Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Cable Statement

August 2022
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Glossary of Acronyms

APFP	Applications: Prescribed Forms and Procedures
DCO	Development Consent Order
DEL	Dudgeon Extension Limited
DEP	Dudgeon Offshore Wind Farm Extension Project
DOWF	Dudgeon Offshore Wind Farm
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
km	Kilometre
MHWS	Mean High Water Springs
MMO	Marine Mammals Organisation's
MW	Megawatt
NSIP	Nationally Significant Infrastructure Project
OFTO	Offshore Transmission Owner
OSP	Offshore Substation Platform
SEL	Scira Extension Limited
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SOWF	Sheringham Shoal Offshore Wind Farm
WT	Wind Turbine

Glossary of Terms and Acronyms

Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore lease area.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
DCO Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable corridor which would house HDD entry or exit points.
Infield cables	Cables which link the wind turbines to the offshore substation platforms.
Interlink cables	Cables linking two separate project areas. This can be cables linking: 1) DEP South and DEP North 2) DEP South and SEP 3) DEP North and SEP 1 is relevant if DEP is constructed alone or first in a phased development. 2 and 3 are relevant in an integrated construction.
Interlink cable corridor	This is the area which will contain the interlink cables between offshore substation platform/s and the adjacent Offshore Temporary Works Area.
Integrated Grid Option	Transmission infrastructure which serves both extension projects.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable corridor to joint

	sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore and connected to the onshore export cables.
Offshore export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
Separated Grid Option	Transmission infrastructure which allows each project to transmit electricity entirely separately.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension lease area.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
The Applicant	Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the DCO. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP. (See intro chapter for example).
Transition joint bay	Connects offshore and onshore export cables at the landfall. The transition joint bay will be located above mean high water.

8.1 CABLE STATEMENT

8.1.1 Summary

1. Equinor New Energy Ltd. (the Applicant) is planning to develop the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and the Dudgeon Offshore Wind Farm Extension Project (DEP), (the Projects) with an export capacity of approximately 786 megawatt (MW) in total. The Projects SEP and DEP wind farm sites are 15.8 kilometres (km) and 26.5km from the coast for SEP and DEP respectively at their closest point.

2. Whilst SEP and DEP have different commercial ownerships and are each deemed Nationally Significant Infrastructure Projects (NSIPs) in their own right, a single application for development consent is being made for both wind farms, and their associated transmission infrastructure. A single planning process and Development Consent Order (DCO) application is intended to provide for consistency in the approach to the assessment, consultation and examination, as well as increased transparency for a potential compulsory acquisition process. Applicant is submitting an application to the Secretary of State under Section 37 of the Planning Act 2008 for a DCO for the construction and operation of both Projects.

3. This Cable Statement has been prepared in accordance with Regulation 6(1)(b)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (the APFP Regulations) which requires the applicant for a DCO for the construction of an offshore generating station to provide a statement regarding the route and method of installation of any cable connecting the generating station to the onshore electricity transmission network.

4. The Applicant is seeking to coordinate the development of SEP and DEP as far as possible. The preferred option is a development scenario with an integrated transmission system, providing transmission infrastructure which serves both of the wind farms, where both projects are built concurrently. However, given the different commercial ownerships of each Project, alternative development scenarios such as a separated grid option (i.e. transmission infrastructure which allows each Project to transmit electricity entirely separately) will allow SEP and DEP to be constructed in a phased approach, if necessary. Therefore, the DCO application seeks to consent a range of development scenarios in the same overall corridors to allow for separate development if required, and to accommodate either sequential or concurrent build of the two projects.

5. The range of development scenarios considered for SEP and DEP can be broadly categorised as:

   a) In isolation: – where only SEP or DEP is constructed,

   b) Sequential: – where SEP and DEP are both constructed in a phased approach with either SEP or DEP being constructed first; or

   c) Concurrent: – where SEP and DEP are both constructed at the same time.

