Norfolk Boreas Offshore Wind Farm

Outline Scour Protection and Cable Protection Plan

DCO Document 8.16

Applicant: Norfolk Boreas Limited
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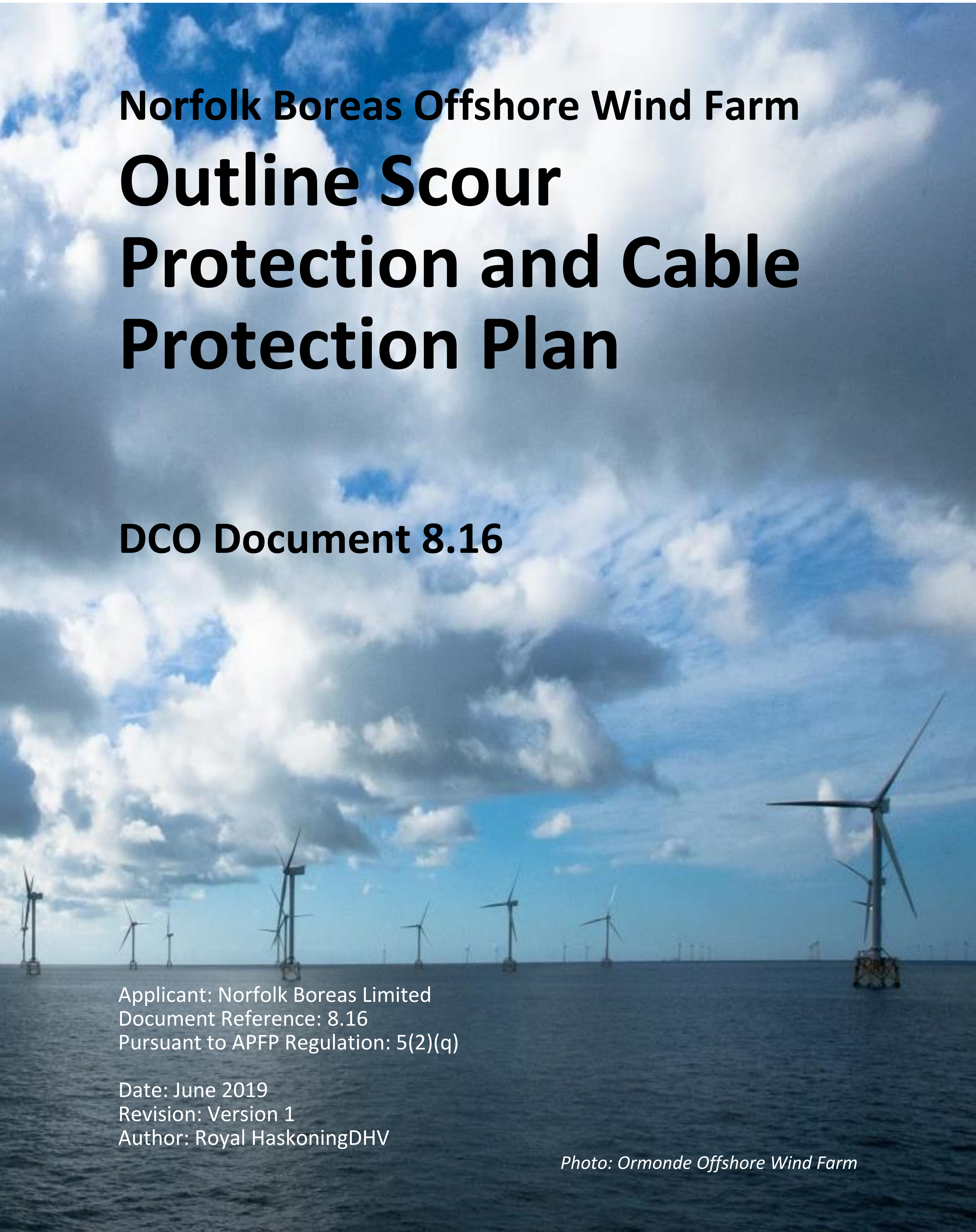

Photo: Ormonde Offshore Wind Farm

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Glossary of Acronyms

DCO	Development Consent Order
DML	Deemed Marine Licence
EIA	Environmental Impact Assessment
ES	Environmental Statement
GBS	Gravity Base Structure
HDD	Horizontal Directional Drilling
LiDAR	Light Detection and Ranging
MMO	Marine Management Organisation
MW	Megawatt
NV East	Norfolk Vanguard East
NV West	Norfolk Vanguard West
OFTO	Offshore Transmission Operator
OWF	Offshore Wind Farm
SAC	Special Area of Conservation
SIP	Site Integrity Plan
SNCB	Statutory Nature Conservation Bodies
VWPL	Vattenfall Wind Power Limited
ZEA	Zone Environmental Appraisal

