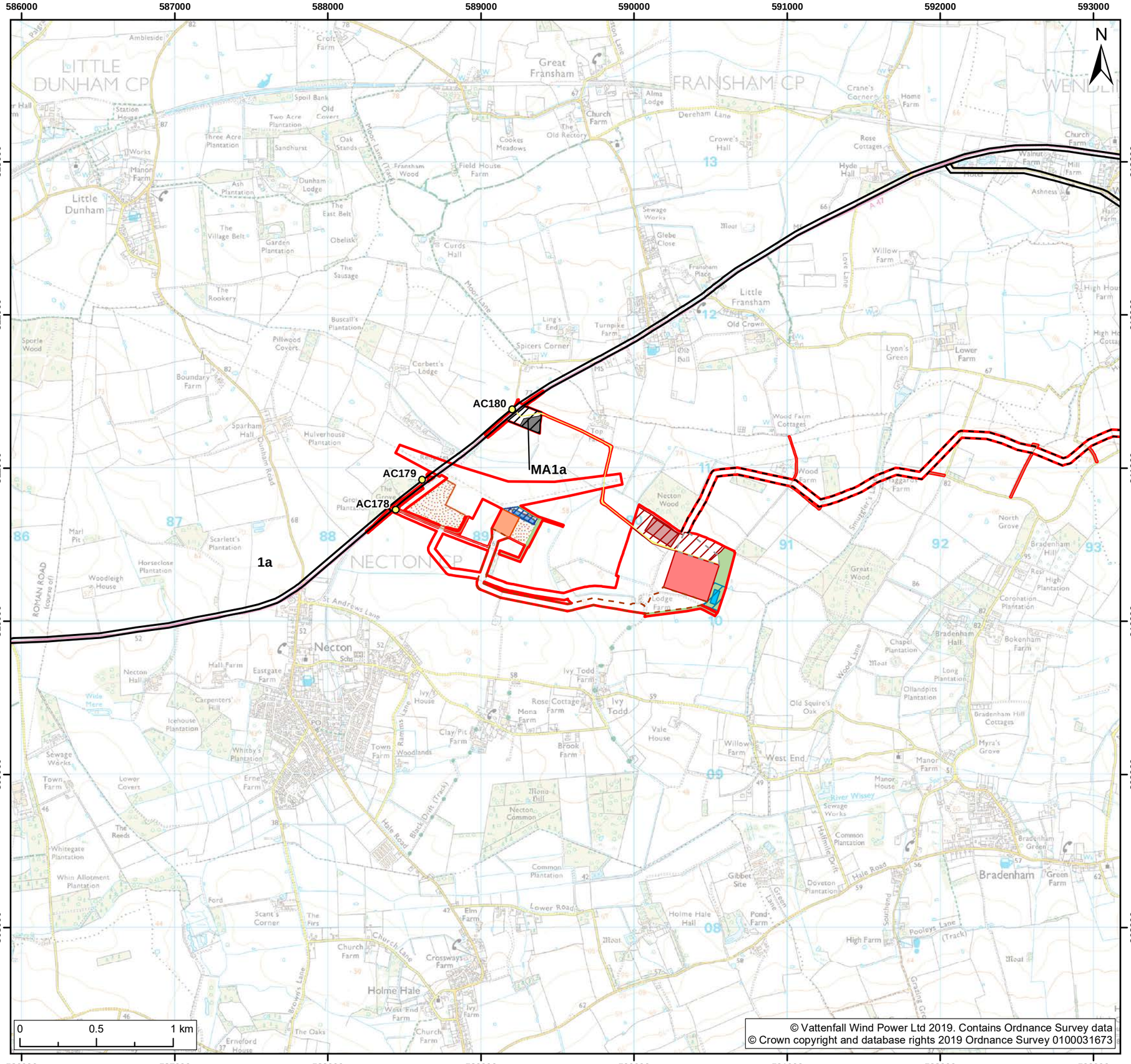

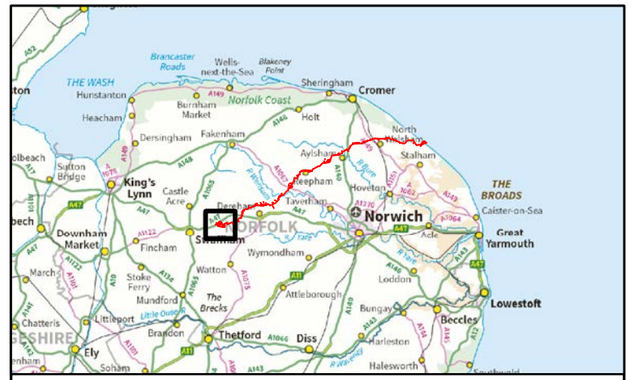

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond

Highway links

- Major highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3)

Figure: 7 | Drawing No: PB5640-007-009-007b

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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03	13/05/2019	JT	CD	A3	1:25,000

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

VATTENFALL

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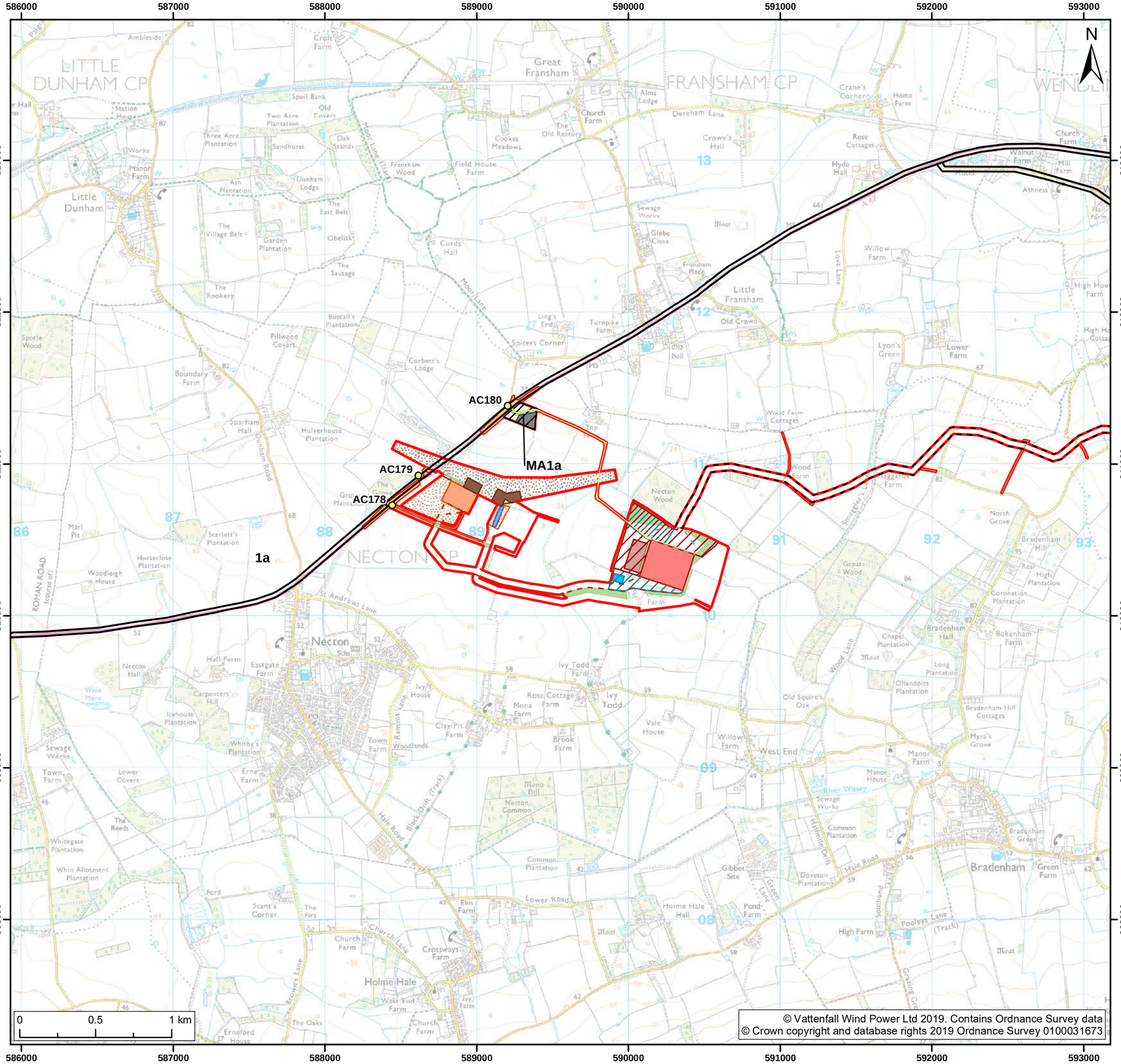

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower search area
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond

Highway links

- Major highway links
- Access point ID

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Highways Links – Scenario 1 (Stage 2) and Scenario 2 (Stage 3)

Figure: 7 | Drawing No: PB5640-007-009-007c

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
04	15/05/2019	JT	CD	A3	1:25,000
03	13/05/2019	JT	CD	A3	1:25,000

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

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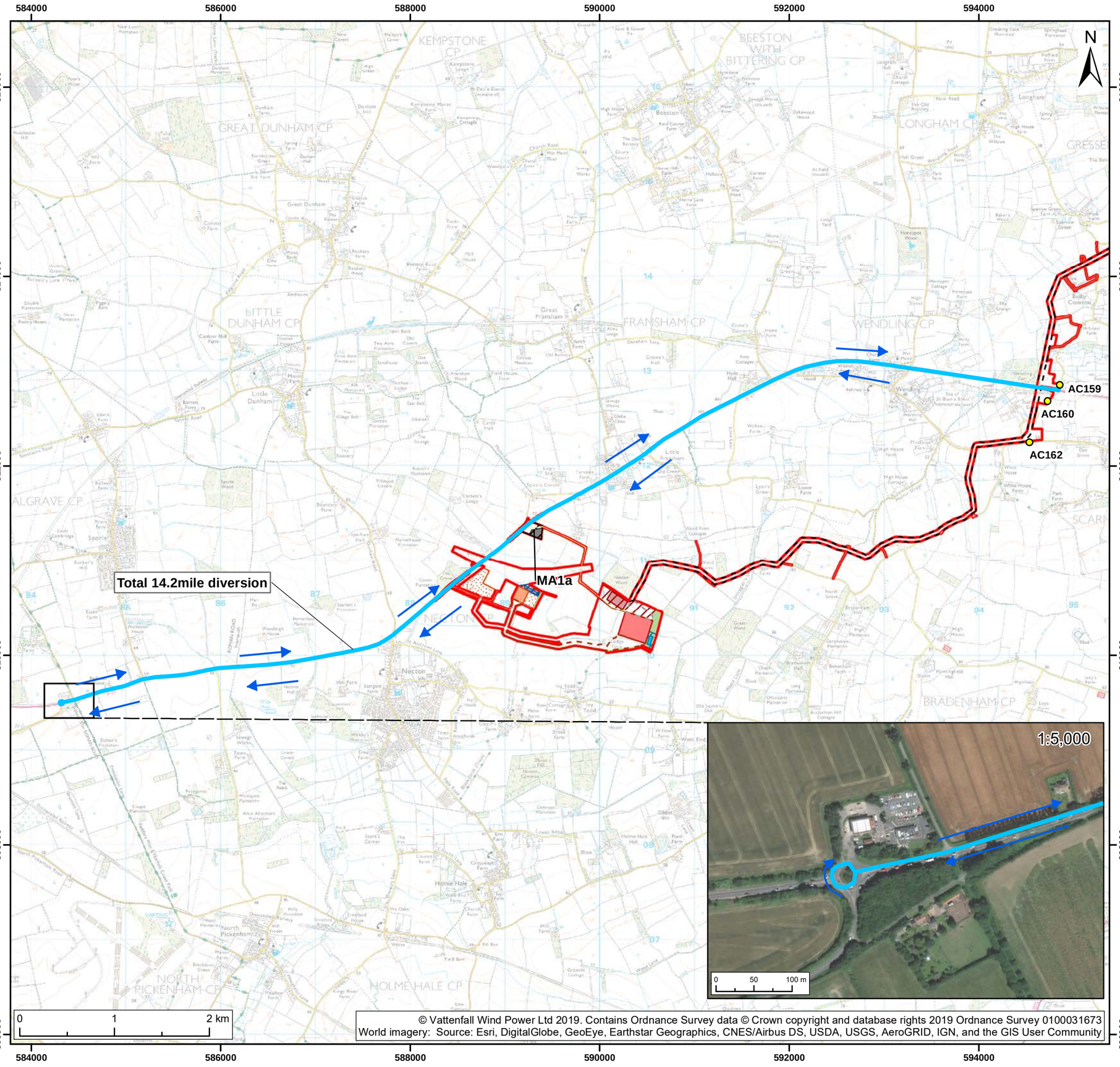

Legend:

- Norfolk Boreas red line boundary
- **Norfolk Boreas Onshore Project Infrastructure (Scenario 1)**
- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel

Project: Norfolk Boreas	Report: Outline Traffic Management Plan

Title: Diversion utilising the 'McDonalds Roundabout' u-turn route (AC159) (Scenario 1)

Figure: 8a | Drawing No: PB5640-007-009-008a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	15/05/2019	JT	CD	A3	1:40,000
02	08/05/2019	JT	CD	A3	1:40,000

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

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Royal HaskoningDHV
Enhancing Society Together

584000 586000 588000 590000 592000 594000

316000 314000 312000 310000 308000 306000

N

TC1
TC2
TC2
AC159
TC1
AC160
MA2
AC162
MA1a
Total 14.2mile diversion

1:5,000
0 50 100 m

0 1 2 km

Legend:

- Norfolk Boreas red line boundary
- **Norfolk Boreas Onshore Project Infrastructure (Scenario 2)**
- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower search area
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Diversion utilising the 'McDonalds Roundabout' u-turn route (AC159) (Scenario 2)

Figure: 8b | Drawing No: PB5640-007-009-008b

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	15/05/2019	JT	CD	A3	1:40,000
02	08/05/2019	JT	CD	A3	1:40,000

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

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

595000 596000 597000 598000 599000 600000

315000 314000 313000 312000 311000 310000

TC3a/b TC3a TC3a/b

TC2 TC2 TC1 MA2 AC159 TC1 AC160 MA1b AC162

Total 5.8 mile diversion

1:10,000

0 100 200 m

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Diversion utilising Dereham u-turn route (AC159)

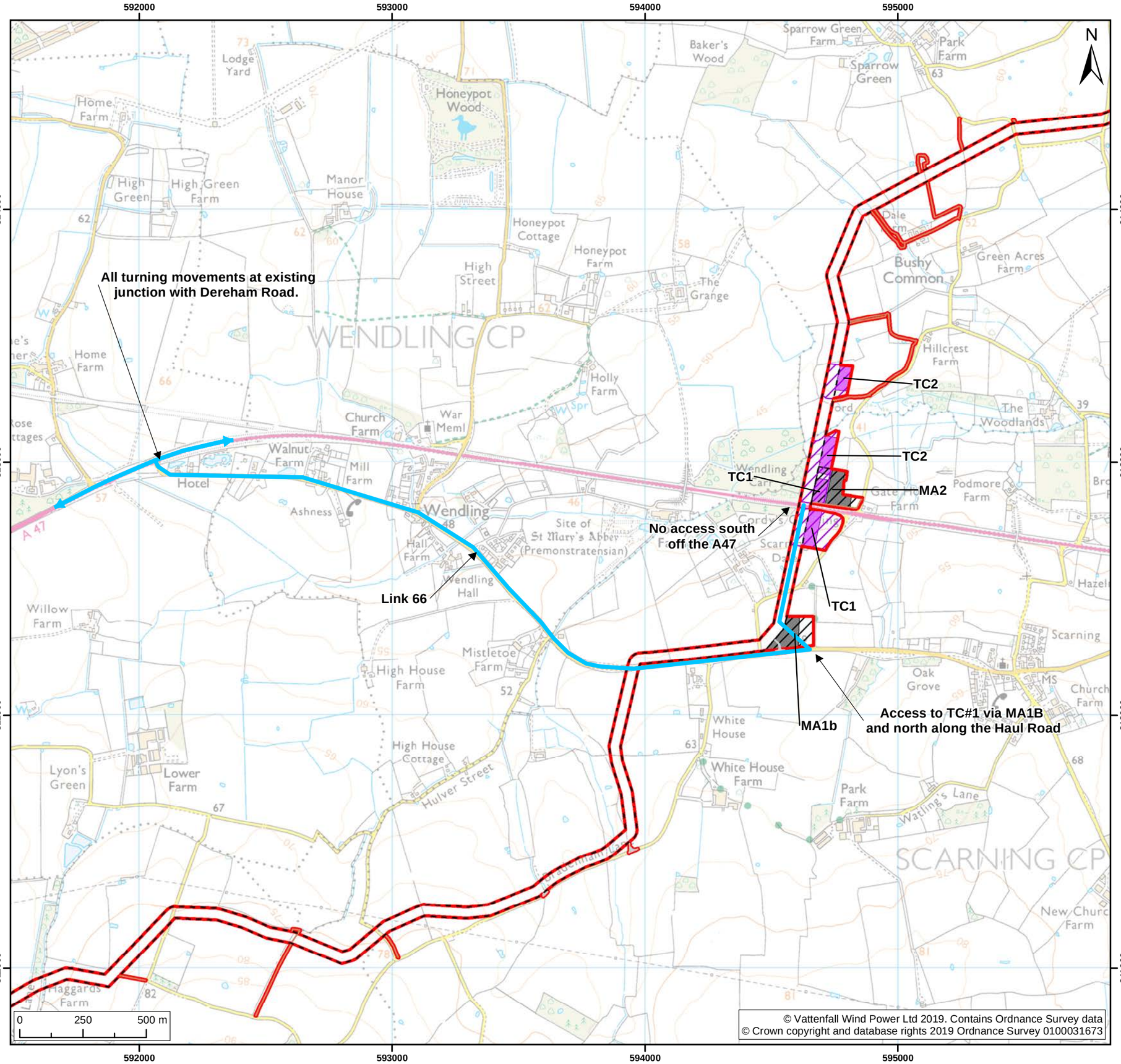
Figure: 9 | Drawing No: PB5640-007-009-009

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	08/05/2019	JT	CD	A3	1:20,000
01	25/04/2019	JT	CD	A3	1:10,000

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

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together



Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access
- TC1 south construction vehicle access route

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Construction vehicle access route to TC1 south (AC162)

Figure: 10 | Drawing No: PB5640-007-009-010

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	08/05/2019	JT	CD	A3	1:15,000
01	25/04/2019	JT	CD	A3	1:15,000

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

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

584000 586000 588000 590000

312000 310000 308000

All incoming HGVs destined for Access D1 to hold at layby. Driver to communicate to Access D1 to confirm that it is clear to proceed to the access for unopposed access

1:5,000

0 50 100 m

Total 5.6 mile diversion

AC179

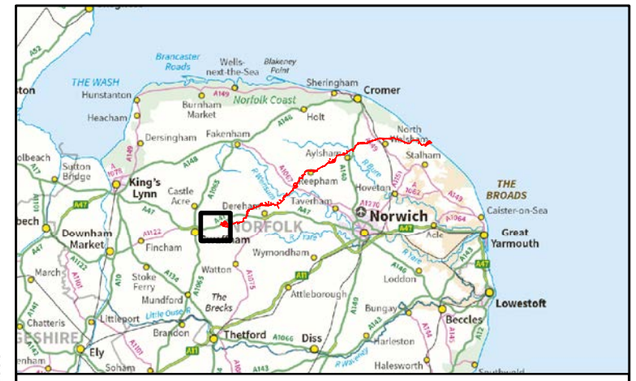
AC178

MA1a

1:5,000

0 50 100 m

0 0.5 1 km



Legend:

- Norfolk Boreas red line boundary
- **Norfolk Boreas Onshore Project Infrastructure (Scenario 1)**
- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Diversion utilising the 'McDonalds Roundabout' u-turn route (AC178 & AC179)

Figure: 11a | Drawing No: PB5640-007-009-011a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	08/05/2019	JT	CD	A3	1:25,000
02	02/05/2019	JT	CD	A3	1:25,000