6. The Applicant's DCO application contains all of the electrical infrastructure required for the Project, summarised as follows:

a) The offshore electrical components for the Project consisting of array, inter-connector, offshore electrical platform (OSP) and export cables that transmit the power from the wind turbines (WT) to landfall at Weybourne. The offshore electrical assets consist of up to two offshore electrical platforms
b) An onshore cable corridor will link the landfall with the grid connection point at the existing Norwich Main substation, via a new high voltage alternating current (HVAC) onshore substation. An HVAC transmission system will be used for the transmission of the power from the wind farm site/s to the onshore substation

7. The Grid Connection Agreement that has been secured by the Applicant is for a connection located at the Norwich Main substation in Norfolk. via a new HVAC onshore substation. An HVAC transmission system will be used for the transmission of the power from the wind farm site/s to the onshore substation

8.1.2 Introduction

8. This Cable Statement has been prepared by Equinor New Energy Ltd. (the Applicant) pursuant to Regulation 6(1)(b)(i) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (the APFP Regulations).

9. This Statement forms part of the application to the Secretary of State for the Projects for a DCO to construct and operate offshore generating station SEP and DEP:

SEP will consist of between 13 and 23 wind turbines, each having a rated electrical capacity of between 15MW and 26MW

DEP will consist of between 17 and 30 wind turbines, each having a rated electrical capacity of between 15MW and 26MW.

Taken together, there will be between 30 and 53 wind turbines, producing an expected total estimate of 786MW As the export capacity of the Projects will exceed 100MW each, they are Nationally Significant Infrastructure Projects (NSIP) as defined under sections 14(1)(a) and 15(3) of the Planning Act 2008.

10. The SEP and DEP wind farm sites are 15.8km and 26.5km from the coast for SEP and DEP respectively at their closest point.

11. Further information on the location and design of the Project is set out in the accompanying Environmental Statement **Chapter 4 Project Description** (Document 6.1.4).

12. The Applicant is seeking to coordinate the development of SEP and DEP as far as possible. The preferred option is a development scenario with an integrated transmission system, providing transmission infrastructure which serves both of the wind farms, where both Projects are built concurrently. However, given the different commercial ownerships of each Project, alternative development scenarios such as a separated grid option (i.e. transmission infrastructure which allows each Project to transmit electricity entirely separately) will allow SEP and DEP to be constructed in a phased approach, if necessary. Therefore, the DCO application seeks to consent a range of development scenarios in the same overall corridors to allow for separate development if required, and to accommodate either sequential or concurrent build of the two Projects.

13. The **draft DCO** (document reference 3.1) therefore makes provision for the following scenarios:

14. Scenario 1 means each project is constructed separately in any one of the following ways:

    a. the construction of SEP only where DEP does not proceed to construction;

    b. the construction of DEP only where SEP does not proceed to construction;

    c. sequential construction of SEP then DEP or vice versa; or

    d. concurrent construction of the two projects;

15. Scenario 2 means the two projects are constructed sequentially and whichever project is constructed first will install the ducts for the second project;

16. Scenario 3 means either Scira Extension Limited (SEL) or Dudgeon Extension Limited (DEL) constructs on behalf of both itself and the other project an integrated onshore substation and connection to National Grid's Norwich Main Substation (the relevant works are identified in the Order as the scenario 3 integrated onshore works) and all other onshore and offshore works are constructed either concurrently or sequentially;

17. Scenario 4 means the two projects are constructed concurrently and either SEL or DEL constructs on behalf of both itself and the other project both onshore and offshore integrated works including the integrated offshore substation and the integrated onshore substation (the relevant works are identified in the Order as the integrated offshore works and scenario 4 integrated onshore works).

18. A **Scenarios Statement** (document reference 9.28) is also provided as part of the DCO application, which provides further information on the consenting scenarios for SEP and DEP.

19. This Statement provides details of the proposed offshore and onshore cable corridors and cable installation methods and is intended to provide a summary of the detailed information set out in the **Chapter 4 Project Description** (document reference 6.1.4) of the Environmental Statement.

8.1.3 Description of Grid Connection Works

20. The Applicant's application for a DCO (the Application) contains all of the electrical cable works required for the Project.