Glossary of Terminology

Array cables	Cables which link wind turbine to wind turbine, and wind turbine to offshore electrical platforms.
Interconnector cables	Offshore cables which link offshore electrical platforms within the Norfolk Boreas site.
Landfall	Where the offshore cables come ashore at Happisburgh South.
Offshore cable corridor	The corridor of seabed from the Norfolk Boreas site to the landfall site within which the offshore export cables will be located.
Offshore electrical platform	A fixed structure located within the Norfolk Boreas site, containing electrical equipment to aggregate the power from the wind turbines and convert it into a suitable form for export to shore.
Offshore export cables	The cables which transmit power from the offshore electrical platform to the landfall.
Offshore service platform	A platform to house workers offshore and/or provide helicopter refuelling facilities. An accommodation vessel may be used as an alternative for housing workers.
Offshore project area	The area including the Norfolk Boreas site, project interconnector search area and offshore cable corridor.
Project interconnector cable	Offshore cables which would link either turbines or an offshore electrical platform in the Norfolk Boreas site with an offshore electrical platform in one of the Norfolk Vanguard sites.
Project interconnector search area	The area within which project interconnector cables would be installed.
Safety zones	An area around a vessel which should be avoided during offshore construction.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the foundations as a result of the flow of water.
The Applicant	Norfolk Boreas Limited
The Norfolk Vanguard OWF sites	Term used exclusively to refer to the two-distinct offshore wind farm areas, Norfolk Vanguard East and Norfolk Vanguard West (also termed NV East and NV West).
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.

1 INTRODUCTION

1.1 Purpose of this document

1. This Outline Scour Protection and Cable Protection Plan outlines the key principles of how Norfolk Boreas Limited intends to manage the protection of foundations and cables from the effects of scour and hazards (e.g. snagging anchors in the case of cables), both immediately post-construction and throughout the operational life of Norfolk Boreas. This statement also provides a summary of the effects of scour and cable protection as presented in the Environmental Statement (ES).

2. This Outline Scour Protection and Cable Protection Plan relates to cable protection in the offshore cable corridor outside the Haisborough, Hammond and Winterton Special Area of Conservation (SAC), as well as any scour protection and cable protection in the Norfolk Boreas site. Cable protection within the Haisborough, Hammond and Winterton SAC is outlined in section 3 for completeness, however this is considered in further detail in the Outline Haisborough, Hammond and Winterton SAC Site Integrity Plan (SIP) (document reference 8.20) and must be agreed with the Marine Management Organisation (MMO) in consultation with relevant Statutory Nature Conservation Bodies (SNCBs) in accordance with Condition 9(1)(m) of Development Consent Order (DCO) Schedules 11 and 12 (the Transmission DMLs). Cable protection within the Haisborough, Hammond and Winterton SAC will therefore not be considered in the final Scour Protection and Cable Protection Plan.

3. A geophysical (bathymetry sub-bottom profiling, sidescan sonar, magnetometer and ultra-high resolution seismic) survey of the Norfolk Boreas site was completed between 14th May and 30th August 2017 and a geotechnical (vibrocores and cone penetration tests) survey was completed between 7th September and 25th October 2017. Bathymetry and sub-bottom profiling were used to characterise the existing environment in this plan. A benthic survey of Norfolk Boreas was completed between 11th and 16th August 2017 (Appendix 10.1 of the ES). These surveys are herein referred to as the “Norfolk Boreas site surveys”.

4. Norfolk Boreas Limited are currently undertaking a seabed mobility study to map the direction and migration rate of selected sand waves across the Norfolk Boreas site. The study, which is ongoing, compares bathymetric data collected from the site at different locations across different years to assess the rate and direction of sandwave migration. At the time of writing only preliminary findings (which compare data collected by Gardline in 2010 and the Fugro surveys discussed above) are available. Further surveys that cover smaller areas (2016 to 2020) have been commissioned which will be used to update and validate the initial findings.

5. Geophysical and geotechnical surveys were completed by Fugro between 19th June and 4th September 2012 for NV East (formerly East Anglia FOUR) and between 7th September and 14th November 2016 for NV West and the offshore cable corridor. As such, there is a good understanding of the existing marine physical processes environment at project interconnector search area and offshore cable corridor and its adjacent areas. Further information on the underlying geological conditions of the site will be developed through further geophysical and geotechnical surveys prior to construction.