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

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

584000 586000 588000 590000

312000 310000 308000

All incoming HGVs destined for Access D1 to hold at layby. Driver to communicate to Access D1 to confirm that it is clear to proceed to the access for unopposed access

1:5,000

0 50 100 m

Total 5.6 mile diversion

MA1a

AC179

AC178

1:5,000

0 50 100 m

N

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower search area
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Diversion utilising the 'McDonalds Roundabout' u-turn route (AC178 & AC179)

Figure: 11b | Drawing No: PB5640-007-009-011b

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	08/05/2019	JT	CD	A3	1:25,000
02	02/05/2019	JT	CD	A3	1:25,000

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

VATTENFALL

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588000 590000 592000 594000 596000 598000 600000

316000 314000 312000 310000 308000 306000

N

Total 15 mile diversion

AC178

MA1a

1:10,000

0 100 200 m

0 1 2 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title:

Diversion utilising Dereham u-turn route (AC178) (Scenario 1)

Figure: 12a | Drawing No: PB5640-007-009-012a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
04	15/05/2019	JT	CD	A3	1:45,000
03	08/05/2019	JT	CD	A3	1:45,000

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

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

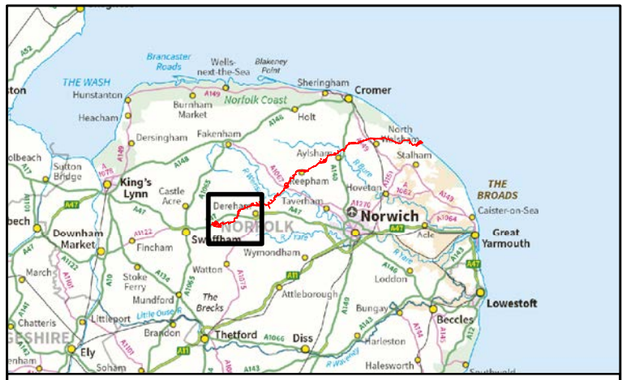
588000 590000 592000 594000 596000 598000 600000

316000 314000 312000 310000 308000 306000

N

Total 15 mile diversion

TC1
TC2
TC2
TC3a
TC3a/b
TC3a/b
MA3
TC4
TC4
MA2
TC1
AC179
AC178
MA1a

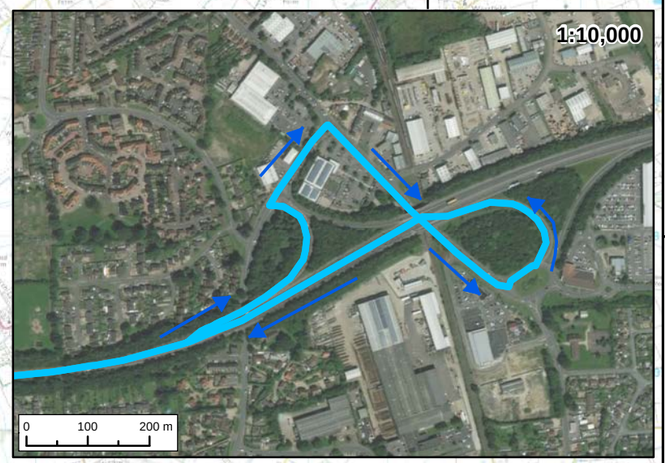


Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower search area
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond
- Construction vehicle u-turn route
- Access Point ID
- Direction of travel



0 1 2 km

Project:	Report:
Norfolk Boreas	Outline Traffic Management Plan

Title: Diversion utilising Dereham u-turn route (AC178 & AC179) (Scenario 2)

Figure: 12b | Drawing No: PB5640-007-009-012b

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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03	08/05/2019	JT	CD	A3	1:45,000

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

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8 APPENDIX 1 SCENARIO 1 HGV DISTRIBUTION

Link ID	Link description	Norfolk Boreas Scenario 1 Construction Vehicle Movements	
		All Vehicles	HGVs
1a	A47	124	100
1b	A47	172	100
2	A47	181	70
3	A47	121	70
4	A47	81	70
5	A47	290	281
6	A47	284	281
7	A47	83	70
8	A146	77	70
9	A47	326	323
10	A47	324	323
11	A1065	10	0
12	A1065	5	0
13a	A148	336	323
13b	A148	215	206
14	A148	150	138
15	B1145 – Litcham	3	0
16	B1110/B1146 - Holt Road	91	64
17	B1145 - Billingford Road	73	64
18	A1067	136	117
19	A148	335	323
20	Mill Common Road	0	0
21	B1147 - Etling Green	38	29
22	B1147 - Dereham Road	58	29
23	Northgate - from junction with B1146	104	64
24	A1067	211	167
25	Elsing Lane	50	30
26	A1074	31	0
27	A140	29	0
28	A140	29	0
29	A1067	164	117
30	A1067	147	117

Link ID	Link description	Norfolk Boreas Scenario 1 Construction Vehicle Movements	
		All Vehicles	HGVs
31	A1067	21	0
32	B1149 – Norwich road	103	92
33	B1149 - Holt Road	152	99
34	B1145 - west of Cawston	130	61
35a	B1159 - Coast Road	118	95
35b	B1159 - Coast Road	118	95
36	B1149 - Holt Road	114	92
37	B1145 - Cawston road	21	0
38	A140 - Cromer Road	66	0
39	A140 – Hevingham	128	46
40a	A140 – Roughton	93	92
40b	A140 – Roughton	287	197
41	B1436 – Felbrigg	145	138
42	B1145 - Reepham Road	80	40
43	Cromer Road - Ingworth	10	0
44a	A149	104	92
44b	A149	127	92
45	A149	76	66
46	B1145 - Lyngate Road	110	67
47a	Bacton Road – North Walsham	24	0
47b	North Walsham Road - Edingthorpe Green	54	30
47c	North Walsham Road – Broomholm	37	30
48	B1159 - Bacton Road	0	0
49	B1159	33	30
50	A1151	14	0
51	A1151	15	0
52	A149 - Wayford Road	89	66
53	A149	281	281
54	A149	93	92
55	A149	93	92
56	A149	97	92
57	A149	97	92

Link ID	Link description	Norfolk Boreas Scenario 1 Construction Vehicle Movements	
		All Vehicles	HGVs
58	NNDR - Link a	237	231
59	NNDR - Link b	231	231
60	NNDR - Link c	117	117
61	B1436 - Roughton Road	20	0
62	A1042	35	0
63	A1151	5	0
64	A12	72	70
65	A47	323	323
66	Wendling – Dereham Road	109	69
67	North Walsham Road / Happisburgh Road	104	64
68	The Street / Heydon Road	105	65
69	Little London Road	81	*61
70	Plantation Road	50	30
71	Vicarage Road / Whimpwell Street	51	31
72	Dereham Road / Longham Road – Dillington	54	34
73	Hoe Road South	49	29
74	Mill Street, Elsing Road – Swanton Morley	50	30
75	B1354 – Blickling	110	70
76	High Noon Road / Church Road	51	31
77	Hall Lane – North Walsham	50	30
78	Bylaugh	50	30
79	B1145 / Suffield Road	75	31
A	Dale Road	54	34
B	Bradenham Lane	109	69
C	Norwich Road	49	29
D	Lime Kiln Road (west)	54	34
E	Mill Lane	54	34
F	Heydon Road	49	29
G	B1145 - Cawston road	52	32
H	Wood Dalling Road	52	32
I	Southgate (Road to Southgate from B1149)	49	29
J	Banningham Road	54	34

Link ID	Link description	Norfolk Boreas Scenario 1 Construction Vehicle Movements	
		All Vehicles	HGVs
K	Greens Road, B1145, Felmingham Road, Brick Kiln Lane	69	37
L	Paston Road	50	30
M	North Walsham Road / Happisburgh Road	53	33
N	Bacton Road	53	33
O	Edingthorpe Road	53	33
P	Edingthorpe	53	33
Q	Hole House Road	53	33
R	North Walsham Road, Grub Street	51	31
S	Walcott Green	51	31
T	Unnamed Road	54	34
U	Swanton Road	49	29
V	Lime Kiln Road	54	34
*	Proposed mitigation flows identified in the ES		

9 APPENDIX 2 SCENARIO 2 HGV DISTRIBUTION

Link ID	Link description	Norfolk Boreas Scenario 2 Construction Vehicle Movements	
		All Vehicles	HGVs
1a	A47	551	415
1b	A47	785	415
2	A47	691	291
3	A47	525	291
4	A47	369	291
5	A47	641	580
6	A47	604	580
7	A47	358	291
8	A146	322	291
9	A47	648	637
10	A47	640	637
11	A1065	72	0
12	A1065	38	0
13a	A148	683	595
13b	A148	434	*379
14	A148	444	369
15	B1145 – Litcham	15	0
16	B1110/B1146 - Holt Road	352	224
17	B1145 - Billingford Road	320	224
18	A1067	388	313
19	A148	678	637
20	Mill Common Road	0	0
21	B1147 - Etling Green	288	224
22	B1147 - Dereham Road	312	224
23	Northgate - from junction with B1146	4	0
24	A1067	578	407
25	Elsing Lane	92	72
26	A1074	118	0
27	A140	128	0
28	A140	152	0
29	A1067	451	313
30	A1067	457	313

Link ID	Link description	Norfolk Boreas Scenario 2 Construction Vehicle Movements	
		All Vehicles	HGVs
31	A1067	127	0
32	B1149 – Norwich road	257	***184
33	B1149 - Holt Road	385	212
34	B1145 - west of Cawston	388	***168
35a	B1159 - Coast Road	390	294
35b	B1159 - Coast Road	326	263
36	B1149 - Holt Road	320	***184
37	B1145 - Cawston road	182	80
38	A140 - Cromer Road	292	0
39	A140 – Hevingham	417	129
40a	A140 – Roughton	300	289
40b	A140 – Roughton	428	184
41	B1436 – Felbrigg	354	*287
42	B1145 - Reepham Road	198	**72
43	Cromer Road - Ingworth	26	0
44a	A149	391	289
44b	A149	420	262
45	A149	320	206
46	B1145 - Lyngate Road	465	224
47a	Bacton Road – North Walsham	145	0
47b	North Walsham Road - Edingthorpe Green	203	72
47c	North Walsham Road – Broomholm	91	**72
48	B1159 - Bacton Road	0	0
49	B1159	91	**72
50	A1151	158	0
51	A1151	88	0
52	A149 - Wayford Road	297	206
53	A149	634	630
54	A149	251	248
55	A149	251	248
56	A149	270	248
57	A149	271	248

Link ID	Link description	Norfolk Boreas Scenario 2 Construction Vehicle Movements	
		All Vehicles	HGVs
58	NNDR - Link a	487	453
59	NNDR - Link b	472	453
60	NNDR - Link c	400	313
61	B1436 - Roughton Road	76	0
62	A1042	164	0
63	A1151	67	0
64	A12	299	291
65	A47	639	637
66	Wendling – Dereham Road	192	152
67	North Walsham Road / Happisburgh Road	159	80
68	The Street / Heydon Road	160	80
69	Little London Road	260	**48
70	Plantation Road	284	184
71	Vicarage Road / Whimpwell Street	64	30
72	Dereham Road / Longham Road – Dillington	184	136
73	Hoe Road South	158	96
74	Mill Street, Elsing Road – Swanton Morley	103	72
75	B1354 – Blickling	72	72
76	High Noon Road / Church Road	92	72
77	Hall Lane – North Walsham	92	**72
78	Bylaugh	92	72
79	B1145 / Suffield Road	92	72
*	Refined Primary Peak flows identified in the ES		
**	Proposed mitigation flows identified in the ES		
***	Proposed mitigation flows identified in the Norfolk Vanguard OTMP as of Examination Deadline 7 (2nd May 2019)		

10 APPENDIX 3 ROUTE ACCESS STUDY

COLLETT
EXPERTS IN MOTION

COLLETT

EXPERTS IN MOTION

Route Access Survey – Revision 2
314597

Norfolk Vanguard
Off A47 near Necton, Norfolk

Royal HaskoningDHV

Report Produced: March 2018

Royal HaskoningDHV

Contents

Report Details

Report for
Ryan Eldon
Royal HaskoningDHV
Rightwell House
Bretton
Peterborough
PE3 8DW

Attendees of Survey
Steven Mangham

Issued by
Steven Mangham

Approved by
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Document Revisions

No	Date	Details
1	25/04/2018	Route B removed from report
2	25/04/2018	Updated to Client Comments

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Company Profile

Collett & Sons Ltd established in Halifax over 45 years ago specialise in the multimodal logistics throughout the UK, Europe and Worldwide.

Our Company owns a modern fleet of over 60 vehicles and over 100 trailers, operating from 3 depots located in Halifax, Goole and Grangemouth.

The depots situated in Google and Grangemouth offer strategically located sites suitable to provide central hubs for the distribution of abnormal load components throughout the UK. Each facility is complete with up to 110 tonnes lifting capacity in order to be able to handle different abnormal load types. As logistical partners to the Wind Energy Industry, the company is able to offer the complete transport solution from point of manufacture through to job site.

Collett & Sons Limited operate an in-house consultancy that deals with transport feasibility, route and site access surveys, Swept Path Analysis, Traffic Management Plans, Test Drives and Environment Statements.

In addition to consulting services, Collett & Sons Limited delivers the following services;

Marine
Port Operation
Heavy Lift Storage
Heavy Transport
Project Management
Freight Forwarding
Heavy Lift
General Haulage
Warehousing
Test Station (DVSA-authorised)
SHEQ Training

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1 Executive Summary

1.1. One route has been assessed for the transportation of a 200Te Transformer from the Kings Lynn Port to proposed Norfolk Vanguard Site. The Route has been detailed along the A47 to site.

1.2. The start location within the Port of Kings Lynn has been chosen due to previous information regarding the heavy load quay within the dock.

Third party land

1.3. No third party land has been identified by the assessment.

Road widening

1.4. No road widening has been identified by the assessment.

Modifications to street furniture

1.5. Street furniture removal will be required at a number of locations along the route and have been detailed where required.

Manual Steering

1.6. Due to the vehicle configuration, manual steering will be utilised at numerous locations along the routes including roundabouts.

Vertical Alignment

1.7. There is an overhead bridge along Route A on the A47. Clarification of the bridge clearance height has been sought from the relevant authorities and the response has indicated a clearance of 5.18m critical. Additional clearance checks to be undertaken prior to any movements.

Structural Assessment

1.8. The relevant authorities who own or manage the structures on the route have been consulted regarding any potential issues along the proposed route. No negative responses have been received at time of issue although Kier Group, who manages the A47, would not comment without a formal BE16 being applied for.

Other areas of note

1.9. There are numerous overhead cables along both routes. Once the final loaded configuration and dimensions are finalised, the utilities services should be contacted regarding their cable heights. It may be that some cables will have to be removed or a specialist team join the delivery convoy to raise the cables, where required.

1.10. Tree pruning will be required along the route to ensure a suitable clearance is available for the load.

2. Introduction

2.1 Collett & Sons Ltd. were commissioned by Royal Haskoning DHV (RHDHV) to undertake an abnormal loads route access study to assess the transportation of a 200Te Transformer to the Norfolk Vanguard Site, off A47 near Necton, Norfolk (the site).

2.2 The site is located off the A47 near Necton, Norfolk. The purpose of this report is to detail access to the entrance of Norfolk Vanguard site from Kings Lynn Harbour.

Methodology

2.3 An initial desk based study was undertaken to identify possible loading configurations for the component (details confirmed by RHDHV).

2.4 The route surveyed in this report has been identified by Collett.

2.5 A site visit was then carried out to determine the feasibility of the identified routes and pinch points.

2.6 Following the site visit, Swept Path Analysis (SPA) was then carried out at the identified pinch points. The SPA's are detailed in this report, and indicate any areas of road widening or land take that are required.

2.7 All drawings are produced using Ordnance Survey 'OS MasterMap' mapping data, unless stated otherwise. Street furniture is not included on OS MasterMap data; this is plotted by taking measurements on site with a tape. Actual road widths are also checked and adjusted on the map data accordingly. Where adjustments to the OS MasterMap data have been made this is indicated as 'adjusted' on the drawing.

2.8 The analysis is based on the most onerous components when loaded on delivery vehicles.

2.9 The trailers used to transport the component modular. Manual Steering indicates that the steering of the axles is controlled by an operative using an override devise. Manual Steering can be used to achieve alternative swept areas where appropriate.

2.10 Upon selection of the route, the relevant authorities were contacted with regard to the structural suitability of the delivery route for the heaviest loaded vehicle.

2.11 Details pertaining to the highway boundary have not been obtained from the County Council, thus in order to determine the impact on third party land it has been assumed that fence lines, walls and hedgerows define this boundary.

2.12 In addition, the report is supplemented by photographic evidence, map referencing and CAD drawings of the 'pinch points' for the proposed routes.

3. Components

3.1. RHDHV have requested that the assessment on which this report is compiled be based on the delivery of a 200Te Transformer.

3.2. The transformer specification was supplied by RHDHV.

4. Abnormal Indivisible Load Profiles

4.1. The abnormal loads are assessed based on weight, length, width and height and loaded to the most appropriate vehicle, the weights and dimensions of these are detailed below. The loading diagrams are detailed in APPENDIX 1.

4.2.	314597-A
200te Transformer	
	Loaded vehicle dimensions
Overall vehicle Length	66.06m
Rigid Length	27.04m
Width	4.929m
Height	5.10
G.V.W excluding tractor units	332.86Te

5. Requirements for the movement of Abnormal Indivisible Loads

5.1. An abnormal load is defined as below (including the actions required for permitting and notice).

Weight

5.2. Gross weight or axle weights exceeding C & U or Authorised Weight limits up to 80,000kgs (78.74 tons).

5.3. ***Action required:*** 2 clear days' notice with indemnity to Highway and Bridge Authorities.

5.4. Gross weight (of vehicle carrying the load) exceeding 80,000kgs (78.74tons) up to 150,000kgs (147.63tons).

5.5. ***Action required:*** 2 clear days' notice to Police and 5 clear days' notice with indemnity to Highway and Bridge Authorities.

5.6. Gross weight (of vehicle carrying the load) exceeding 150,000kgs (147.63tons).

5.7. ***Action required:*** HA Special Order (form BE16), up to 8 weeks approval time, plus 5 clear days' notice to Police and 5 clear days' notice with indemnity to Highway and Bridge Authorities.

Width

5.8. Width exceeding 2.9 metres (for C & U loads) 3.0 metres (9' 10") up to 5.0 metres (16' 5") for other loads

5.9. ***Action required:*** 2 clear days' notice to the Police.

5.10. Width exceeding 5.0 metres (16' 5") up to 6.1metres (20')

5.11. ***Action required:*** HA form VR1 plus 2 clear days' notice to Police.

5.12. Width exceeding 6.1 metres (20')

5.13. ***Action required:*** HA Special Order (form BE16), up to 8 weeks approval time, plus 5 clear days' notice to Police and 5 clear days' notice with indemnity to Highway and Bridge Authorities.

Length

5.14. When exceeding 18.65 metres (61' 2") up to 30 metres (98' 5") rigid length - (Vehicle or train of vehicles)

5.15. ***Action required***: 2 clear days' notice to the Police.

5.16. Vehicle combination exceeding 25.9 metres (85').

5.17. ***Action required:*** 2 clear days' notice to the Police.

5.18. When exceeding 30.0 metres (98' 5") rigid length.

5.19. ***Action required:*** HA Special Order (form BE 16), up to 8 weeks approval time, plus 5 clear days' notice to Police and 5 clear days' notice with indemnity to Highway and Bridge Authorities.