8.1.3.1 Electrical solution

21. The Applicant will deploy HVAC technology for the Project. HVAC cabling will be used between the WTs and the OPS, the offshore electrical platform(s) and the onshore project substation, with HVAC inter-array cabling; between the offshore array and the offshore electrical platforms; and for the interface cabling between the onshore project substation and the existing Norwich Main substation in Norfolk. This electrical solution will require the following:

8.1.3.2 Offshore works

22. Array cables will collect and transfer power generated by the WTs to the offshore electrical platforms. The cables connect the WTs together into strings, with the number of WTs connected together depending on factors such as the generation capacity of each WT on the relevant cable network, distance between WTs and the cable sizes available. The strings of WTs would then in turn be connected to the offshore electrical platforms.

23. Up to two offshore electrical platforms would collect electricity from the WTs and transport it to landfall via up to 2 high voltage direct current (HVDC) subsea export cables.

24. The subsea export cables would connect the offshore development to a landfall at, Weybourne on the North Norfolk coast. Depending on the development scenario the offshore cable corridor is either approximately 20km or 62km in length from the edge of the Project site to the landfall location.

8.1.3.3 Onshore works at the landfall

25. The transition jointing pit, where the offshore cables join the onshore cables, would be located at the landfall at Weybourne on the North Norfolk coast. To enable the export cables from the Projects to be brought through to the transition jointing pits, horizontal directional drillings (HDD) would be made and ducts would be installed to pull through and accommodate the cables.

8.1.3.4 Onshore cable corridor

26. The onshore cable corridor would run between the onshore transition jointing pits and the onshore substation site, located approximately 250m south of the Norwich Main substation south of Norwich. The route is approximately 60km long in a predominantly southernly direction from Weybourne, North Norfolk, passing through mainly agricultural land, with exception of Weybourne Wood, where the cable corridor will pass through a commercial woodland. This woodland will be crossed by two trenchless crossings to minimise tree losses in this location. The onshore cable corridor would be 60m wide increasing to 100m at trenchless crossings. The onshore cable corridor will contain the HVAC onshore export cables and associated fibre optic cables buried underground within ducts for both SEP and DEP. The onshore export cables will require trenches to be excavated, within which ducts will be installed to house the cable circuits. Major crossings, such as major roads, river and rail crossings will be undertaken using trenchless crossings techniques such as HDD upon which ducts will be fitted through.

8.1.3.5 Onshore project substation

27. The proposed site for the onshore substation is located in arable land south of the existing Norwich Main substation (**Figure 4.11**). The site is located approximately 250m south of the Norwich Main substation, immediately west of the Norwich to Ipswich rail line, and approximately 600m north of the nearest village of Swainsthorpe.

28. The substation will convert the exported power from HVAC, to 400kV (grid voltage). The substation also contains equipment to help maintain stable grid voltage.

29. Depending on the to be chosen project scenario the substation site would be located within a single compound where the size would be either up to 3.25ha or 6.0ha. The largest structures within the onshore substation will be the control building and SVC building with an approximate height of 15m. The main electrical equipment (transformers etc.) will not exceed a height of 15m. The tallest features within the onshore substation site will be the lightning protection masts at a height of 30m above ground level. The worst-case parameters have been assessed and included in the draft DCO.

8.1.4 Consenting of Grid Connection

30. Part 1 of Schedule 1 of the draft DCO describes the works for which development consent is being sought.

8.1.4.1 For offshore works - SEP

31. The SEP offshore generating station is comprised within Work Nos. 1A and 2A and includes the WTs and a network of subsea array cables. These Work Nos. apply in all project development scenarios.

32. Work Nos. 3A – 7A are the offshore grid transmission and connection works (including associated mitigation works) and are “associated development” to the generating station within the meaning of section 115 of the Planning Act 2008. These include an offshore substation platform, HVAC subsea export cables and landfall connection works comprising of a cable circuit and ducts seaward of MHWS. These Work Nos. apply in project development scenarios 1, 2 and 3.