6. The Environmental Impact Assessment (EIA) has assumed a worst case scenario of all foundations having scour protection in order to provide a conservative assessment.

7. Cable burial is expected to be possible throughout the offshore cable corridor, with the exception of cable crossing locations. In order to provide a conservative and future-proof impact assessment, a contingency estimate for cable protection is included in the assessment, should cable burial not be possible (e.g. due to unexpected hard substrate being encountered during the preconstruction surveys or cable burial).

8. Vattenfall Wind Power Limited (VWPL) (the parent company of Norfolk Boreas Limited) is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. Norfolk Vanguard's development schedule is approximately one year ahead of Norfolk Boreas and as such the Norfolk Vanguard project is now under Examination.

9. Norfolk Vanguard may undertake some onshore enabling works for Norfolk Boreas, but these are not relevant to this document. Should Norfolk Vanguard proceed to construction Norfolk Boreas wish to maintain the option to connect to the Norfolk Vanguard project via a "project interconnector". Further information on when a project interconnector may be required is provided in ES Chapter 5 Project description section 5.4.12.

10. As it is not yet known whether Norfolk Vanguard will obtain development consent or proceed to implementation and construction, the Norfolk Boreas application needs to seek consent to implement Norfolk Boreas as an independent project. Therefore, the Applicant has included two scenarios in the development consent application as follows:

- Scenario 1: Norfolk Vanguard and Norfolk Boreas are both delivered (with associated synergies), and Norfolk Vanguard carries out shared works, onshore to benefit Norfolk Boreas (Scenario 1).
- Scenario 2: Only Norfolk Boreas is delivered; Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project (Scenario 2).

11. Both scenarios have been considered when drafting this document, however the only difference between the two scenarios would be that under Scenario 1 the project interconnector could be required, whereas under Scenario 2 it would not be required as Norfolk Vanguard would not exist and therefore it would not be possible to connect to that project.

12. This document has sought to take account of developments throughout the Norfolk Vanguard examination and is consistent with a version of the Norfolk Vanguard Outline Scour Protection and Cable Protection plan that was resubmitted at Deadline 7 (02 May 2019).

13. A final Scour Protection and Cable Protection Plan would be developed post-consent in consultation with the MMO and relevant SNCB, as the final design develops and based on information arising from pre-construction surveys, as required under Condition 14(1)(e) of Schedules 9 and 10 (the Generation DMLs), Condition 9(1)(e) of Schedules 11 and 12 (the Transmission DMLs) and 7(1)(e) of Schedule 13 (The Project Interconnector DML) of the DCO:

A scour protection and cable protection plan (in accordance with the outline scour protection and cable protection plan) providing details of the need, type, sources, quantity, distribution and installation methods for scour protection and cable (including fibre optic cable) protection.

14. In addition, Condition 22 of Schedule 9 and 10, Condition 17 of Schedule 11 and 12 and Condition 13 of Schedule 13 of the DCO requires reporting of cable protection:

(1) Not more than 4 months following completion of the construction phase of the authorised scheme, the undertaker must provide the MMO and the relevant statutory nature conservation bodies with a report setting out details of the cable protection used for the authorised scheme.

(2) The report must include the following information—

(a) location of the cable protection;

(b) volume of cable protection;

(c) any other information relating to the cable protection as agreed between the MMO and the undertaker.

1.2 Background

15. Norfolk Boreas Limited (an affiliate company of Vattenfall Wind Power Ltd (VWPL), 'the Applicant') is proposing to develop Norfolk Boreas, an offshore wind farm in the southern North Sea.

16. The Norfolk Boreas project comprises the Norfolk Boreas site, within which wind turbines, associated platforms and array cables will be located. The offshore wind

farm will be connected to the shore by offshore export cables installed within the offshore cable corridor from the wind farm to a landfall point at Happisburgh South, Norfolk. From there onshore cables would transport power over approximately 60km to the onshore project substation near to the village of Necton, Norfolk. A full project description is given in the ES, Chapter 5 Project Description (document reference 6.1.5).

17. Once built, Norfolk Boreas would have an export capacity of up to 1,800MW, with the offshore components comprising:

- Wind turbines;
- Offshore electrical platforms;
- A service platform;
- Met masts;
- Lidar;
- Array cables;
- Inter-connector cables or project interconnector cables[1]; and
- Export cables.