Bridge Height

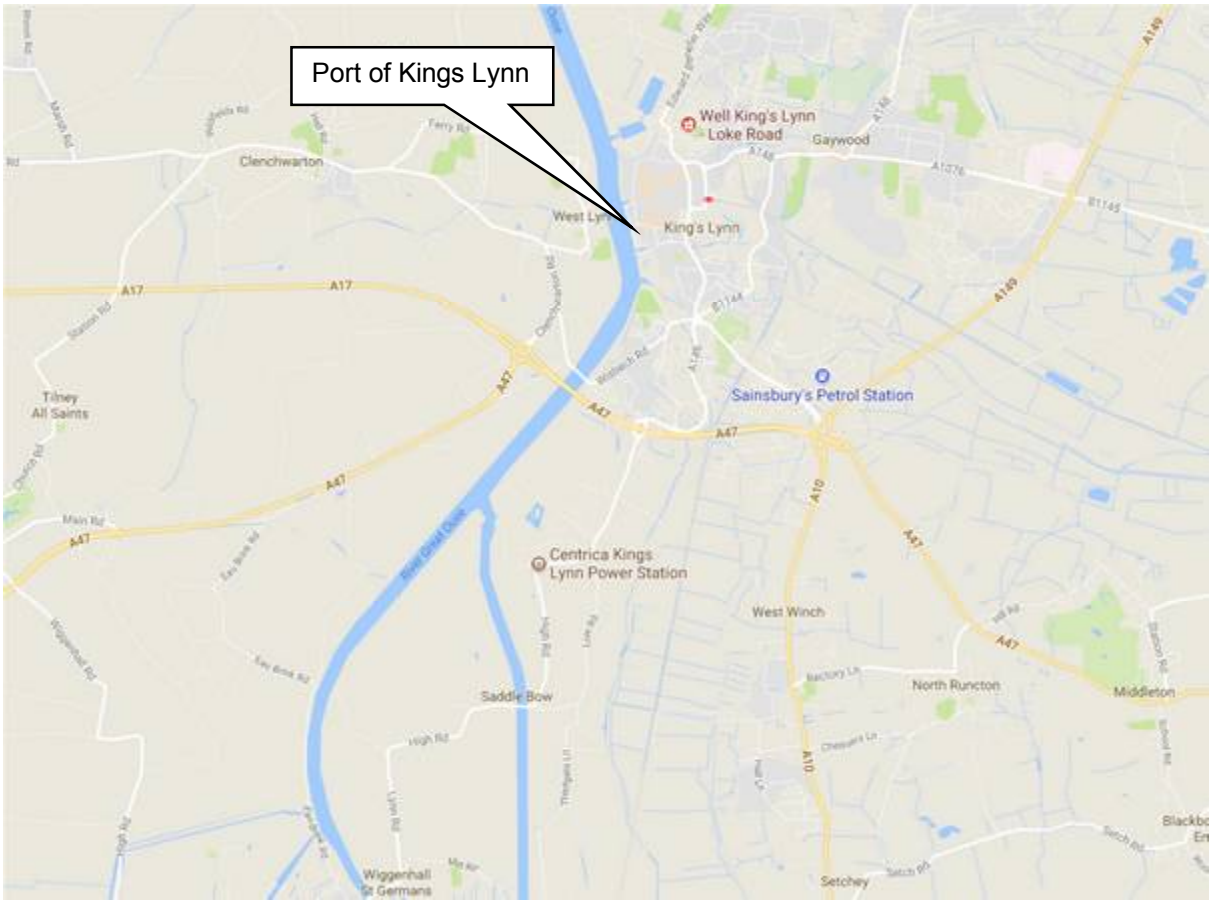
5.20. Any low bridges along the route that have a clearance less than 5.0m will be signed as a low bridge. This threshold could create difficulties in the passage of over-height or near over-height vehicles.

Abnormal Load Requirements

5.21. For the specified abnormal load, the following actions will be required for the delivery vehicle.

5.22.	**314597-A**	**Action Required**
	200te Transformer	HA Special Order (form BE16), up to 8 weeks approval time, plus 5 clear days notice to Police and 5 clear days notice with indemnity to Highways and Bridge Authorities.

6. Port Information



Kings Lynn

6.1. The Port of King's Lynn is located on the Wash on the UK's east coast. Trunk roads connect the port to Cambridge, where the M11 leads down to the M25 and east to Leicester and the M1.

Table of normal acceptance dimensions of vessels

			Normal acceptance dimensions of vessels			
Dock, Jetty or quay	**Quay Length**	**Depth of water**	**Length**	**Beam**	**Draught**	**Approx. dwt**
Alexandra Dock	350m	5.3m	119m	13.85m	5.5m	4,000
Bentinck Dock	800m	5.3m	119m	13.85	5.5m	4,000
Riverside Quay	220m	Tidal	140m	20.0m	6.0m	5,500

Alexandra Dock

7. Responses from Statutory Consultees (Structures Suitability)

7.1. The loading information for this transformer configuration has been sent to the relevant authorities to ascertain if there are any issues with weights and structures within the areas of the Authorities jurisdiction – Details of the authorities can be found below.

7.2. For the purposes of the responses below, the routes referred to are as follows

Route:
• Exit Kings Lynn Harbour onto Edward Benefer Way, • Continue on Edward Benerfer Way to merge onto Grimston Road A148. • Continue on A148 to roundabout junction with A149 Queen Elizabeth Way, • At roundabout turn right onto A149 Queen Elizabeth Way, • Continue on A149 through 2 roundabouts to roundabout junction with A47, • At roundabout turn left onto A47, • At roundabout turn left onto A47, • At roundabout, continue on A47, • At roundabout continue on A47, Continue on A47 to proposed site entrance on the right hand side at approx. OS Grid refs: TF 89245 11382.

7.3. The following summarises the correspondence between the relevant authorities. The detailed responses can be viewed in APPENDIX 3.

County Council Highways	**Issues?**	**Contact Name**	**Email Address**	**Phone Number**
Norfolk Council	No	Mark North	Pandt.bridges@norfolk.gov.uk	01603 223804
Area 6	No Comment	John Hughes	John.Hughes@kier.co.uk	01223 255255
Network Rail	No	Katie Nicholson	Katie.Nicholson@networkrail.co.uk	01908 783 140
Historic Railways Estate	No	Tania Howell	Tania.Howell@jacobs.com	0118 946 8911
Canal and river trust	Not responded	N/A	abnormal.loads@canalrivertrust.org.uk	0113 2005759

Summary of Structural Issues

7.4. At the time of issue, Canal and River Trust have yet to respond and Area 6 could not comment without a formal BE16 application. Responses from the other authorities in the table above have not highlighted any structural issues.

8. Route Assessment

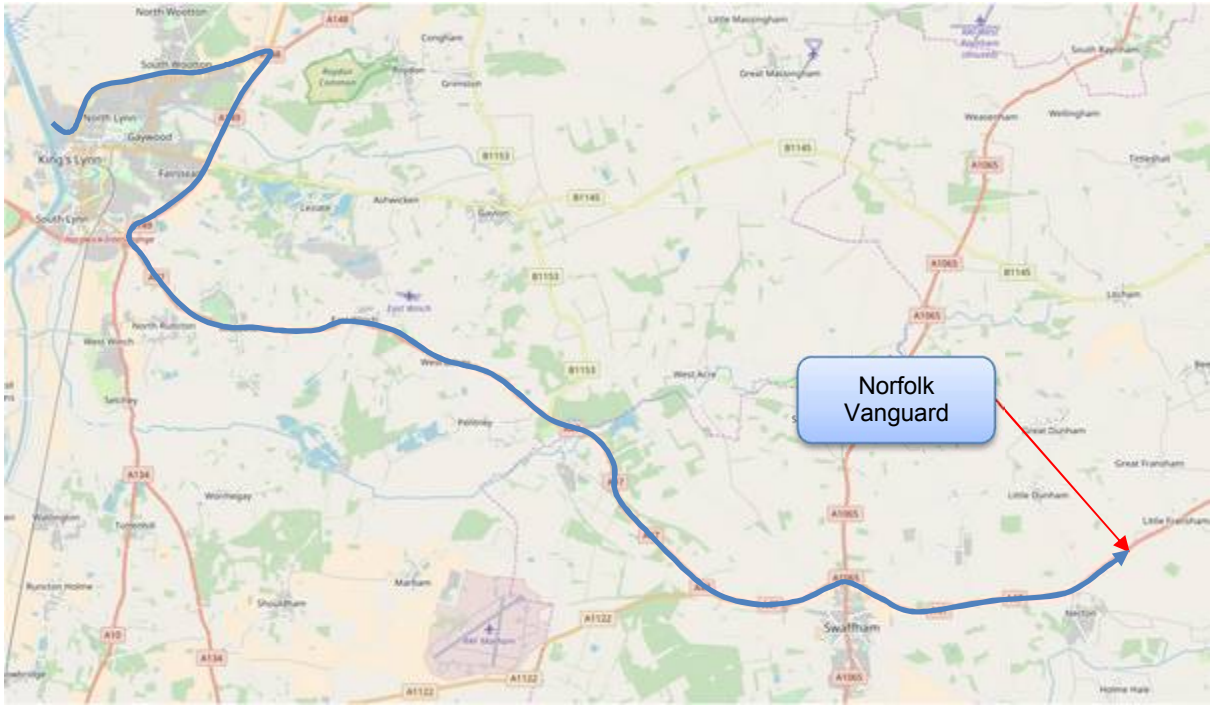
8.1. This section of the report illustrates in detail the pinch points and routes for the delivery of all abnormal load components from Kings Lynn Harbour to Norfolk Vanguard.

8.2. *Route*

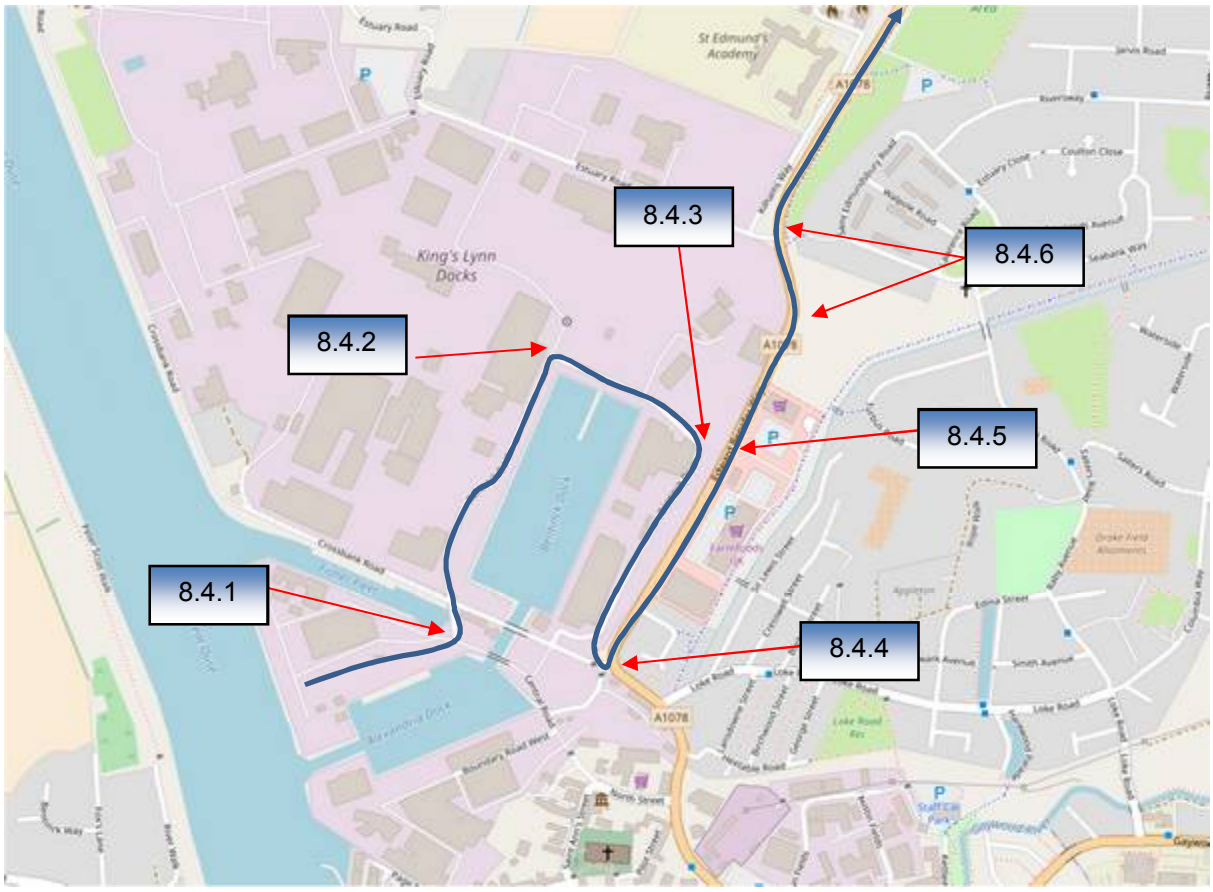
Start Location	Kings Lynn Harbour	Distance of Route	Km	Miles
Via:	A149/A47		34.1	21.2

- Exit Kings Lynn Harbour onto Edward Benefer Way,
- Continue on Edward Benerfer Way to merge onto Grimston Road A148.
- Continue on A148 to roundabout junction with A149 Queen Elizabeth Way,
- At roundabout turn right onto A149 Queen Elizabeth Way,
- Continue on A149 through 2 roundabouts to roundabout junction with A47,
- At roundabout turn left onto A47,
- At roundabout, turn left onto A47,
- At roundabout, continue on A47,
- At roundabout, continue on A47,
- Continue on A47 to site entrance on the right hand side at approx. OS Grid ref: TF 89275 11404.

8.3. Map Overview



8.4. *Map Extract*



KEY – Colour coding of modification requirements					
	Indicates major modifications are required i.e. Road widening, street furniture etc.		Indicates manoeuvre or minor modifications i.e. contraflow manoeuvre.		No modifications required.

8.4.1.1. – Aerial View of Location

8.4.1.2. – View prior to junction

8.4.1.3. – View at crossing

8.4.1.4. – View after crossing

Description:	From the Heavy Lift Quay turn left within the dock to avoid the bridges.		
Distance from previous Pinch Point	N/A	Distance to following Pinch Point	0.25km

	Modification required	Reason for Modification	Additional Information:
	Manual steering required	To assist navigation	Loaded vehicle will navigate this location without any issues.

Item No:	Title	OS Grid Ref:	TF 61628 20743
8.4.1	Exit form he Quay	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.4.2.1. – Aerial View of Location

8.4.2.2. – View prior to bend

8.4.2.3. – View at crossing

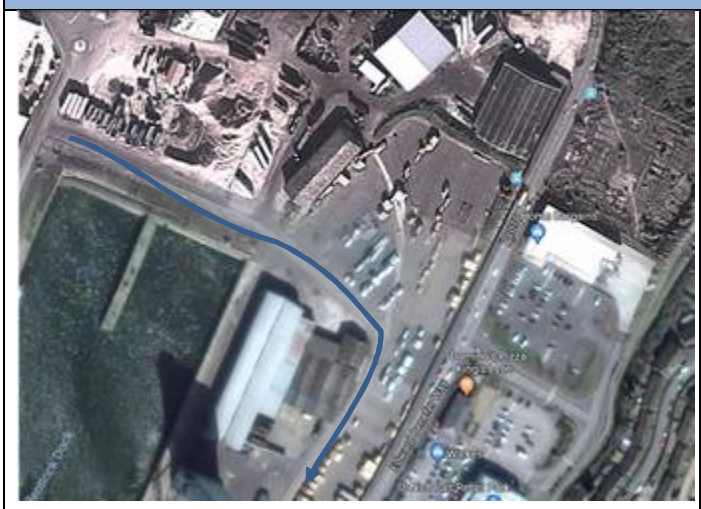
8.4.2.4. – Reverse view of bend

Description:	Continue through the port to 90° right hand bend.

Distance from previous Pinch Point	0.25km	Distance to following Pinch Point	0.05km

	Modification required	Reason for Modification	Additional Information:
	Street furniture/Manual steering	To provide clear envelope	Street furniture to be cleared on inside of bend to allow navigation.

Item No:	Title	OS Grid Ref:	TF 61756 21132
8.4.2	90° Right hand bend within the port	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A



8.4.3.1. – Aerial View of Location

8.4.3.2. – View prior to bend

8.4.3.3. – View after bend

Description:	Continue through the port to 90 right hand bend.

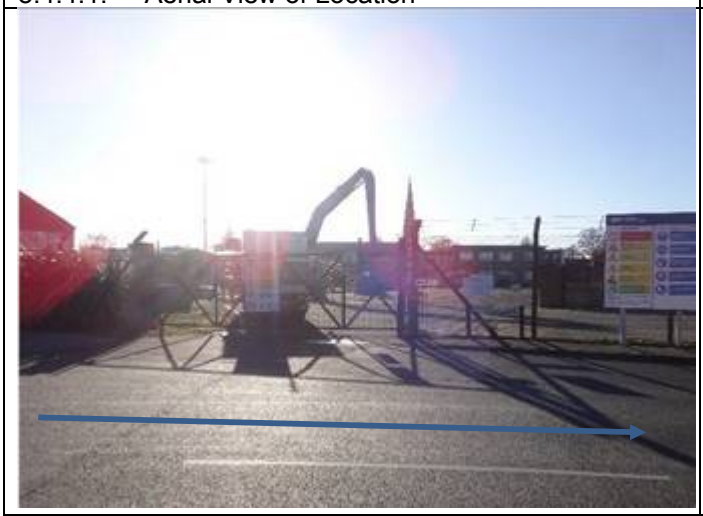
Distance from previous Pinch Point	0.5km	Distance to following Pinch Point	0.25km

	Modification required	Reason for Modification	Additional Information:
	Street furniture/Manual steering	To provide clear envelope	Area around bend required to be cleared.

Item No:	Title		
8.4.3	Right hand bend within the port	OS Grid Ref:	TF 61962 21018
		Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.4.4.1. – Aerial View of Location

8.4.4.2. – Port Exit



8.4.4.3. – Reverse back past Gatehouse

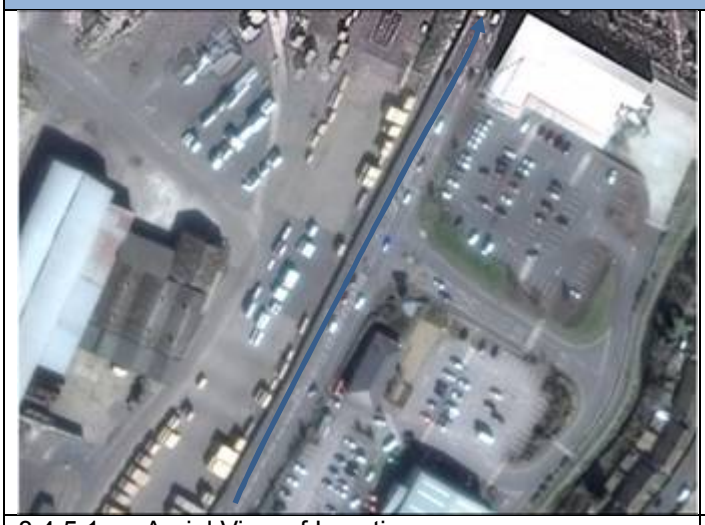
8.4.4.4. – Left turn onto Edward Benefer Way

Description:	Continue to port exit to junction with Edwards Benefer Way. At junction preform a 3 point turning manoeuvre to travel north on Edwards Benefer Way.

Distance from previous Pinch Point	0.25km	Distance to following Pinch Point	0.35km

	Modification required	Reason for Modification	Additional Information:
	Reverse manoeuvre and manual steering required	To exit the port	Loaded vehicle to turn left out of exit gate, reverse back past gate house and then turn left onto Edwards Benefer Way.

Item No:	Title	OS Grid Ref:	TF 61842 20712
8.4.4	Port exit	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-100A1.1



8.4.5.1. – Aerial View of Location

8.4.5.2. – View of splitter island

8.4.5.3. – View on junction

8.4.5.4. – View on junction

Description:	Continue on Edwards Benefer Way through junction with St Nicholas Retailer Park. At junction continue on Edwards Benefer Way

Distance from previous Pinch Point		0.35km	Distance to following Pinch Point	0.30km
	Modification required	Reason for Modification	Additional Information:	
	No modifications required	No issues at this location	Loaded vehicle will navigate past these splitter islands without any issues.	