8.1.4.2 For offshore works - DEP

33. The DEP offshore generating station is comprised within Work Nos. 1B and 2B and includes the WTs and a network of subsea array cables. These Work Nos. apply in all project development scenarios. Work Nos. 3B – 7B are the offshore grid transmission and connection works and are “associated development” to the generating station within the meaning of section 115 of the Planning Act 2008. These include an offshore substation platform, HVAC subsea export cables and landfall connection works comprising of a cable circuit and ducts seaward of mean high water springs (MHWS). These Work Nos. apply in project development scenarios 1, 2 and 3.

8.1.4.3 Offshore works – integrated grid solution

34. In scenario 4, offshore Work Nos. 3C to 7C would be undertaken instead of Work Nos. 3A to 7A and 3B to 7B. In scenario 4, either SEL or DEL would rely on the powers in the **draft DCO** (document reference 3.1) to deliver an integrated electrical system both onshore and offshore including:

   a. an integrated offshore substation platform located in SEP as opposed to two separate offshore substation platforms, one for each project;
   b. an integrated onshore substation and connection to Norwich Main; and
   c. up to two cable circuits and ducts (including landfall transmission works) between the offshore integrated substation platform and the onshore integrated substation.

8.1.4.4 Intertidal area SEP and/or DEP

35. One HDD duct will be required for the installation of each of the SEP and DEP export cables. As such, up to two drills will be undertaken for the landfall works. An extra drill per Project has been allowed for contingency (i.e. up to four drills in total to install two ducts). Each drill will be launched from a compound inland, drilled under the beach and intertidal area, and will exit out at sea.

36. The HDD will exit in the subtidal, approximately 1,000m from the coastline (up to 1,150m from the onshore entry point). The HDD works should not require any prolonged periods of restrictions or closures to the beach for public access, although it is possible that some work activities will be required to be performed on the beach that may require short periods of restricted access

37. In scenarios 1, 2 and 3 the activities described in paragraphs 35 and 36 fall under Work Nos. 7A and/or 7B to 8A and/or 8B. In scenario 4, the activities would fall under Work Nos. 7C and 8C.

8.1.4.5 Onshore works SEP and/or DEP

38. The Applicant has included its onshore works, from MHWS to the onshore project substation and the extension to the existing National Grid substation, under Schedule 1, part 1 “Authorised Development" within its DCO application to the Secretary of State.

39. Work Nos. 8A to 22A and/or 8B to 22B are the onshore grid transmission and connection works (including associated mitigation works) for SEP and are “associated development” to the generating station within the meaning of section 115 of the Planning Act 2008. These include the export cables from MHWS to the onshore substation, the onshore project substation itself including associated surface water management, embankments, boundary treatments, bunding and landscaping, and connection to the existing Norwich main substation.

40. In scenario 3, Work Nos. 15C to 17C would be undertaken instead of Work Nos. 14A to 16A and Work Nos. 14B to 16B where it is opted to construct the integrated onshore substation (but not the integrated offshore substation).

41. In scenario 4, onshore Work Nos. 8C, 9C 12C and 15C to 17C would be undertaken instead of Work Nos. 8A, 8B, 9A, 9B, 12A, 12B, 15A to 17A and 15B to 17B. In scenario 4, either SEL or DEL would rely on the powers in the draft DCO (document reference 3.1) to deliver an integrated electrical system both onshore and offshore including:

   a. an integrated offshore substation platform located in SEP as opposed to two separate offshore substation platforms, one for each project;
   b. an integrated onshore substation and connection to Norwich Main; and
   c. up to two cable circuits and ducts (including landfall transmission works) between the offshore integrated substation platform and the onshore integrated substation.

8.1.5 Description of Generating Equipment

42. The WTs consist of three primary components; the tower, the nacelle and the rotor. The rotor is the device which, through circular motion, extracts the energy from the wind. The nacelle houses the equipment that can turn rotational motion into electrical energy. The tower supports the nacelle and gives the rotor the necessary height.

43. The capacity of the Project will depend on the number of WTs that are installed and their individual rating. The Projects would consist of between 30 and 53 wind turbines, producing an expected total estimate of 786MW

44. In the UK, offshore wind farm developers such as the Applicant can either construct the offshore transmission assets themselves or opt for an Offshore Transmission Owner (OFTO) to do so. OFTO assets generally consist of the onshore infrastructure required to connect to the national electricity transmission system, the offshore export cables and offshore electrical stations.

45. If the Applicant constructs the assets itself, then it must transfer the assets to an OFTO post-construction and pre-operation. OFTOs are selected on a competitive basis through a tender process. It is anticipated that the Applicant will opt for the generator build option which means that the offshore transmission assets will be transferred to an OFTO post construction and pre-operation.

8.1.6 Offshore Cable Installation

8.1.6.1 Cable installation methods

46. The purpose of cable burial is to ensure that the cables are protected from damage, either from other activities such as fishing and shipping, or from naturally occurring physical processes acting on the sea bed.

47. Burial of the offshore cables will be through any combination of ploughing, jetting or mechanical cutting; however infield cable burial is more likely to be undertaken by jetting or mechanical cutting.

a. Ploughing: A plough uses a forward blade to cut through the sea bed, while burying the cable behind it. Ploughs can be used as a pre-trench tool (i.e. the cables are laid into a trench for later backfilling), a post-lay burial tool (i.e. the cable is first laid in position on the sea bed before being ploughed in) or, more commonly, as a simultaneous lay and burial tool. Ploughing tools can be pulled directly by a surface vessel or can be mounted onto self-propelled caterpillar tracked vehicles which run along the sea bed taking power from a surface vessel. The plough inserts the cable into the sea bed as it moves

b. Mechanical cutting: This method involves the excavation of a trench (either by pre-trenching or simultaneously with cable laying), with the excavated material placed alongside. The cable is then laid in the trench and the sediment returned to the trench to complete the burial of the cable, either mechanically or by natural processes. This is a challenging and time-consuming process (indicative burial rate is 30-80m/h) and while it will not be used as the primary burial method, it may be required for particular sections where the other methods are not feasible.

c. Jetting: Jetting uses high powered jets of water to fluidise the sea bed sediments and lower the cable to the required depth. Jetting may be undertaken either as a separate operation on a cable that has been pre-laid on the sea bed, or by simultaneously laying and jetting. As with a plough, the jetting tool can either be pulled directly by a surface vessel or mounted onto self-propelled caterpillar tracked vehicles.

48. Cable crossings will be designed to protect the obstacle being crossed, as well as the SEP and DEP cables once they have been installed. Detailed methodologies for the crossing of cables and pipelines will be determined in consultation with the owners of the infrastructure to be crossed and crossing agreements will be entered into. However, a number of techniques may be utilised, including:

a. Pre-lay and post lay concrete mattresses;

b. Pre-lay and post lay rock placement; or

c. Pre-lay cable with Uraduct shell structure protection and post-lay rock placement / rock bags.

49. There are certain situations where the use of external cable protection may be required. These include:

a. Where an adequate degree of protection has not been achieved from the burial process. This may be as a result of challenging grounds conditions, or unforeseen circumstances with the burial process, such as break down of the burial tool/s.

b. Where the infield cables approach the wind turbines and OSP/s

c. At cable crossings

d. At the HDD exit pits

50. The deemed Marine Licences within the **draft DCO** (document reference 3.1) require a construction method statement to be submitted to and approved by the Marine Management Organisation's (MMO) that includes details of scour protection and cable protection including details of the need, type, sources, quantity and installation methods for scour protection and cable protection. If changes are proposed following cable laying operations then the details need to be re-submitted to the MMO for further approval.