Item No:	Title	OS Grid Ref:	TF 62008 21014
8.4.5	Edwards Benefer Way junction with Retail Park	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.4.6.1. – Aerial View of Location

8.4.6.2. – View on left hand bend

8.4.6.3. – View on junction

8.4.6.4. – View on junction

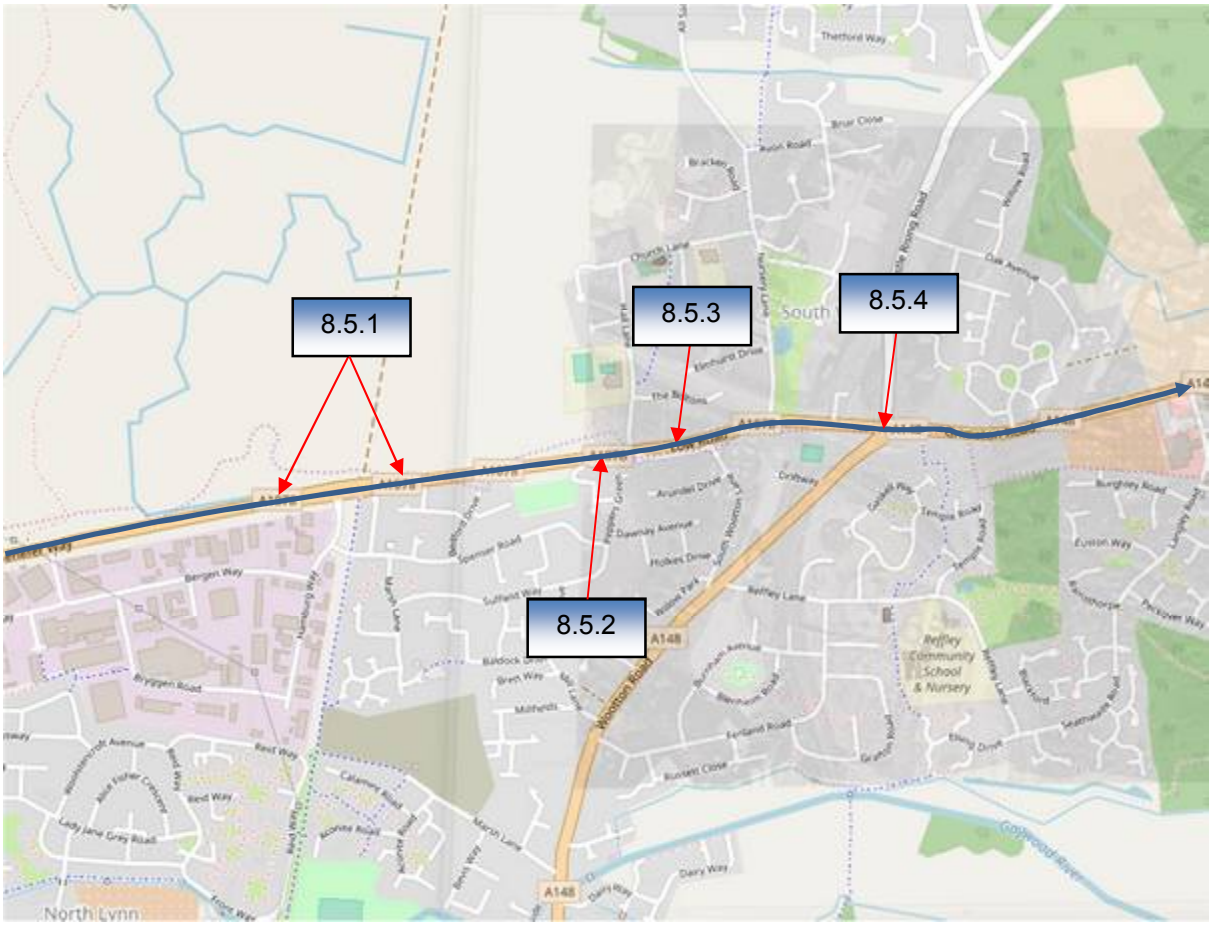
Description:	Continue on Edwards Benefer Way through junction with Estuary Road. At junction continue on Edwards Benefer Way.

Distance from previous Pinch Point	0.30km	Distance to following Pinch Point	1.50km

	Modification required	Reason for Modification	Additional Information:
	Modifications to street furniture required	To provide clear envelope	All street furniture on splitter islands to be removed.

Item No:	Title	OS Grid Ref:	TF 62054 21308
8.4.5	Edwards Benefer Way junction with Estuary Road	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.5. **Map Extract**



	
8.5.1.1. – Aerial View of Location	8.5.1.2. – View on left hand bend
	
8.5.1.3. – View on junction	8.5.1.4. – View on junction

Description:	Continue on Edwards Benefer Way through junction with Hamburg way. At junction continue on Edwards Benefer Way.		
Distance from previous Pinch Point	1.50km	Distance to following Pinch Point	0.40km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	Loaded vehicle will navigate this location without any issues.

Item No:	Title	OS Grid Ref:	TF 63321 22213
8.5.1	Splitter islands at junction of Hamburg Way	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.5.2.1. – Aerial View of Location

8.5.2.2. – View of island

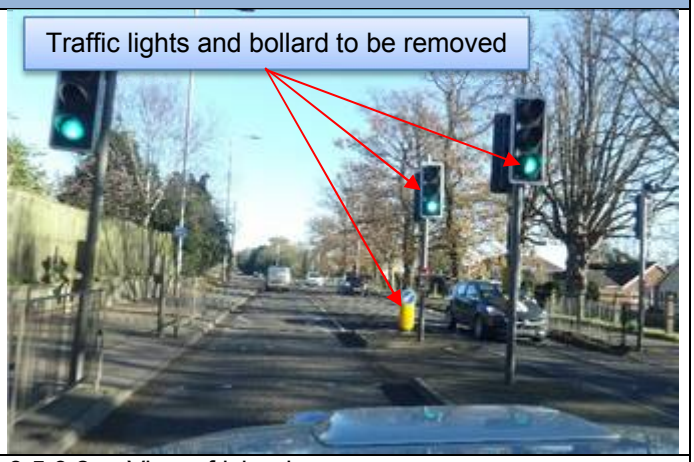
Description:	Continue on Edwards Benefer Way.		
Distance from previous Pinch Point	0.40km	Distance to following Pinch Point	0.19km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	Loaded vehicle will navigate this location without any issues.

Item No:	Title	OS Grid Ref:	TF 63954 22324
8.5.2	Splitter islands at junction of Hall Way	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

COLLETT EXPERTS IN MOTION

8.5.3.1. – Aerial View of Location



8.5.3.2. – View of island

Description:	Continue on Edwards Benefer Way.		
Distance from previous Pinch Point	0.19km	Distance to following Pinch Point	0.19km

	Modification required	Reason for Modification	Additional Information:
	Modifications to street furniture required	To provide clear envelope	Splitter island to be cleared of street furniture.

Item No:	Title	OS Grid Ref:	TF 64045 22334
8.5.3	Splitter islands after junction of Hall Way	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

COLLETT EXPERTS IN MOTION

8.5.4.1. – Aerial View of Location | 8.5.4.2. – View of island 3

Description:	Continue on Edwards Benefer Way.		
Distance from previous Pinch Point	0.19km	Distance to following Pinch Point	0.35km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	Loaded vehicle will navigate this location without any issues.

Item No:	Title	OS Grid Ref:	TF 64342 22397
8.5.4	Splitter island at junction of Nursery Way	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

COLLETT EXPERTS IN MOTION

8.5.5.1. – Aerial View of Location | 8.5.5.2. – View of island

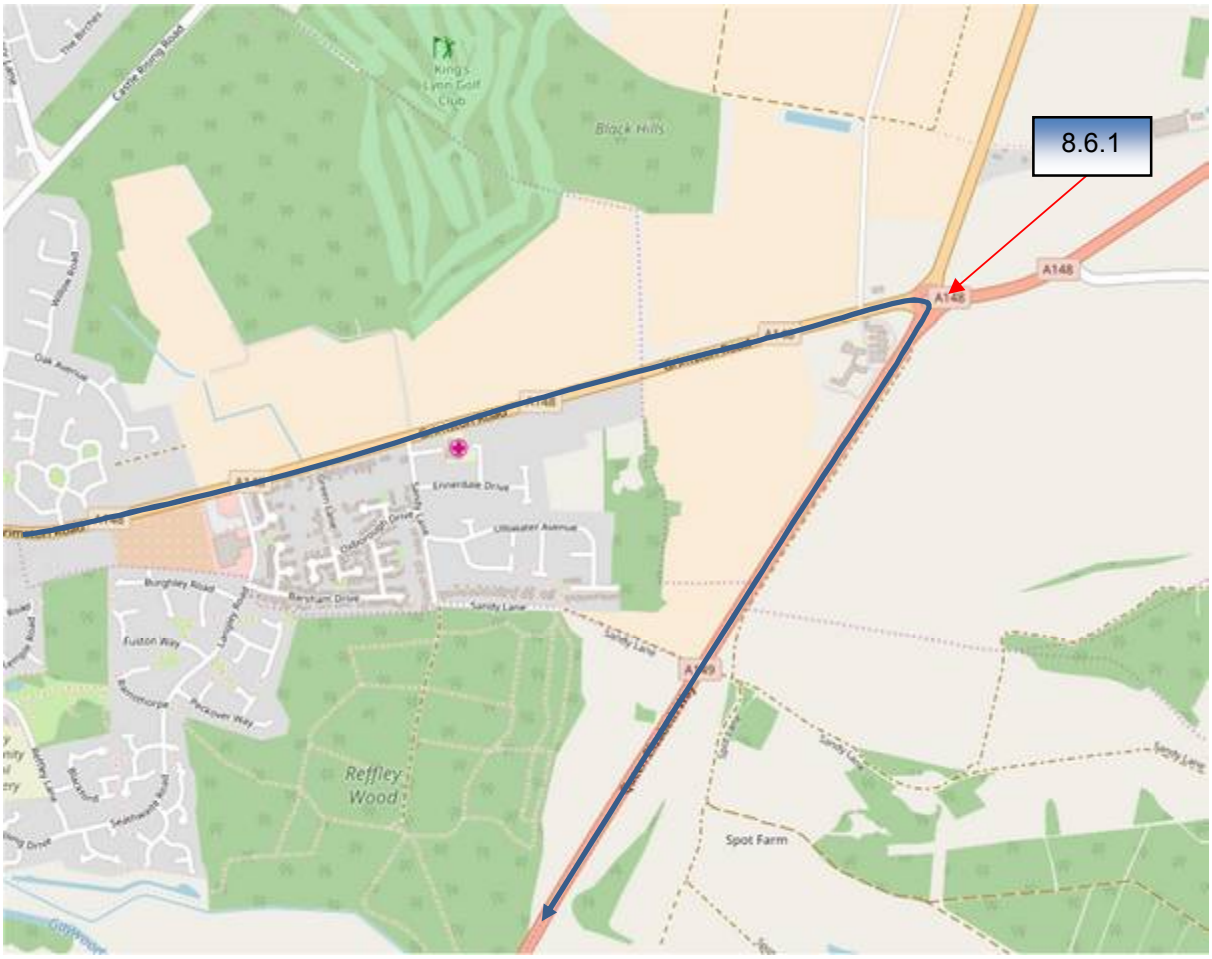
Description:	Continue on Edwards Benefer Way to junction with A148. At junction continue onto A148.		
Distance from previous Pinch Point	0.35km	Distance to following Pinch Point	2.30km

Load:	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	Loaded vehicle will navigate this location without any issues.

Item No:	Title	OS Grid Ref:	TF 66758 22973
8.5.5	Splitter islands at junction of A148	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

COLLETT EXPERTS IN MOTION

8.6. **Map Extract**



8.6.1.1. – Aerial View of Location

8.6.1.2. – View on prior to roundabout

8.6.1.3. – View on roundabout

8.6.1.4. – View on junction

Description:	Continue on A148 to roundabout junction with A149. At roundabout turn right onto A149.

Distance from previous Pinch Point	2.30km	Distance to following Pinch Point	3.00km

Load:	Modification required	Reason for Modification	Additional Information:
	Contraflow manoeuvre required	To allow navigation	A contra flow manoeuvre is required at this roundabout in order to navigate this roundabout.

Item No:	Title		
8.6.1	A148 roundabout junction with A149	OS Grid Ref:	TF 66767 22985
		Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-120A1.1

8.7. **Map Extract**

8.7.1.1. – Aerial View of Location

8.7.1.2. – View on prior to roundabout

8.7.1.3. – View on roundabout

8.7.1.4. – View of exit of roundabout

Description:	Continue on A149 to roundabout junction with A1076. At roundabout continue on A149.

Distance from previous Pinch Point	3.00km	Distance to following Pinch Point	2.00km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	No issues at this roundabout.

Item No:	Title	OS Grid Ref:	TF 65346 20197
8.7.1	A149 roundabout junction with A1076	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-130A1.1

8.7.2.1. – Aerial View of Location

8.7.2.2. – View of entrance to roundabout

8.7.2.3. – View on roundabout

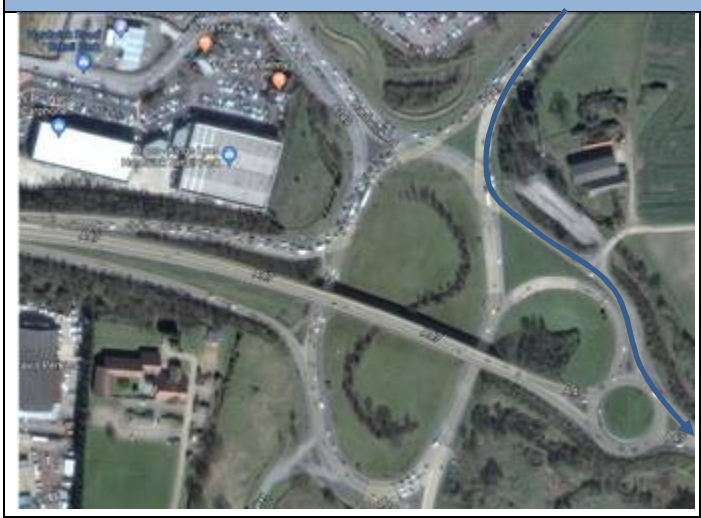
8.7.2.4. – View of exit of roundabout

Description:	Continue on A149 to roundabout junction with Sainsbury's. At roundabout continue on A149.

Distance from previous Pinch Point	2.00km	Distance to following Pinch Point	1.00km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	No issues at this roundabout.

Item No:	Title	OS Grid Ref:	TF 63970 18745
8.7.2	A149 roundabout junction with Sainsbury's.	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-140A1.1



8.7.3.1. – Aerial View of Location

8.7.3.2. – View of entrance to roundabout

8.7.3.3. – View on exit of roundabout

8.7.3.4. – View after roundabout exit

Description:	Continue on A149 to roundabout junction with A47. At roundabout turn right onto A47.

Distance from previous Pinch Point	1.00km	Distance to following Pinch Point	0.90km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	No issues at this roundabout.

Item No:	Title		
8.7.3	A149 roundabout junction with A47	OS Grid Ref:	TF 63297 18102
		Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-150A1.1

8.7.3.1. – Aerial View of Location

8.7.3.2. – View of entrance to roundabout

8.7.3.3. – View on roundabout

8.7.3.4. – View of exit of roundabout

Description:	Continue on A47 to roundabout junction with A47. At roundabout turn left onto A47.

Distance from previous Pinch Point	0.90km	Distance to following Pinch Point	18.30km

Load:	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	No issues at this roundabout.

Item No:	Title	OS Grid Ref:	TF 63500 18057
8.7.4	A47 roundabout	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-160A1.1

8.8. **Map Extract**

8.8.1.1. – Aerial View of Location

8.8.1.2. – View of entrance to roundabout

8.8.1.3. – View on roundabout

8.8.1.4. – View of exit of roundabout

Description:	Continue on A47 to roundabout junction with A1122. At roundabout, continue straight on A47.

Distance from previous Pinch Point	18.30km	Distance to following Pinch Point	3.00km

Load:	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at location	No issues at this roundabout.

Item No:	Title		
8.8.1	A47/A1122 roundabout	OS Grid Ref:	TF 78322 09905
		Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-170A1.1

	
8.8.2.1. – Aerial View of Location	8.8.2.2. – Reverse view of bend

Description:	Continue on A47 to overhead bridge.		
Distance from previous Pinch Point	3.00km	Distance to following Pinch Point	3.40km

	Modification required	Reason for Modification	Additional Information:
	No modification required	No issues at location	Clarification of the bridge clearance height was sought from the relevant authorities. Response has highlighted a clearance height of 5.2m although this should be reassessed prior to any delvieries being undertaken.

Item No:	Title		
8.8.2	Overhead bridge on A47	OS Grid Ref:	TF 81184 09866
		Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.8.3.1. – Aerial View of Location

8.8.3.2. – View of entrance to roundabout

8.8.3.3. – View on roundabout

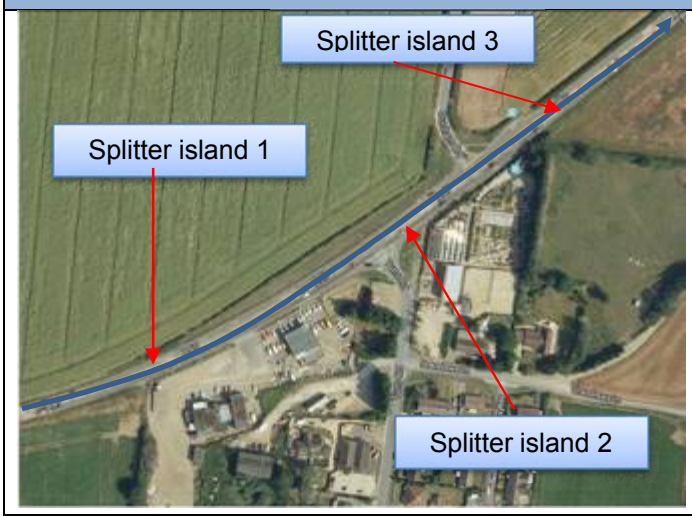
8.8.3.4. – View of exit of roundabout

Description:	Continue on A47 to roundabout at junction with Norwich Road. At roundabout, continue straight on A47.

Distance from previous Pinch Point	3.40km	Distance to following Pinch Point	3.40km

	Modification required	Reason for Modification	Additional Information:
	Modifications to street furniture, tree pruning and manual steering required.	To allow navigation	Street furniture on central island of roundabout to be removed due to oversail of loaded vehicle. Tree on central island to be pruned.

Item No:	Title	OS Grid Ref:	TF 84328 09486
8.8.3	Roundabout prior to site	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-180A1.1



8.8.4.1. – Aerial View of Location

8.8.4.2. – Splitter Island 1

8.8.4.3. – Splitter Island 2

8.8.4.4. – Splitter Island 3

Description:	Continue on A47 through Necton.

Distance from previous Pinch Point	3.40km	Distance to following Pinch Point	2.10km

	Modification required	Reason for Modification	Additional Information:
	No modifications required	No issues at this location	Loaded vehicle will navigate past these splitter islands without any issues.

Item No:	Title	OS Grid Ref:	TF 87765 10171
8.8.4	Splitter islands in Necton	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	N/A

8.8.5.1. – Aerial View of Location

8.8.5.2. – View of entrance to roundabout

8.8.5.3. – View on roundabout

Description:	Continue on A47 to proposed site entrance.

Distance from previous Pinch Point	2.10km	Distance to following Pinch Point	N/A

	Modification required	Reason for Modification	Additional Information:
	New site entrance to be constructed	To allow access into site	Swept Path Analysis has been undertaken on the proposed site entrance design and showed that the loaded vehicle could access the site based on that design.

Item No:	Title	OS Grid Ref:	TF 89255 11397
8.8.5	Proposed site entrance location	Customer	RHDHV
		Project	Norfolk Vanguard
		Drawing Nos	314597-190A1.1

9. Recommendations

9.1. If suitable agreements and necessary amendments to the route can be made with both the highway authorities and land owners then this route is recommended for the delivery of all the components.