8.1.6.2 Landfall

51. The offshore export cables make landfall at Weybourne, at a location to the west of Weybourne beach car park in proximity to the Muckleburgh Military Collection. The offshore export cables will be connected to the onshore export cables in transition joint bays, having been installed under the intertidal zone by HDD.
52. A temporary onshore compound will be required to accommodate the drilling rigs, ducting and welfare facilities. The temporary landfall compound will be set back approximately 150m inland from the beach and would be up to 75m long by 75m wide. Each drill would start from the landfall compound, travel beneath the beach, and will exit in the subtidal zone at a suitable water depth.
53. A typical programme for preparation of the export cable installation at the landfall would involve mobilisation, drilling of the two boreholes, preparation of the ducts, towing the ducts to the exit point, duct installation and excavation of the transition zone over a period of approximately five months. Upon completion of the duct installation, the onshore landfall compound would be demobilised, including the removal of drilling rigs and welfare facilities from the site.
54. The cable pull-in would then be undertaken, followed by backfilling at the HDD exit and jointing of the subsea and onshore cables in the onshore transition joint bay over a period of approximately five months.

8.1.7 Onshore Cable Installation

8.1.7.1 Transition joint bays

55. The offshore and onshore cables will be jointed together in one or two underground transition joint bays located onshore within the landfall compound. This would comprise an excavated area of up to 52m x 20m (for the worst-case SEP and DEP sequential scenario) with a reinforced concrete floor to allow winching during cable pulling and a stable surface to allow jointing.
56. Following cable pulling and jointing activities, the joints would be buried to a depth of up to 3m using stabilised backfill, pre-excavated material or a concrete box. The remainder of the transition joint bay will be backfilled with the pre-excavated material and returned to the pre-construction condition, so far as is reasonably possible.

8.1.7.2 Onshore cabling

57. The onshore cable duct will be installed in sections of up to 1km at a time, with a typical construction presence of up to four weeks along each 1km section.

58. Topsoil would be stripped from the section of the onshore cable corridor to be worked on and stored within the working width. The cable trench(es) would then be excavated, typically utilising tracked excavators. The excavated subsoil would be stored separately from the topsoil, and both will be managed to minimise soil erosion.

59. The cable duct installation works are a continuous activity with each work front progressing a section at a time. In any given location once the cable ducts have been installed the trench will be backfilled and the work front will continue moving onto the next section.

60. The primary cable installation method will be open cut trenching, with cable ducts installed within the trenches and backfilled with soil. Cables would then be pulled though the pre-laid ducts at a later stage in the construction programme.

61. Depending on the thermal resistivity of the soil and the height of the water table, it is likely that a stabilised backfill such as cement bound sand (CBS) will be required to encase the ducting. This is commonly used to ensure that the thermal conductivity of the material around the cables is of a known consistent value for the length of the installation.

62. Once the ducts are encased in CBS (typically covering depth of 100mm above the ducts) a compaction plate would be used until the required level of compaction is achieved. The trench would then be backfilled in stages using the subsoil stored at the side of the trench and compacted using suitable compaction plant. Following construction the stored topsoil would then be replaced on top of the backfilled subsoil to reinstate the trench to pre-construction condition, so far as reasonably possible.

63. Cables would be pulled through the pre-installed ducts later in the construction programme Trenches would not need to be reopened, and the cable pull would take place from jointing bays located approximately every 1000m along the cable corridor.

64. During the cable pull and jointing works cable drums would be delivered by HGV low loader to the open joint bay locations and a winch would be attached to the cable. The cable would then be winched off the drum from one joint pit to another, through the buried ducts. Cable jointing would be conducted once both lengths of cable have been installed within each joint bay.

8.1.7.3 Onshore project substation

65. The onshore substation site is located in arable land south of the existing Norwich Main substation. The site is located approximately 250m south of Norwich Main, immediately west of the Norwich to Ipswich rail line, and approximately 600m north of the nearest village (Swainsthorpe).

66. The onshore project substation will consist of an HVAC substation. Construction will include a number of key stages, including earthworks, foundations, superstructure and equipment installation.

67. The 400kV cables from the onshore substation to the existing Norwich Main substation would be typically installed by direct bury method. This method will require a trench to be excavated between the onshore substation and Norwich Main (approximately 850m in length) for the cables to be laid directly and jointed before being reinstated. Should any sensitive features be located along the route from the preferred substation location to the existing substation at Norwich Main then trenchless crossings may also be required. The working width, trench depth, trenchless crossing width, and other dimension for the 400kV installation would be the same as those described for the main cable duct installation.