9.2. These recommendations are made from a purely transport orientated view, and do not consider any political issues in terms of land ownership, or any other precincts raised, that may otherwise be restrictive. It is recommended to have adequate warning signs implemented to warn other road users at critical points along the route.

9.3. All hedges, shrubs, bushes, trees and overhanging branches along the nominated routes must be trimmed to allow a minimum envelope on the road of 7.5m wide by 7.5m high for load A and for load B they should be 6.0m by 6.0m.

9.4. All street furniture, signage etc. along the nominated route must be removed to allow a minimum envelope on the road of 7.5m by 7.5m high for load A and for load B they should be 6.0m by 6.0m. Other specific street furniture has been nominated in this report to facilitate ‘over-sailed’ and ‘swept’ areas.

10. Important notes

10.1. The loaded configuration is based on a generic load size identified by Royal Haskoning DHV. No technical drawings were received of the Transformer and it is possible that the load cannot be loaded in the configuration identified in this report. If this is the case, it may result in different loaded dimensions and as a result, the route becoming unsuitable.

10.2. Police escort or Pilot car will be required for all component trailers to negotiate the route, in order to assist with traffic control and control oncoming traffic flow.

10.3. The information contained in this report is privileged and confidential and is for the exclusive use of the client nominated herein.

10.4. All access diagrams and assessments are made and calculated for the road movement of loaded trailer equipment carrying the components. These dimensions are based on the turning circles and specification of Collett & Sons Ltd trailer equipment.

10.5. Land take is usually referred to when land is required from Private Land Owners; road widening is usually referred to when land is required within highways boundaries. The boundaries between private land and highways property are assumed by using obvious demarcation such as fence lines/hedges etc. It should be noted that actual boundaries between highways and private land are not substantiated in this report and can only be authenticated by carrying out land searches.

10.6. All drawings produced of swept path diagrams are illustrated by using the automatic steering principle for the steerable trailers, unless otherwise stated. However, all steerable trailers have a manual override system that if used will alter the path of the trailer.

10.7. All drawings are produced using Ordnance Survey 'OS MasterMap' mapping data, unless stated otherwise. Street furniture is not included on OS MasterMap data, this is plotted by taking measurements on site with a tape, actual road widths are also checked and adjusted on the map data accordingly. Where adjustments to the OS MasterMap data have been made this is indicated as 'adjusted' on the drawing.

10.8. All route assessment, proposed land-take and removal/re-instatement of nominated street furniture is deemed accurate by Collett & Sons Ltd at the date that this report is created. We cannot be held responsible for the development of future road schemes or alterations to the routes surveyed that may leave this report inaccurate.

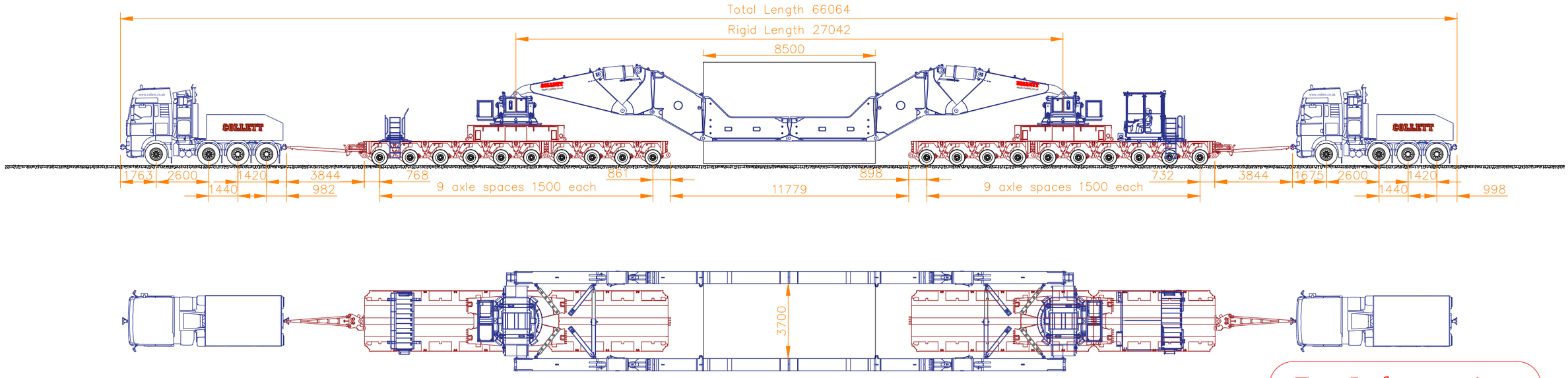
11. List of Drawing Numbers

11.1. Transformer

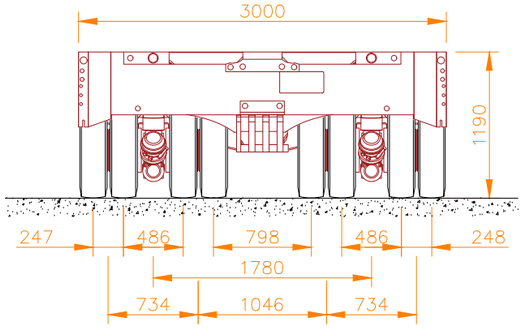
Drawing No	Title
314597-100A1.1	Exit from Kings Lyn port
314597-120A1.1	A148 roundabout junction with A149
314597-130A1.1	A149 roundabout junction with A1076
314597-140A1.1	A149 roundabout junction with Sainsbury's
314597-150A1.1	A149 roundabout junction with A47
314597-160A1.1	A47 Roundabout
314597-170A1.1	A47/A1122 Roundabout
314597-180A1.1	A47/Norwich Road Roundabout
314597-190A1.1	Proposed site entrance off A47

APPENDIX 1 - ELEVATION DRAWINGS OF SWEPT PATH MODELS

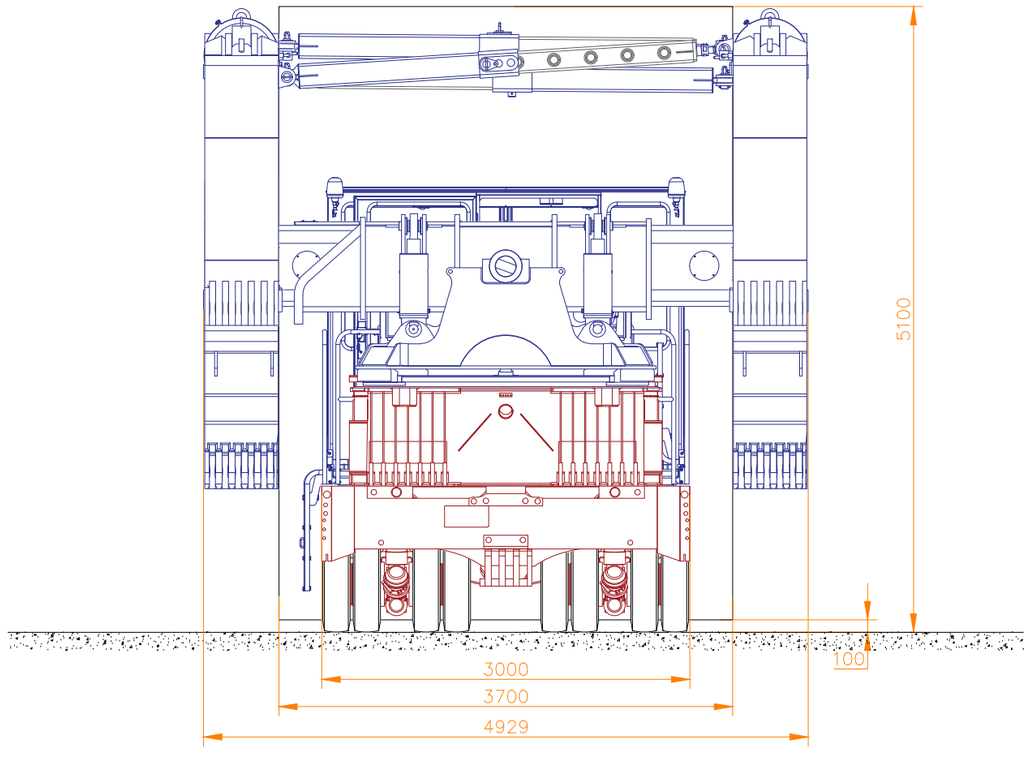
PLAN & SIDE ELEVATION VIEW. SCALE 1:200



TRAILER END ELEVATION VIEW. SCALE 1:50



END ELEVATION VIEW. SCALE 1:50



For Information

1.	THIS DRAWING IS PRELIMINARY AND IS RELEASED FOR INFORMATION ONLY.
2.	ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS OTHERWISE STATED.
3.	ALL WEIGHTS ARE IN METRIC TONNES (t) UNLESS OTHERWISE STATED.
4.	THE CLIENT IS RESPONSIBLE FOR THE PREPARATION OF THE TRANSPORT AREAS TO ENSURE THAT IT IS CAPABLE OF ACCOMMODATING THE LOADS GENERATED BY THE TRAILERS DURING ALL TRANSPORT / LOADING AND UNLOADING OPERATIONS. GROUND TO BE SUITABLY COMPACTED AND LEVELLED FOR A SAFE AND CONVENIENT TRANSPORT OPERATION.
5.	THE CLIENT IS RESPONSIBLE FOR THE STRUCTURAL INTEGRITY OF THE LOAD TRANSPORTED.
6.	THE CLIENT IS TO IDENTIFY AND CONFIRM THE SUITABILITY OF THE SUPPORT POINTS ON THE LOAD TO BE UTILISED DURING TRANSPORT. IT IS ASSUMED THE TRANSFORMER WILL BE FITTED WITH TRANSPORT BRACKETS.
7.	SECURE CARGO ONTO THE TRAILER USING LASHING MATERIAL TO PREVENT SLIDING AND/OR TIPPING OF THE LOAD. ALL STRAPS AND CHAINS TO BE TIGHTENED WITH RATCHET BINDERS. ANTI SLIP RUBBER MATTING TO BE USED BETWEEN THE TRAILER AND THE BASE OF THE LOAD INCLUDING ALL STEEL CONTACT AREAS TO PROMOTE FRICTION.
8.	ALL EQUIPMENT IS SUPPLIED IN ACCORDANCE WITH COLLETT & SONS LIMITED TERMS AND CONDITIONS, AND THE RELEVANT R.H.A. 2009 TERMS AND CONDITIONS.
9.	WITHOUT AUTHORISED SIGNATURES THIS DOCUMENT IS UNCONTROLLED, NOT BINDING AND FOR INDICATIVE PURPOSES ONLY.

Weights Table		
Type	Description	Weight
Type of Trailer	20 Axle Girder Bridge Combination	132.860 t
Type of Load	Transformer	200.000 t
	Total loaded weight excluding tractor units	332.860 t
	Load per axle line on trailer (equivalent to 2 file)	16.643 t
	Load per axle per file	8.322 t
	Load per wheel	2.080 t
Abnormal Load Classification: Special Order (BE16)		

Rev:	Drawn by:	Date:	Checked by:	Date:
00	A.Abdallah	19/03/2018	S.Mangham	19/03/2018

Description: First Issue

Client: Royal Haskoning DHV

Project: Norfolk Vanguard

Title: 200 ton Transformer Transport Arrangement

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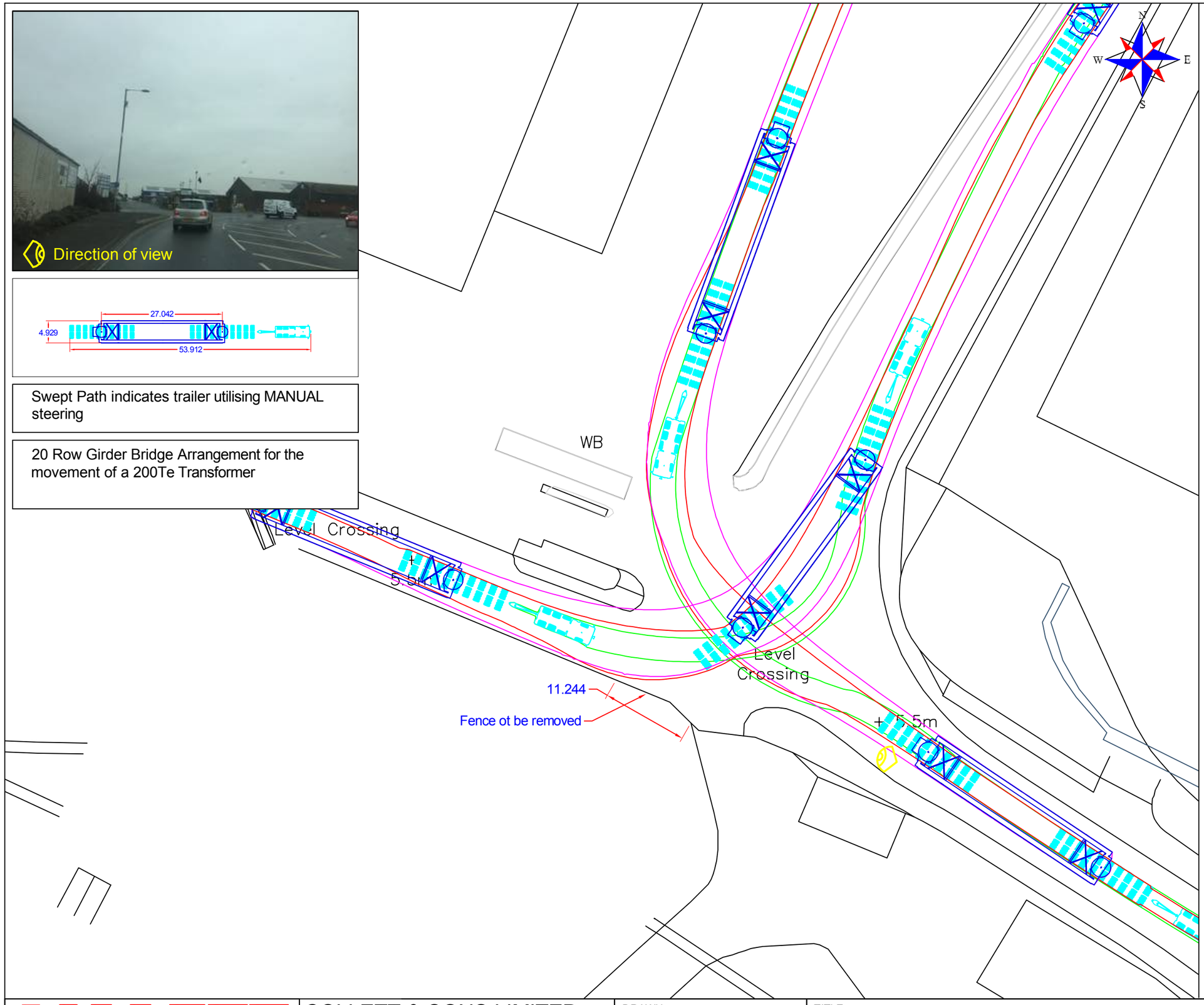
Web: www.collett.co.uk

Paper Size:	Scale:	Project No:	Drawing No:	Sheet No:
A3	As Noted	314597	COL-D-314597-1-1	1 of 1

APPENDIX 2 – SWEPT PATH ANALYSIS

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Exit Kings Lynn port onto Edward Benefer Way.

Caution

- A reverse manoeuvre is required when exiting the port in order to avoid modifications.
- Vehicle to turn left onto Edward Benefer towards town centre then reverse back into Port Entrance.
- Vehicle will then turn left onto Edward Benefer Way..

UK Grid Reference: TF 61846 20715

- The swept path analysis provided is produced from a purely transport orientated view, and does not consider any political issues in terms of land ownership, or any other precincts raised, that may otherwise be restrictive.
- The drawing has been produced from data created by Collett. A site visit has **not** been conducted to verify road widths or the presence of street furniture.
- All swept path diagrams and assessments are made and calculated for the road movement of loaded trailer equipment carrying Turbine components. These dimensions are based on the turning circles and specification of Collett & Sons Ltd trailer equipment.
- This SPA is a means of providing evidence of minimum requirements of any one vehicle as a footprint and there is no safety factor or margin included.
- Turbine delivery vehicles can be both left and right hand drive vehicles, therefore due to drivers perception it must be assumed that every vehicle will not follow the exact same line and so a margin of additional space should be allowed for.
- Land take is usually referred to when land is required from Private Land Owners; road widening is usually referred to when land is required within highways boundaries. The boundaries between private land and highways property are assumed by using obvious demarcation such as fence lines/hedges etc. It should be noted that actual boundaries between highways and private land are not substantiated in this report and can only be authenticated by carrying out land searches.
- Police escorts and permits will be required for the movement of all of the components. Form 'BE16' permits will also be required to undertake the movement of the vehicle shown in the swept path analysis. These permits are at the discretion of the Highway Agency (HA). Therefore, approval of these 'permits for movements' by the HA are a major consideration before the physical capability to deliver these components are undertaken.
- In critical areas, where modifications are required, the road construction must be formed to the minimum specification contained in the Turbine Manufactures Transport Guidance Notes.
- The Turbine Manufactures Transport Guidance Notes will state the minimum road width required for the transport of components. Any roads below this stated width will require widening to reflect this regardless of any swept path analysis not indicating modifications.
- The information is privileged and confidential and is for the exclusive use of the nominated client.
- All dimensions in meters

Area within red outline will be swept by tractor and trailer axles

Hatched area within red outline to be levelled and prepared to accept axle loadings

Area within magenta outline will be oversailed by load and projections

Area within green outline will be oversailed by trailer body

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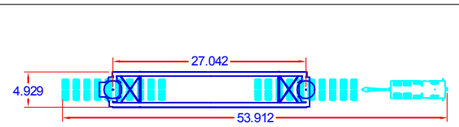
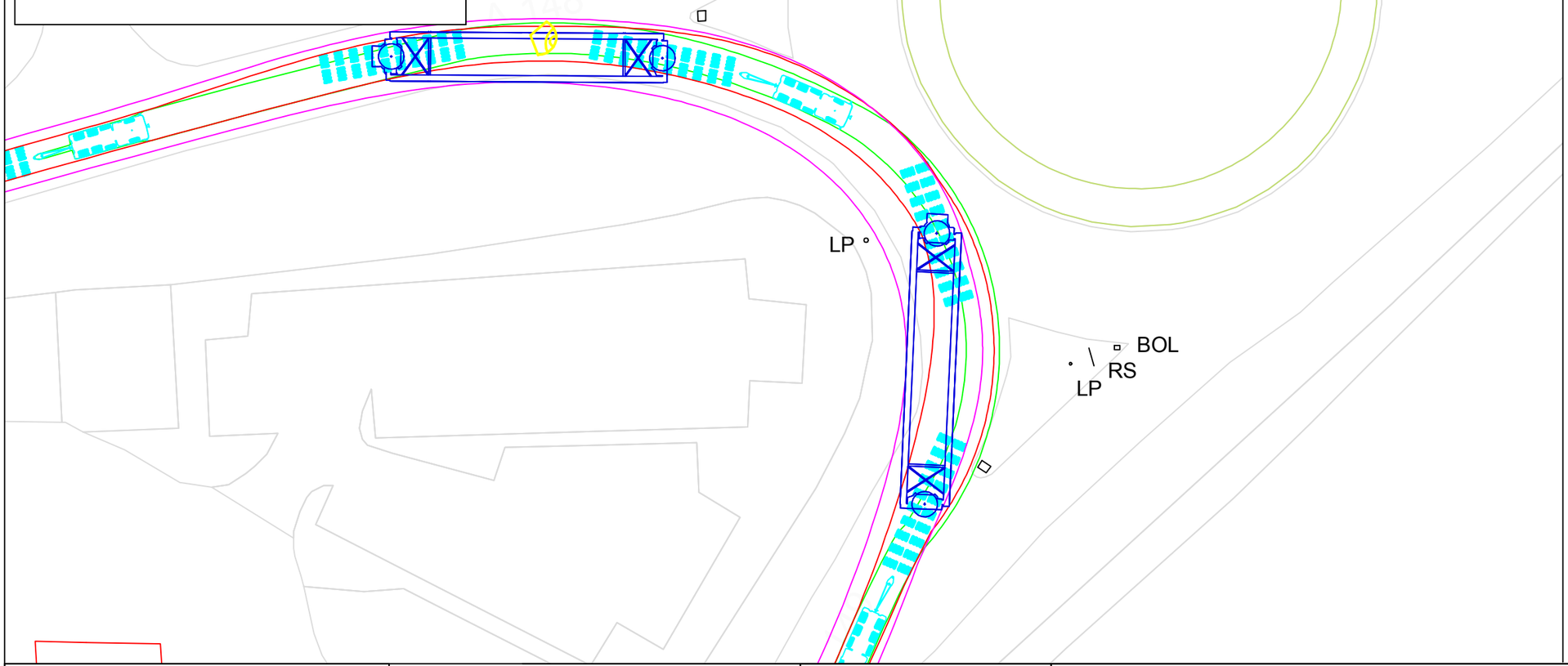
Halifax, HX2 0DF WEB: www.collett.co.uk

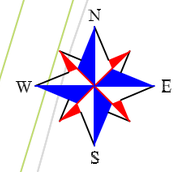
DRAWN S.MANGHAM	TITLE EXIT KINGS LYNN PORT ONTO EDWARD BENEFER WAY		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500 / SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-100A1.1



Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer





Continue on A148 to roundabout junction with A149 Queen Elizabeth Way,

Caution

- Loaded vehicle will navigate this roundabout utilising a contraflow manoeuvre.

UK Grid Reference: TF 66754 22967

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Area within green outline will be oversailed by trailer body

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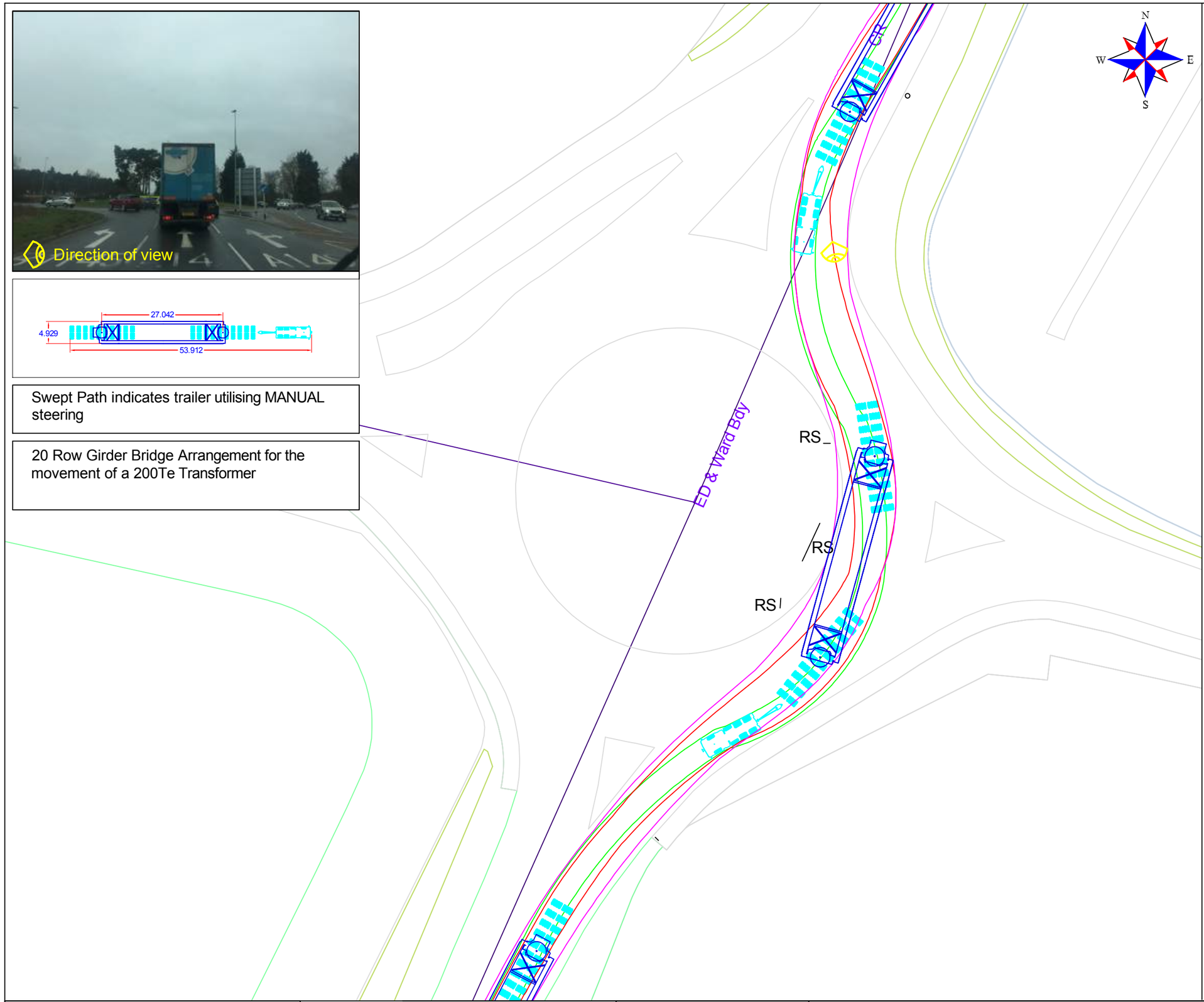
DRAWN S.MANGHAM	TITLE A148 ROUNDBAOUT JUNCTION WITH A149		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500 SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-120A1.1

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A149 to roundabout to at junction with A1076.
At roundabout continue on A149.

Caution

- Loaded vehicle will navigate this roundabout utilising manual steering.

UK Grid Reference: TF 65339 20203

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Area within green outline will be oversailed by trailer body

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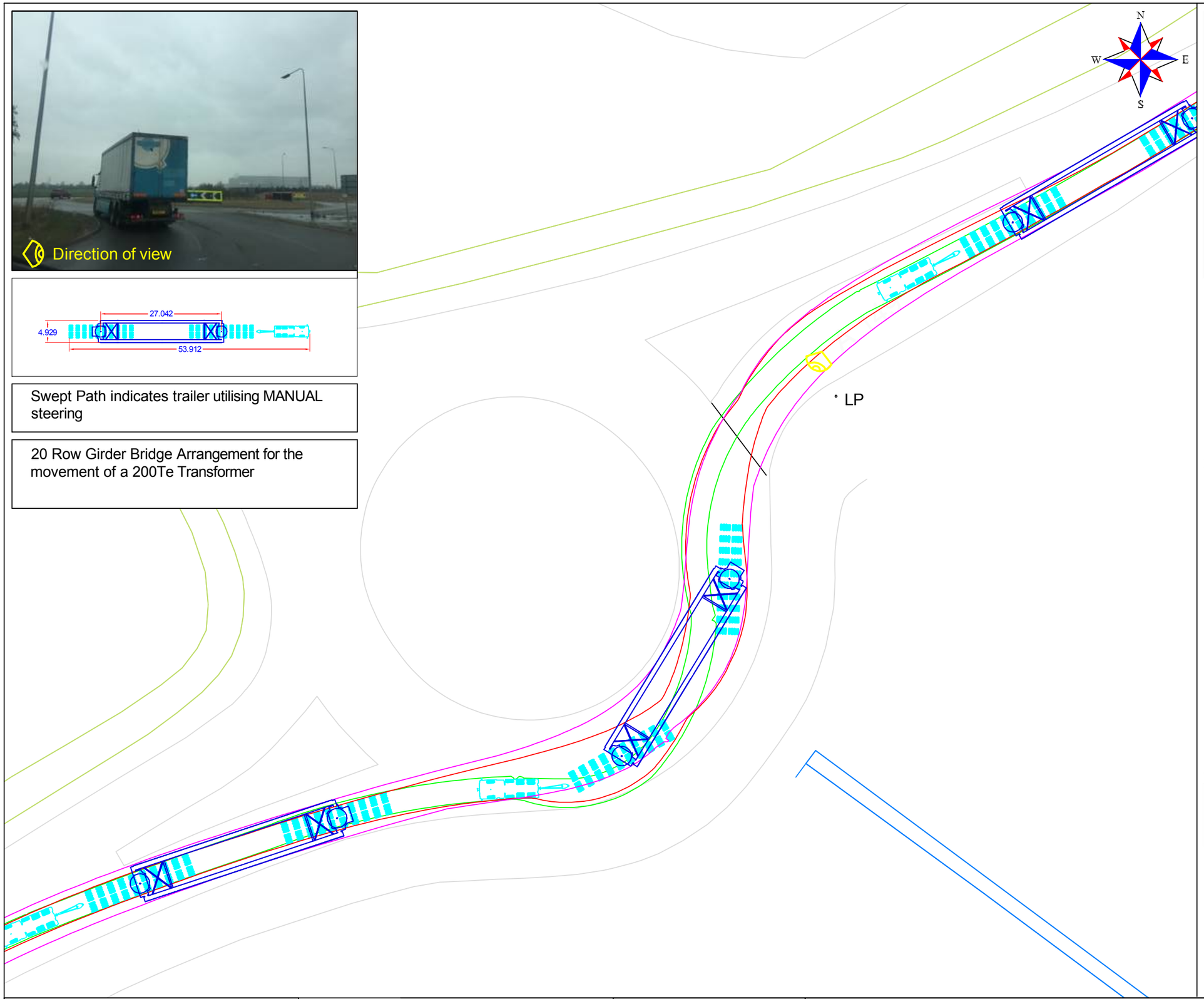
DRAWN S.MANGHAM	TITLE A149 ROUNDABOUT JUNCTION WITH B1145		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500 SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-130A1.1

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A149 to roundabout to at junction with Sainburys.
At roundabout continue on A149.

****Caution****

- Loaded vehicle will navigate this roundabout utilising manual steering.

UK Grid Reference: TF 63957 18715

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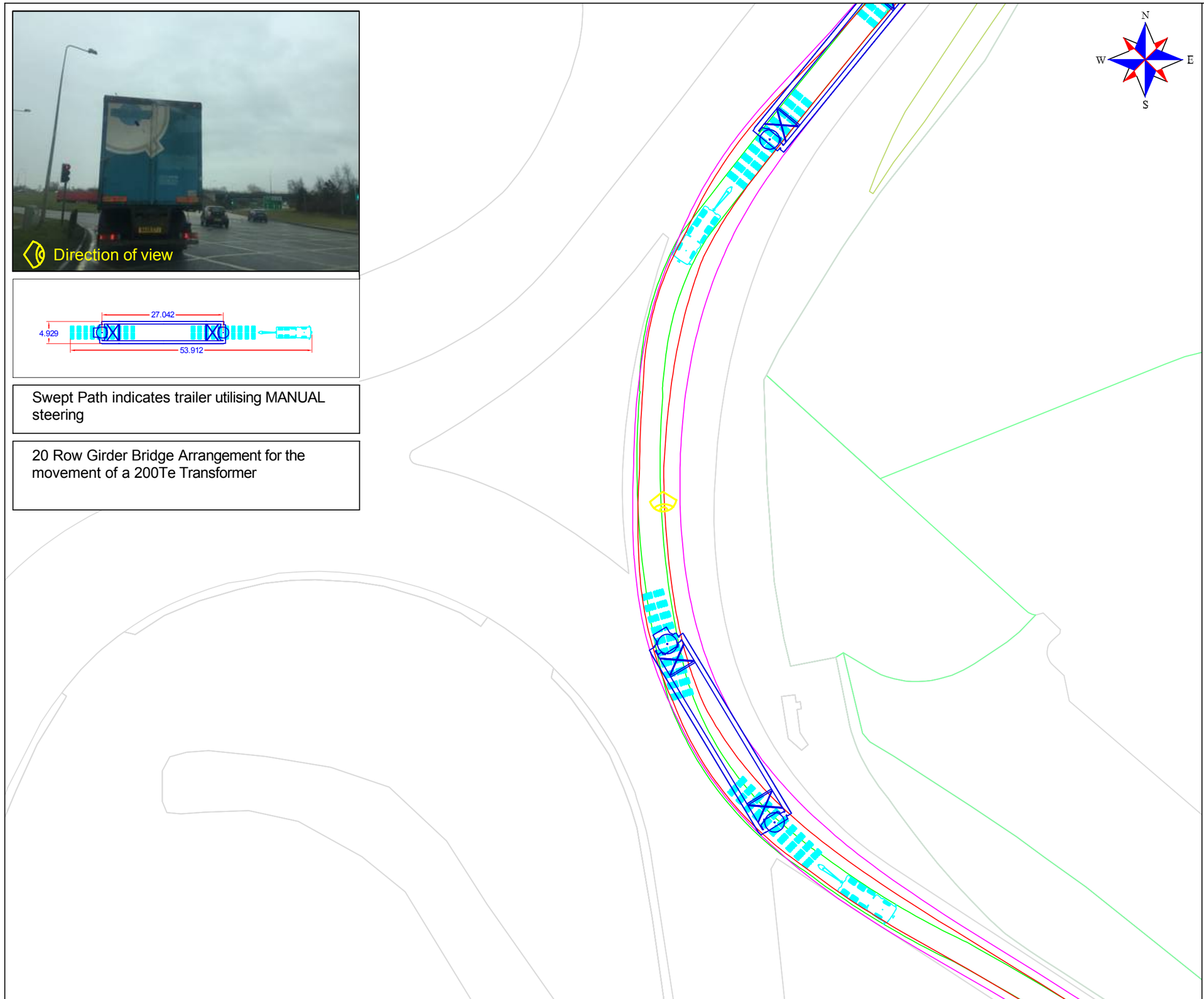
Halifax, HX2 0DF WEB: www.collett.co.uk

DRAWN S.MANGHAM	TITLE A149 ROUNDABOUT JUNCTION WITH SAINBURYS		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500	SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-140A1.1

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A149 to roundabout junction with A47,
At junction turn right onto A47

****Caution****

- Loaded vehicle will navigate this roundabout utilising manual steering.

UK Grid Reference: TF 63240 18156

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Area within green outline will be oversailed by trailer body

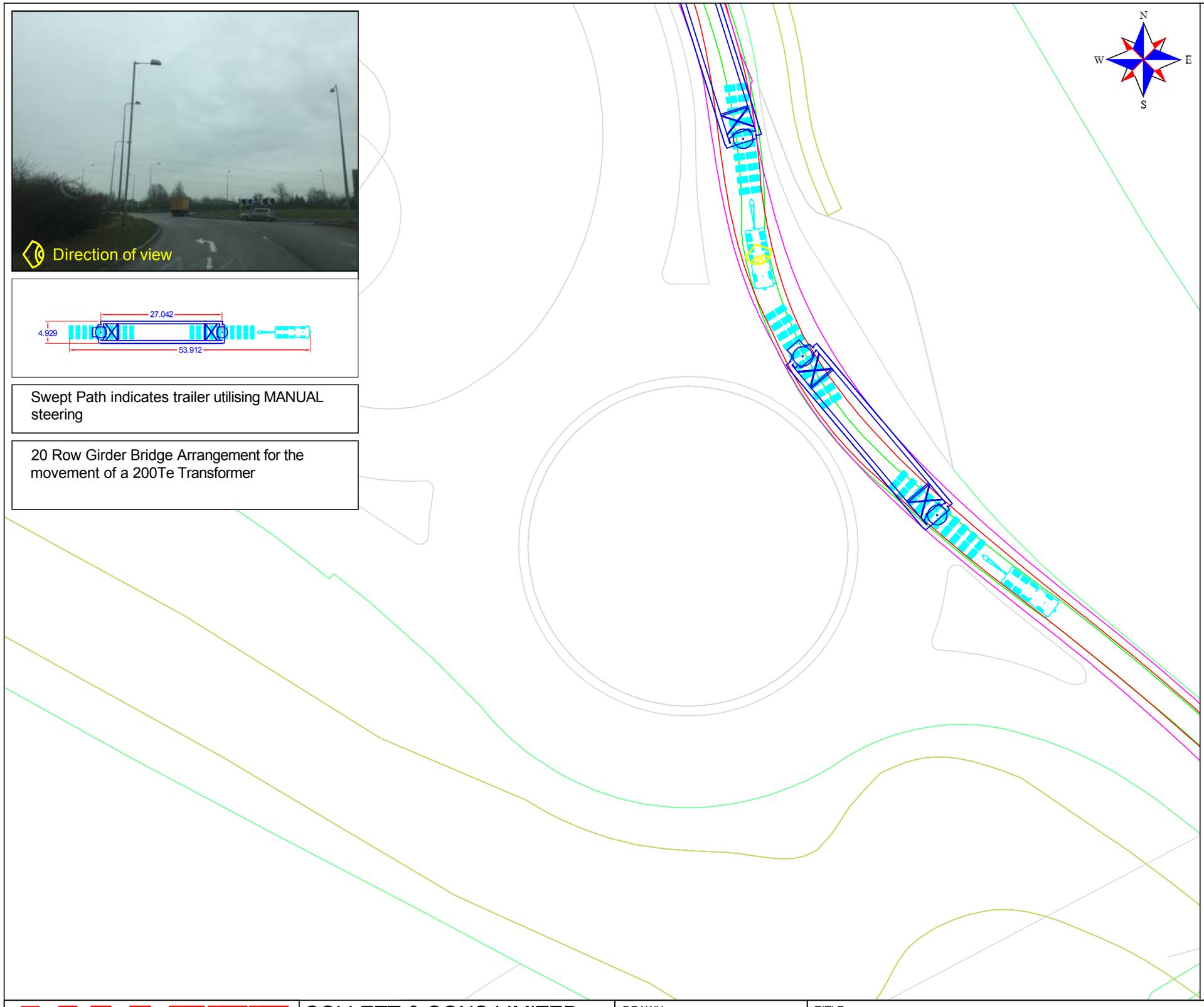
COLLETT
EXPERTS IN MOTION

COLLETT & SONS LIMITED
Victoria Terminal TEL: +44(0)8456 255288
Albert Road FAX: +44(0)8456 255244
Halifax, HX2 0DF WEB: www.collett.co.uk

DRAWN	S.MANGHAM	TITLE	A149/A47 ROUNDABOUT JUNCTION
DATE	20/03/2018	MAPPING	ORDNANCE SURVEY Not Adjusted
CUSTOMER	ROYAL HASKONING DHV		
SCALE	1:500	SIZE	A3
PINCH POINT IDENTIFIED BY	COLLETT	SITE	NORFOLK VANGUARD
DWG. NO	314597-150A1.1		

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A47 to roundabout.
At roundabout, turn left onto A47.

Caution

- Loaded vehicle will navigate this roundabout utilising manual steering.

UK Grid Reference: TF 63500 18063

- The swept path analysis provided is produced from a purely transport orientated view, and does not consider any political issues in terms of land ownership, or any other precincts raised, that may otherwise be restrictive.
- The drawing has been produced from data created by Collett. A site visit has **not** been conducted to verify road widths or the presence of street furniture.
- All swept path diagrams and assessments are made and calculated for the road movement of loaded trailer equipment carrying Turbine components. These dimensions are based on the turning circles and specification of Collett & Sons Ltd trailer equipment.
- This SPA is a means of providing evidence of minimum requirements of any one vehicle as a footprint and there is no safety factor or margin included.
- Turbine delivery vehicles can be both left and right hand drive vehicles, therefore due to drivers perception it must be assumed that every vehicle will not follow the exact same line and so a margin of additional space should be allowed for.
- Land take is usually referred to when land is required from Private Land Owners; road widening is usually referred to when land is required within highways boundaries. The boundaries between private land and highways property are assumed by using obvious demarcation such as fence lines/hedges etc. It should be noted that actual boundaries between highways and private land are not substantiated in this report and can only be authenticated by carrying out land searches.
- Police escorts and permits will be required for the movement of all of the components. Form 'BE16' permits will also be required to undertake the movement of the vehicle shown in the swept path analysis. These permits are at the discretion of the Highway Agency (HA). Therefore, approval of these 'permits for movements' by the HA are a major consideration before the physical capability to deliver these components are undertaken.
- In critical areas, where modifications are required, the road construction must be formed to the minimum specification contained in the Turbine Manufactures Transport Guidance Notes.
- The Turbine Manufactures Transport Guidance Notes will state the minimum road width required for the transport of components. Any roads below this stated width will require widening to reflect this regardless of any swept path analysis not indicating modifications.
- The information is privileged and confidential and is for the exclusive use of the nominated client.
- All dimensions in meters

Area within red outline will be swept by tractor and trailer axles

Hatched area within red outline to be levelled and prepared to accept axle loadings

Area within magenta outline will be oversailed by load and projections

Area within green outline will be oversailed by trailer body

COLLETT
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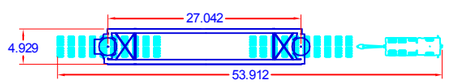
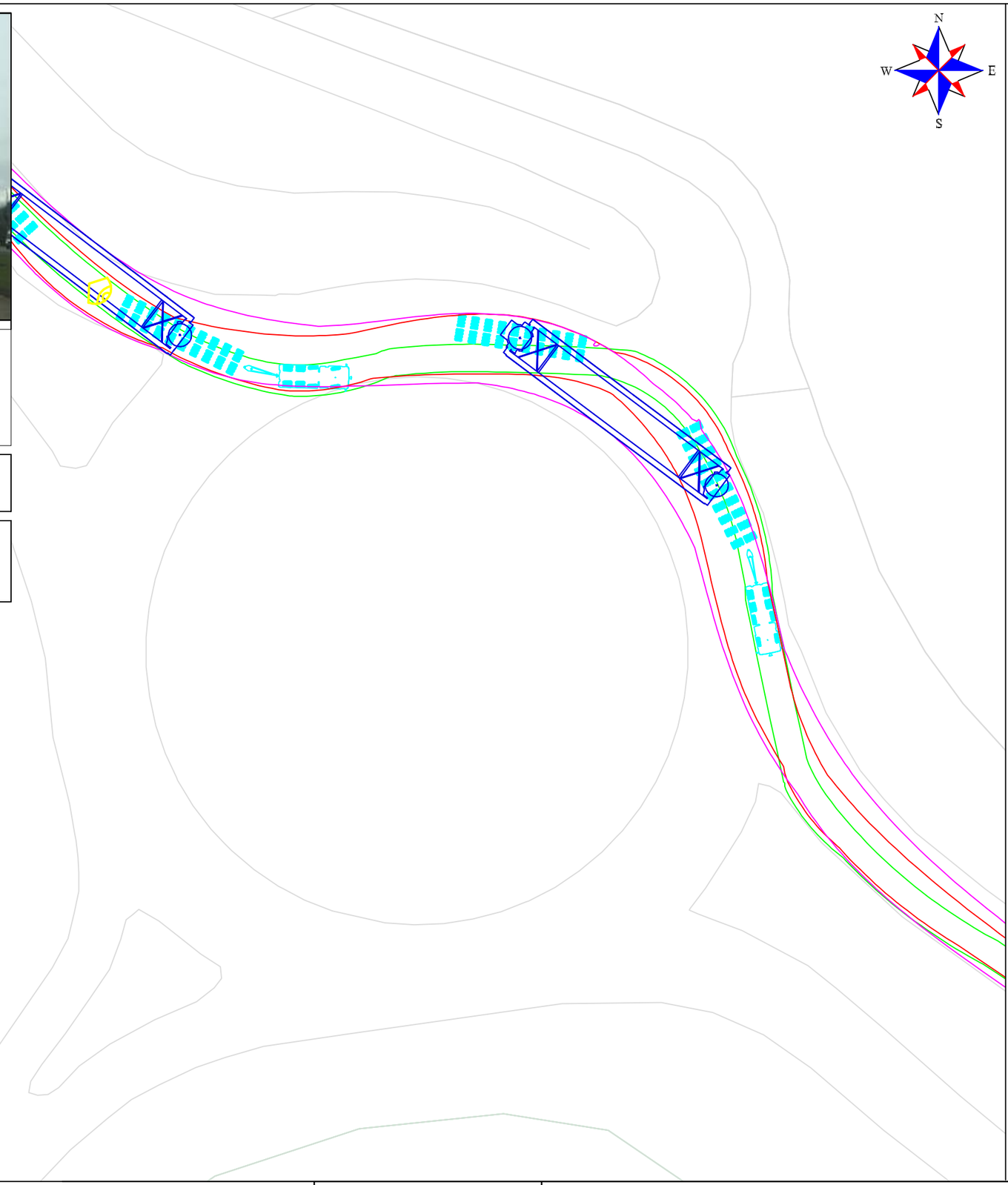
Albert Road FAX: +44(0)8456 255244
Halifax, HX2 0DF WEB: www.collett.co.uk

DRAWN S.MANGHAM	TITLE A47 ROUNDABOUT		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500 SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-160A1.1



Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A47 to roundabout at junction with A1122.
At roundabout, continue on A47.

Caution

- Loaded vehicle will navigate this roundabout utilising manual steering.

UK Grid Reference: TF 78318 09912

- The swept path analysis provided is produced from a purely transport orientated view, and does not consider any political issues in terms of land ownership, or any other precincts raised, that may otherwise be restrictive.
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- All dimensions in meters

Area within red outline will be swept by tractor and trailer axles

Hatched area within red outline to be levelled and prepared to accept axle loadings

Area within magenta outline will be oversailed by load and projections

Area within green outline will be oversailed by trailer body

COLLETT
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COLLETT & SONS LIMITED
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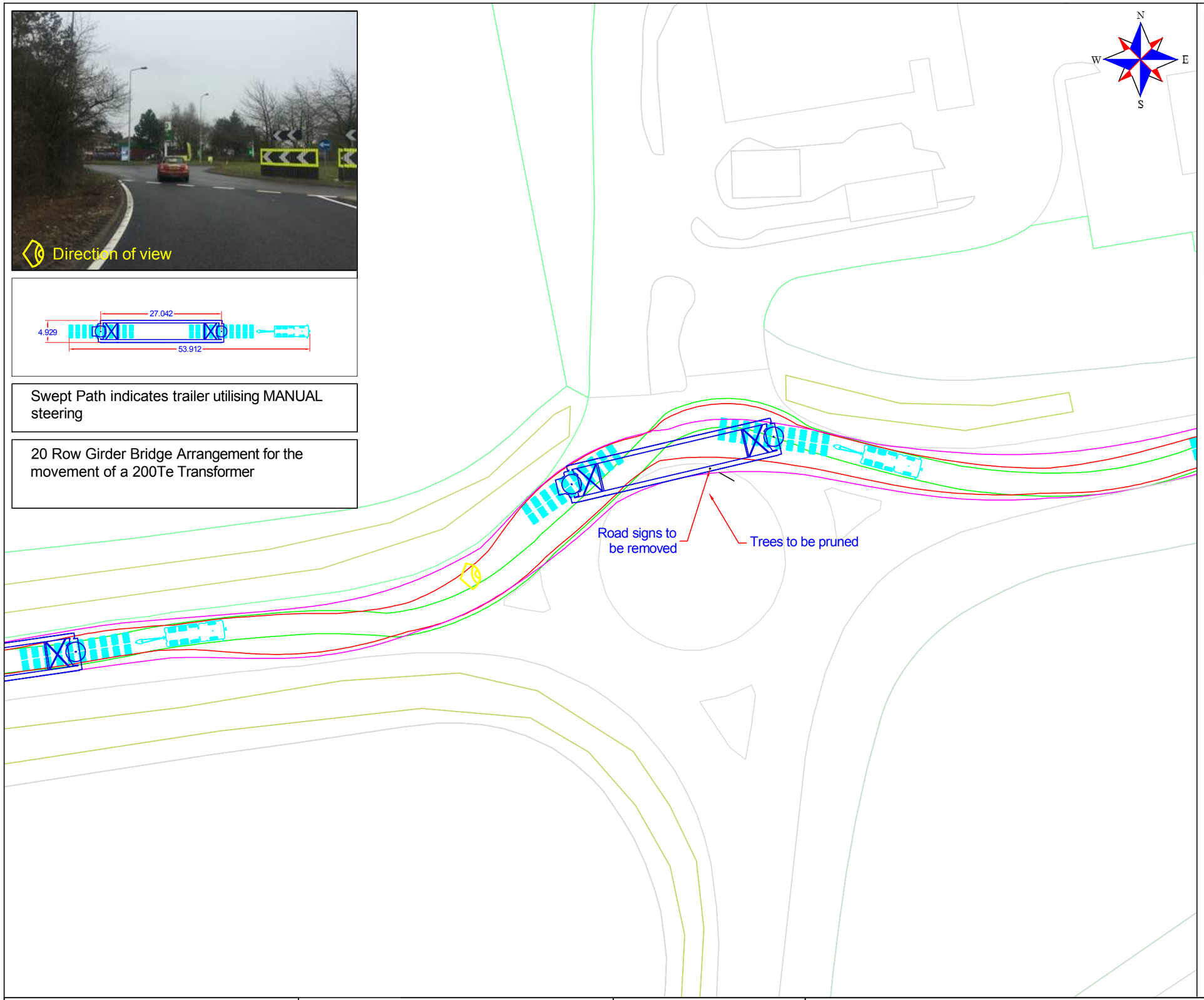
Albert Road FAX: +44(0)8456 255244
Halifax, HX2 0DF WEB: www.collett.co.uk

DRAWN S.MANGHAM	TITLE A47/A1122 ROUNDABOUT		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500	SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-170A1.1

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A47 to roundabout with Norwich Road.
At roundabout, continue on A47.

****Caution****

- Road signs on central island of the roundabout to be removed.
- Trees on roundabout to be pruned.
- Girder Bridge to be raised to clear central island.

UK Grid Reference: TF 84305 09509

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Hatched area within red outline to be levelled and prepared to accept axle loadings

Area within magenta outline will be oversailed by load and projections

Area within green outline will be oversailed by trailer body

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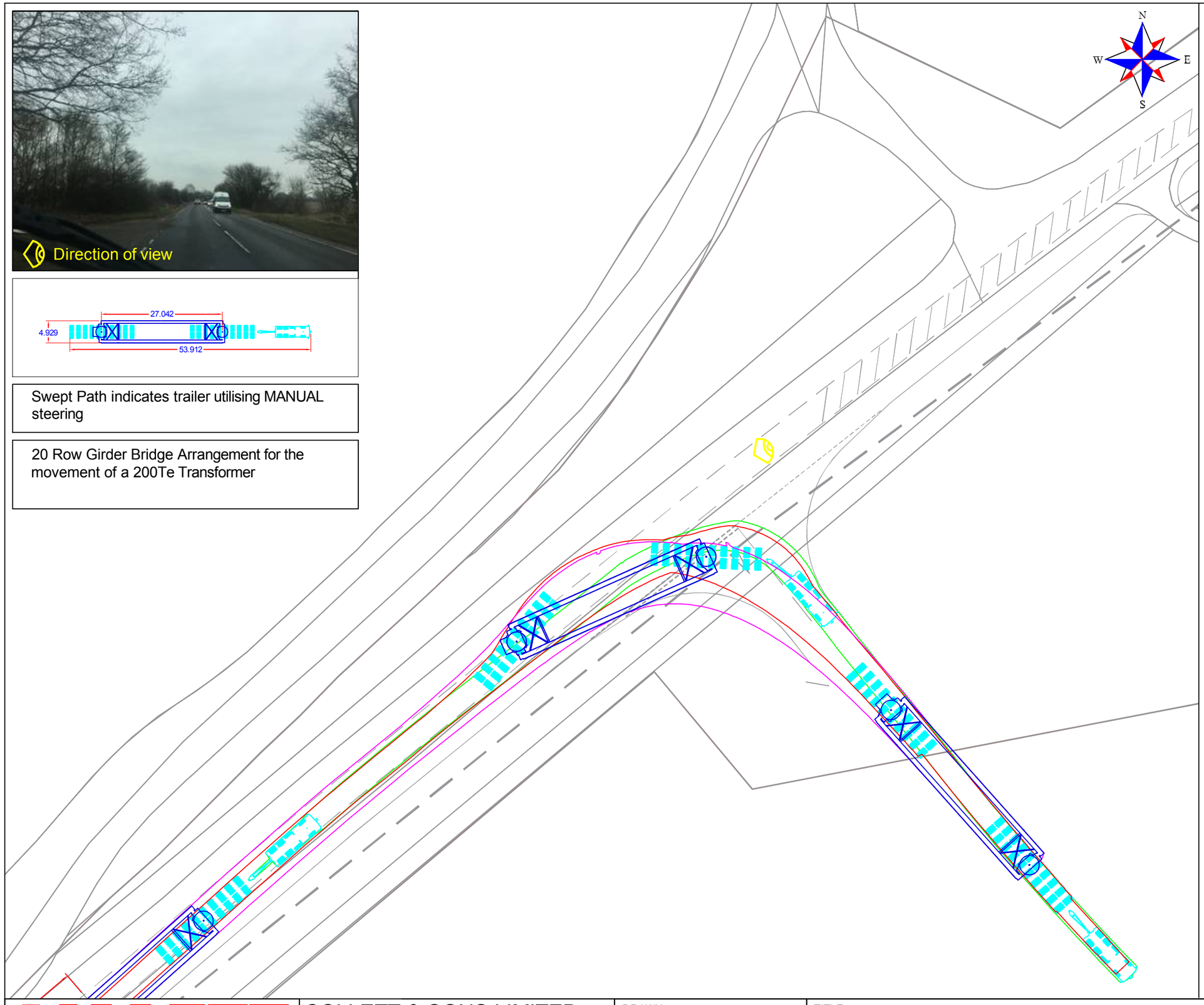
Albert Road FAX: +44(0)8456 255244
Halifax, HX2 0DF WEB: www.collett.co.uk

DRAWN S.MANGHAM	TITLE A47/NORWICH ROAD ROUNDABOUT		
DATE 20/03/2018	MAPPING ORDNANCE SURVEY Not Adjusted	CUSTOMER ROYAL HASKONING DHV	
SCALE 1:500 SIZE A3	PINCH POINT IDENTIFIED BY COLLETT	SITE NORFOLK VANGUARD	DWG. NO 314597-180A1.1

Swept Path indicates trailer utilising MANUAL steering

20 Row Girder Bridge Arrangement for the movement of a 200Te Transformer



Continue on A47 to proposed site entrance.

Caution*

- Proposed junction alignment can be navigated utilising manual steering.

UK Grid Reference: TF 89245 11382

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Area within magenta outline will be oversailed by load and projections

Area within green outline will be oversailed by trailer body

COLLETT
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Albert Road FAX: +44(0)8456 255244
Halifax, HX2 0DF WEB: www.collett.co.uk

DRAWN	S.MANGHAM	TITLE	PROPOSED SITE ENTRANCE OFF A47		
DATE	20/03/2018	MAPPING	PROVIDED BY CLIENT	CUSTOMER	ROYAL HASKONING DHV
SCALE 1:500	SIZE A3	PINCH POINT IDENTIFIED BY	COLLETT	SITE	NORFOLK VANGUARD
				DWG. NO	314597-190A1.1

APPENDIX 3 - COUNCIL CORRESPONDENCE AND COMMENTS

COLLETT
EXPERTS IN MOTION

Victoria Terminal
Albert Road
HALIFAX
West Yorkshire
HX2 0DF

Mistral Point
AW Nielsen Road
GOOLE
East Yorkshire
DN14 6UE

Baltic House
Central Dock Road
GRANGEMOUTH
Central Scotland
FK3 8TY

Tel. +44 (0) 8456 255 233
Fax +44 (0) 8456 255 244
Email info@collett.co.uk
www.collett.co.uk

Our Ref:	314597	**Date:**	10th March 2018

Application for 'Confirmation of suitable route' for Norfolk Vanguard.

To Whom it May Concern,

I am currently carrying out a survey to a site called 'Norfolk Vanguard', off A47 near Necton.

Could you please **confirm in writing** that the **route** detailed below and all structures that are involved in your area on this route are suitable in terms of axle loadings, spacing and Gross vehicle weights, in connection with the loaded vehicle specifications below.

Route:

- Exit Kings Lynn Harbour onto Edward Benefer Way,
- Continue on Edward Benerfer Way to merge onto Grimston Road A148.
- Continue on A148 to roundabout junction with A149 Queen Elizabeth Way,
- At roundabout turn right onto A149 Queen Elizabeth Way,
- Continue on A149 through 2 roundabouts to roundabout junction with A47,
- At roundabout turn left onto A47,
- At roundabout turn left onto A47,
- At roundabout, continue on A47,
- At roundabout continue on A47,
- Continue on A47 to proposed site entrance on the right hand side at approx. OS Grid refs: TF 89245 11382.

Load A: Girder Bridge Only

Rigid Length	27.042	Overall Length	49.70	Overall Width	7.39	Overall Height	4.929	Gross Vehicle Weight	332.86Te

-

	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of wheels per axle	8	8	8	8	8	8	8	8	8	8	8	8	8
Axle Weight (Te.)	16.64	16.64	16.64	16.64	16.64	16.64	16.64	16.64	16.64	16.64	16.64	16.64	16.64
Axle Spacing		1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	11.78	1.50	1.50	1.50

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Albert Road
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West Yorkshire
HX2 0DF

Mistral Point
AW Nielsen Road
GOOLE
East Yorkshire
DN14 6UE

Baltic House
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Central Scotland
FK3 8TY

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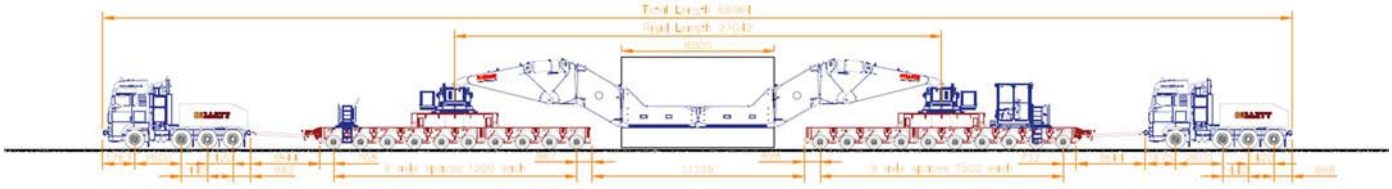
Fax +44 (0) 8456 255 244
Email info@collett.co.uk

www.collett.co.uk

14	15	16	17	18	19	20
8	8	8	8	8	8	8
16.64	16.64	16.64	16.64	16.64	16.64	16.64
	1.50	1.50	1.50	1.50	1.50	1.50



Should there be any problem with any part of the route detailed, I would appreciate your immediate response.

Your urgent response would be greatly appreciated.
Many thanks & best regards

Steven Mangham

COLLETT & SONS LTD

Victoria Terminal
Albert Road
HALIFAX
West Yorkshire
HX2 0DF

Mistral Point
AW Nielsen Road
GOOLE
East Yorkshire
DN14 6UE

Baltic House
Central Dock Road
GRANGEMOUTH
Central Scotland
FK3 8TY

Tel. +44 (0) 8456 255 233
Fax +44 (0) 8456 255 244
Email info@collett.co.uk

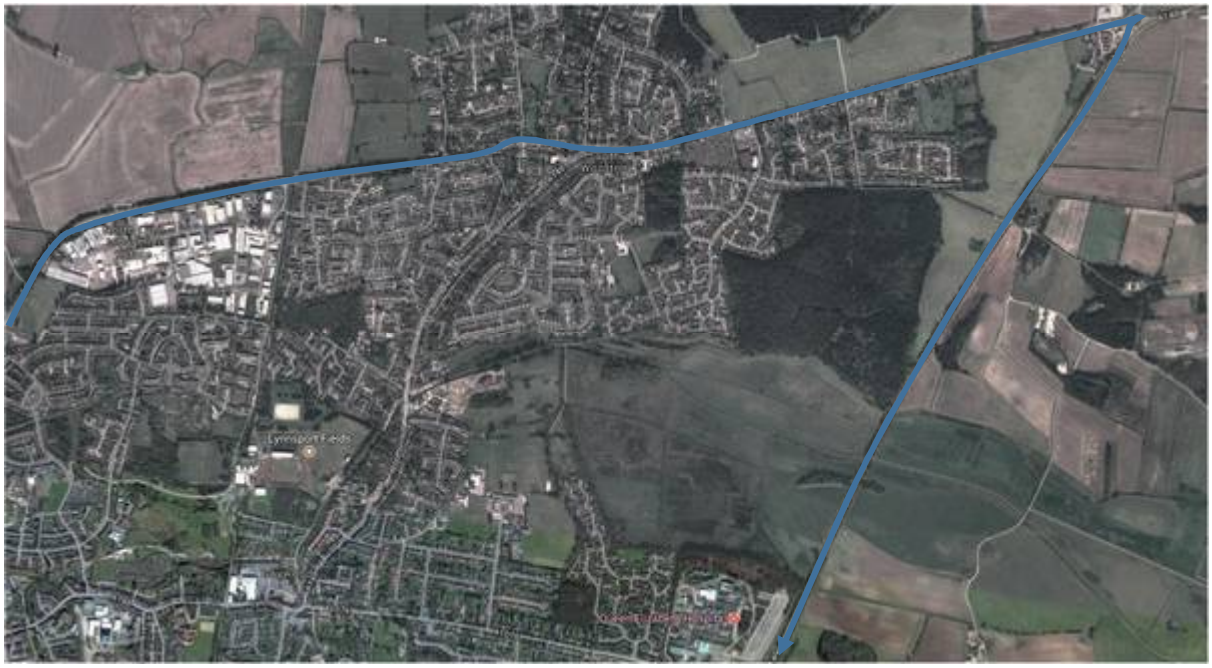
www.collett.co.uk

Map of Routes

Route A

Exit from Kings Lynn Harbour on Edward Benefer Way.

Continue on Edward Benefer Way to merge on Grimston Road A148.



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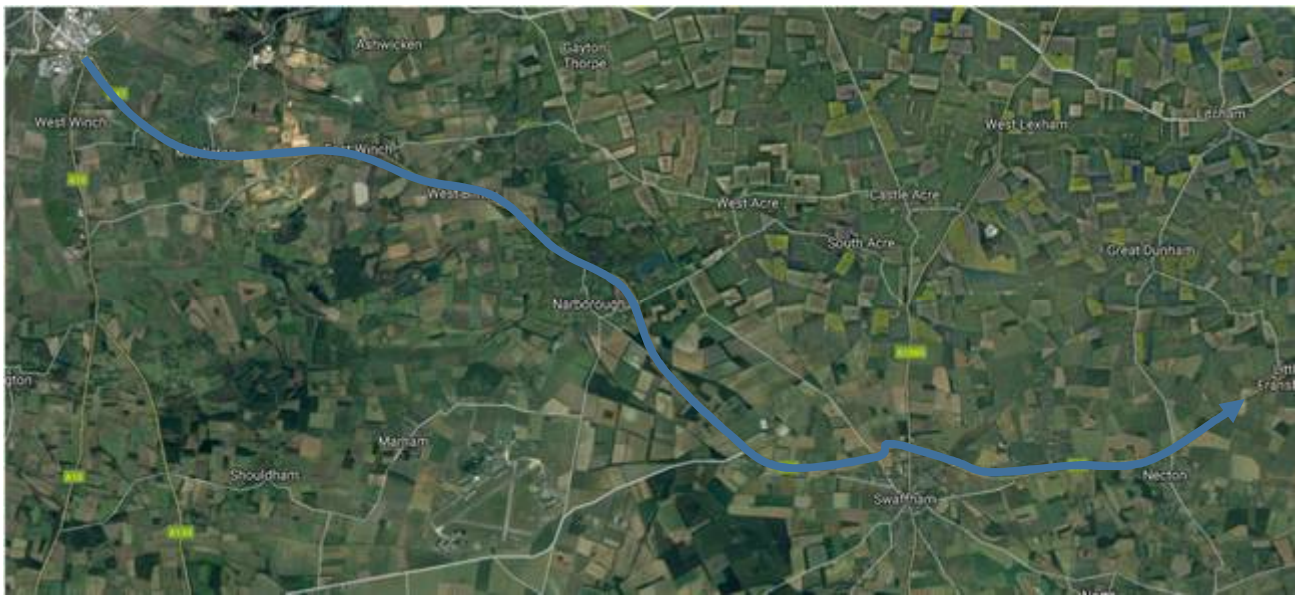
Continue on A148 to roundabout jucntion with A47.

Continue on A47 to Site



Steven Mangham

From: Howell, Tania <Tania.Howell@jacobs.com>
Sent: 21 March 2018 08:19
To: Steven Mangham
Subject: RE: Confirmation of Suitable Route - 314597

Good morning Steven,

Thank you for your enquiry.
I can confirm that neither of the route options will affect any Historic Railways Estate structures.

Regards
Tania

Tania Howell
Abnormal Loads Officer
Jacobs
DDI: 0118 946 8911

If your mail concerns abnormal load movements, please reply to RSGBRB@jacobs.com

---

From: Steven Mangham [mailto:Steven.Mangham@collett.co.uk]
Sent: 20 March 2018 16:54
To: abloads.area6@kier.co.uk; roadspace.area6@kier.co.uk; abnormalloads@norfolk.gov.uk; Abnormal Loads Contact (AbnormalLoadsContact@networkrail.co.uk) <AbnormalLoadsContact@networkrail.co.uk>; abnormal.loads@canalrivertrust.org.uk; RSGBRB@jacobs.com
Subject: [EXTERNAL] Confirmation of Suitable Route - 314597

Good Afternoon,

To Whom It May Concern:

Please find attached a Confirmation of Suitable Route request for Norfolk Vanguard.

Please note that, at present, we do not require a permit to move. This request is for information purposes only to ensure that the route is suitable to accept the axles loads proposed and to identify any potential structure issues there may be on the identified route.

If you could response in writing to steven.mangham@collett.co.uk that would be much appreciated.

Kind Regards,

Steven Mangham
Consulting Team Manager/Renewables Project Manager

Collett & Sons Ltd | Victoria Terminal | Albert Road | Halifax | HX2 0DF | UK
Tel: +44 (0)8456 255288 | Fax: +44 (0)8456 255244 | [redacted]
Email: steven.mangham@collett.co.uk | Web: www.collett.co.uk

Steven Mangham

From: Administrator
Sent: 26 March 2018 12:11
To: Steven Mangham
Subject: FW: 2018-03-23 00-00 Confirmation_of_suitable_route_314597
Attachments: 2018-03-23 00-00 Confirmation_of_suitable_route_314597.pdf; 2018-03-23 00-00 Confirmation_of_suitable_route_314597.xlsx

Michael Collett
Director

Collett & Sons Ltd | Victoria Terminal | Albert Road | Halifax | HX2 0DF | UK
Tel: +44 (0)8456 255233 | Fax: +44 (0)8456 255244 | [redacted]

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www.collett.co.uk

From: Hughes, John [mailto:John.Hughes@kier.co.uk]
Sent: 26 March 2018 11:59
To: info at collett
Cc: Nick Hyde (Nicolas.hyde@highwaysengland.co.uk); Chimwemwe Banda
Subject: 2018-03-23 00-00 Confirmation_of_suitable_route_314597

Steven Mangham
Proposals such as in the attached have to be dealt with by due process.
If you have not already done so you must submit a Special Order Notification to:-

> Abnormal Loads
> Highways England | The Cube | 199 Wharfside Street | Birmingham | B1 1RN
> **Tel**: 0300 470 3102
> **Abnormal Loads Team Tel:** 0300 470 3004
> Web: http://www.highways.gov.uk

I believe that this is done via ESDAL.

There are potentially twenty structures belonging to Highways England that may be affected by your proposal, though I note that you are avoiding some of the larger span structures in your attached proposal.

The structures potentially affected by your proposal are listed in the attached excel spreadsheet.
We at Kier are unable to process your proposal further without a notification and Special Order reference from Highways England.

Regards

John Hughes Bsc. C.Eng MICE

Project Manager Structures
Abnormal Loads Coordinator Highways England Areas 6 and 8

Kier Services I **Highways** I Sandy Highways Depot, Beamish Close, Sandy **SG19 1SD**
T: I 01223 255255 I E: john.hughes@kier.co.uk
Web www.kier.co.uk

Steven Mangham

From: Nicholson Katie <Katie.Nicholson@networkrail.co.uk> on behalf of Network Rail Abnormal Loads <NetworkRailAbnormalLoads@networkrail.co.uk>
Sent: 23 March 2018 13:20
To: Steven Mangham
Subject: QID 615 RE: Confirmation of Suitable Route - 314597

Hi Steven,

Your proposed movement does not affect any Network Rail owned road over rail bridges or tunnels therefore we have no objection to your proposed routes.

Please note we only check the load carrying capacity of Network Rail owned road over rail bridges affected we do not check anything else including:

- Load carrying capacity of level crossings
- Clearance to bridge parapets
- Clearance under a rail bridge
- Clearance to overhead wires at level crossings

Many Thanks

Katie Nicholson
Abnormal Loads Assistant
Abnormal Loads Help Desk: 01908 783 140

NetworkRail Route Services

Abnormal Loads | National Records Group | Route Services
The Quadrant | Elder Gate | Milton Keynes | MK9 1EN
D 01908 783 140 | **E** Katie.Nicholson@networkrail.co.uk **W** Network Rail Abnormal Loads

---

From: Steven Mangham [mailto:Steven.Mangham@collett.co.uk]
Sent: 20 March 2018 16:53
To: abloads.area6@kier.co.uk; roadspace.area6@kier.co.uk; abnormalloads@norfolk.gov.uk; Network Rail Abnormal Loads; abnormal.loads@canalrivertrust.org.uk; rsgbrb@jacobs.com
Subject: Confirmation of Suitable Route - 314597

Good Afternoon,

To Whom It May Concern:

Please find attached a Confirmation of Suitable Route request for Norfolk Vanguard.

Please note that, at present, we do not require a permit to move. This request is for information purposes only to ensure that the route is suitable to accept the axles loads proposed and to identify any potential structure issues there may be on the identified route.

If you could response in writing to steven.mangham@collett.co.uk that would be much appreciated.

Kind Regards,

Steven Mangham
Consulting Team Manager/Renewables Project Manager

Collett & Sons Ltd | Victoria Terminal | Albert Road | Halifax | HX2 0DF | UK
Tel: +44 (0)8456 255288 | Fax: +44 (0)8456 255244 | [redacted]
Email: steven.mangham@collett.co.uk | Web: www.collett.co.uk

Steven Mangham

From: ETD Bridges <pandt.bridges@norfolk.gov.uk>
Sent: 21 March 2018 12:15
To: Steven Mangham
Subject: RE: MOVING - NO DATE FW: Confirmation of Suitable Route - 314597 ABNORMAL LOAD

Hi Steven

I have checked the routes and do not see any problems with the proposed vehicle/axle loads travelling over the NCC owned structures on the route. NCC are not responsible for the structures on the A47 and you will need to contact Highways England for them to comment on the suitability of that part of the route.

Regards

Mark

Mark North
Bridge Network Engineer
Highways & Transport
Community and Environmental Services

Direct Dial Telephone No: 01603 223804
Direct Fax No: 01603 223305
E-mail: mark.north@norfolk.gov.uk

Norfolk County Council
General enquiries: 0344 800 8020 or information@norfolk.gov.uk
Website: www.norfolk.gov.uk

From: Abnormal Loads
Sent: 21 March 2018 08:56
To: ETD Bridges <pandt.bridges@norfolk.gov.uk>
Subject: MOVING - NO DATE FW: Confirmation of Suitable Route - 314597 ABNORMAL LOAD

From: Steven Mangham [mailto:Steven.Mangham@collett.co.uk]
Sent: 20 March 2018 16:53
To: abloads.area6@kier.co.uk; roadspace.area6@kier.co.uk; Abnormal Loads <abnormalloads@norfolk.gov.uk>; Abnormal Loads Contact (AbnormalLoadsContact@networkrail.co.uk) <AbnormalLoadsContact@networkrail.co.uk>; abnormal.loads@canalrivertrust.org.uk; rsgbrb@jacobs.com
Subject: Confirmation of Suitable Route - 314597

Good Afternoon,

To Whom It May Concern:

Please find attached a Confirmation of Suitable Route request for Norfolk Vanguard.

Please note that, at present, we do not require a permit to move. This request is for information purposes only to ensure that the route is suitable to accept the axles loads proposed and to identify any potential structure issues there may be on the identified route.

If you could response in writing to steven.mangham@collett.co.uk that would be much appreciated.

Kind Regards,

Steven Mangham
Consulting Team Manager/Renewables Project Manager

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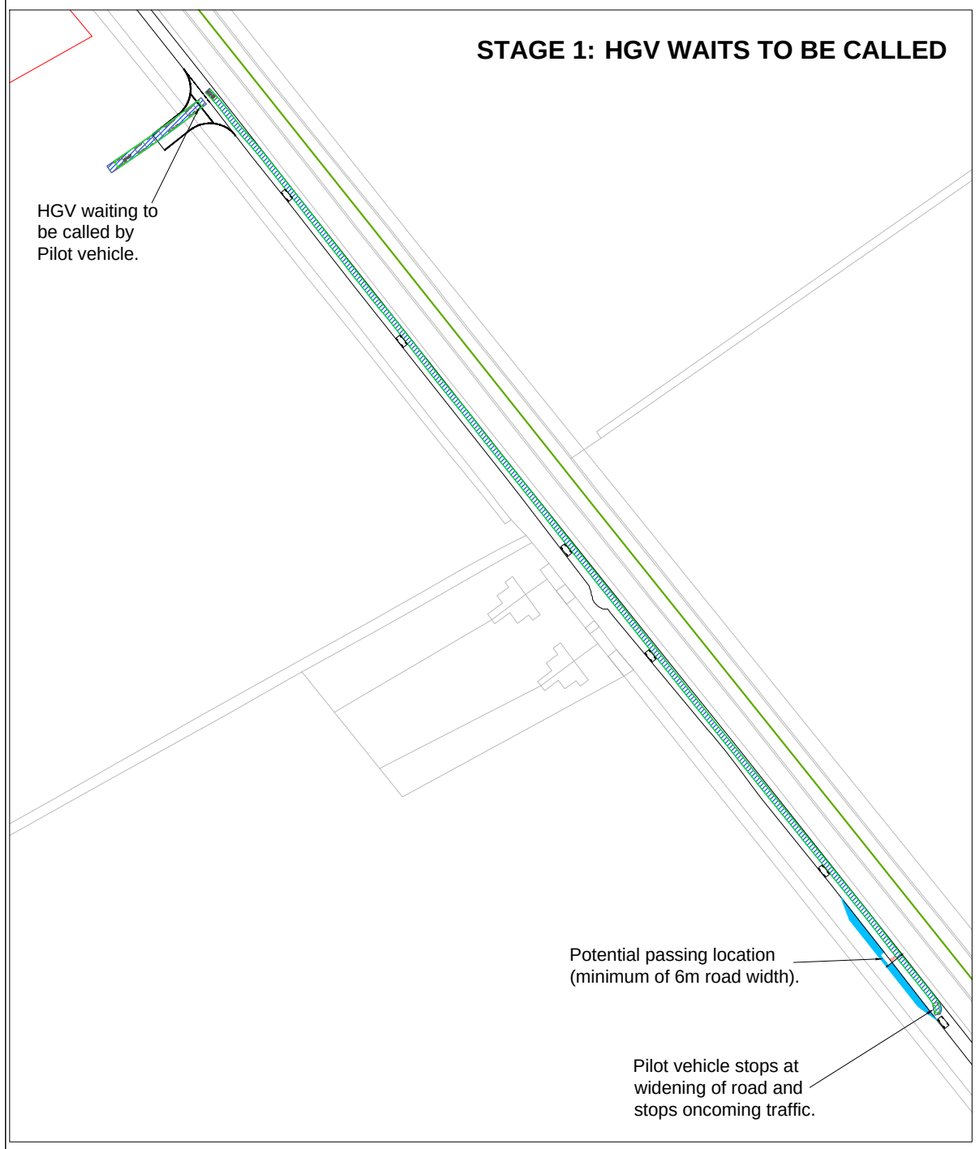
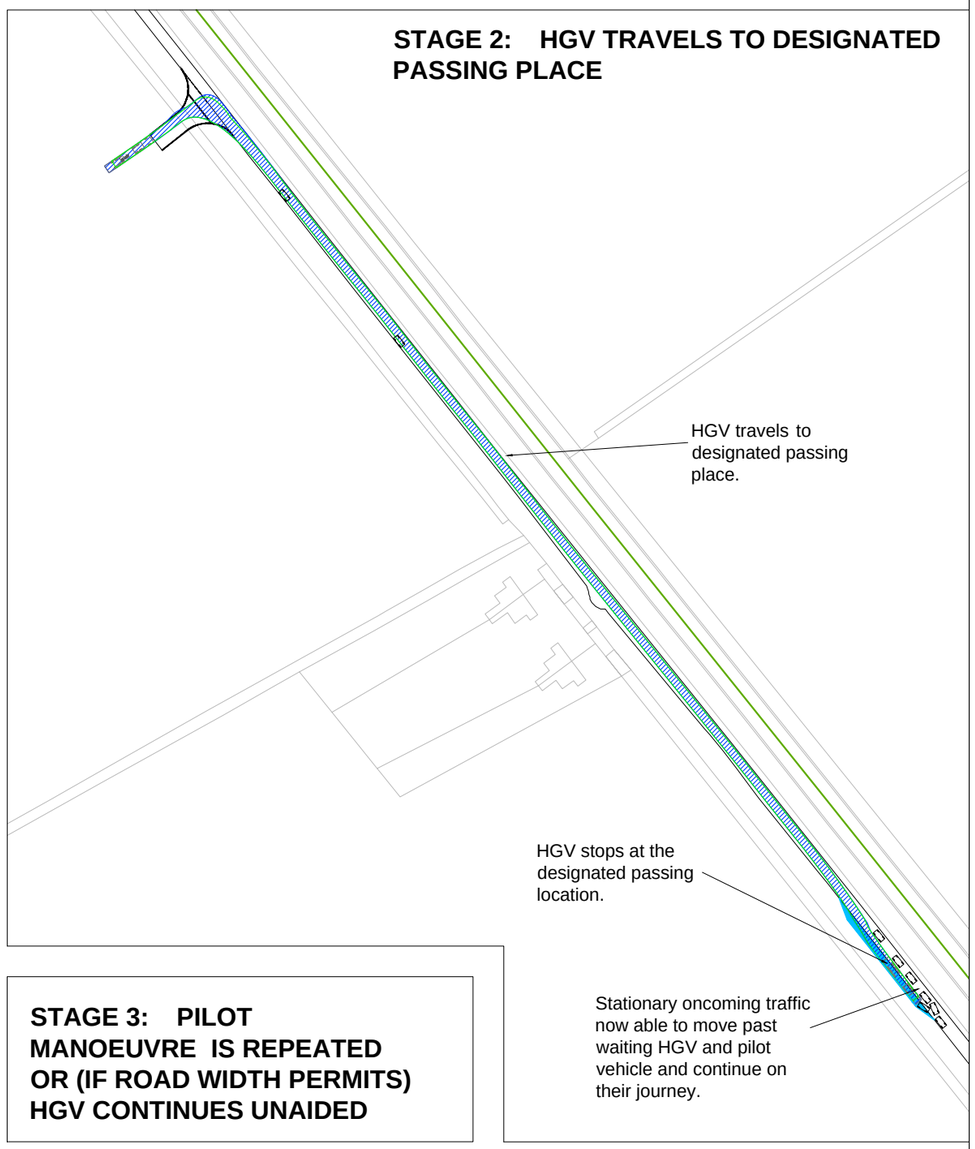
11 APPENDIX 4 PILOT VEHICLE CONCEPT





STAGE 3: PILOT MANOEUVRE IS REPEATED OR (IF ROAD WIDTH PERMITS) HGV CONTINUES UNAIDED

Legend

PROJECT: NORFOLK VANGUARD OFFSHORE WIND FARM	**TITLE:** PILOT VEHICLE WITH PASSING PLACES

Rev	Date	By	Comment		
				Drg No	TP-PB47476-DR011
				Rev	D0.1
				Date	02.05.18
				Layout	LAYOUT