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

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

19. The Norfolk Boreas site is located approximately 73km from the closest point of the Norfolk Coast. The site covers an area of approximately 725km^2.

20. The detailed design of Norfolk Boreas (e.g. numbers of wind turbines, layout configuration, foundation type and requirement for scour protection) would not be determined until post-consent. Therefore, realistic worst case scenarios in terms of potential impacts/effects are adopted to undertake a precautionary and robust impact assessment. A full description of the project design on which the DCO application has been made is presented in Chapter 5 Project description of the ES. (document reference 6.1.5).

[1] There may be a requirement for cables to be placed within the project interconnector search area (Figure 5.1 of the ES) which would link the Norfolk Boreas project to the Norfolk Vanguard project (section 5.4.12 of ES Chapter 5 Project Description). Either “Interconnector cables” which would link platforms within the Norfolk Boreas site would be installed or “project interconnector cables” would be installed. Under no scenario would both be required.

21. For Norfolk Boreas, several different sizes of wind turbine are being considered in the range of 10MW to 20MW. In order to achieve the maximum 1,800MW installed capacity, there would be between 90 (20MW) and 180 (10MW) wind turbines.

22. In addition, up to two offshore electrical platforms, a service platform, two meteorological masts, two LiDAR platforms and two wave buoys, plus a network of up to 740km of offshore cables are considered as part of the worst-case scenario within the Norfolk Boreas site.

23. Norfolk Boreas Limited is considering constructing the project in either a single phase of up to 1,800MW or in two phases (up to a combined maximum of 1,800MW). The layout of the wind turbines will be defined post consent.

24. The construction window is expected to be up to three years for the full 1,800MW capacity and offshore construction would be anticipated to commence around 2025. Chapter 5 Project Description provides indicative construction programmes for the single phase and two phase options.

2 FOUNDATION SCOUR PROTECTION

25. The effects of scour are influenced by the marine processes acting upon offshore infrastructure, such as cables and turbine foundations. Depending on metocean conditions, scour and cable protection may be required around foundations and cables to protect against currents and waves that may cause erosion of the seabed.

26. For all types of foundations, scour protection material is likely to be installed where required during the construction process in order to mitigate the effects of scour and hence release of suspended sediment and bed level changes in the vicinity of each wind turbine location.

27. ES Chapter 5 Project Description, Table 5.5 provides detail on the worst-case scenario footprint (including scour protection) for turbines, electrical and offshore service platforms, met masts and LiDAR. These assumptions are based on the maximum requirements for each foundation type, these predicted areas are summarised below:

- Jacket (pile and suction caisson): Scour protection covering an area which is five times the foundation diameter;
- Monopile: Scour protection covering an area which is five times the pile diameter;
- Gravity Base Structure (GBS): Scour protection covering an area which is five times the foundation diameter;
- Suction Caisson: Scour protection covering an area which is five times the foundation diameter; and
- TetraBase: Scour protection covering an area which is five times the foundation diameter

28. As detailed in section 5.4.3 of ES Chapter 5, for all foundation types scour protection would comprise quarried rock, well graded with d50=200 to 400, (i.e. half the stones will be less than a specified median (200 to 400mm diameter) and half will be greater).

29. Alternative scour protection solutions such as 'frond systems' are also being considered. These comprise continuous lines of overlapping buoyant polypropylene fronds that when activated create a viscous drag barrier that significantly reduces current velocity. The frond lines are secured to a polyester webbing mesh base that is itself secured to the seabed by anchors pre-attached to the mesh base by polyester webbing lines. Grouted mattresses are also being considered.

30. The quantities and extent of scour protection would be dependent on current speed, sediment type and the foundation details and would therefore be determined post consent based on the final design and pre-construction surveys. The maximum worst-case scenario has assumed that a maximum of 27,369,513m^3 of scour protection will be required in total, for all foundations (see Table 1). The maximum height of scour protection at any given point would be 5m.

31. The location of turbine foundations and therefore scour protection would be determined post consent based on the final design and pre-construction surveys.

Table 1 Worst case scenario for scour protection

Foundation	Scour protection area per foundation (m2)	Scour protection Volume per foundation (m^3)	Maximum number of foundations	Total scour protection (m^3)
Turbines	30,159	150,796	180	27,143,361
Offshore electrical platforms	10,000	50,000	2	100,000
Offshore service platform	10,000	50,000	1	50,000
Met masts	7,540	37,699	2	75,398
LiDAR	157	785	2	1,570
Total				**27,369,513**

3 CABLE PROTECTION

3.1 Unburied cables

32. The preferred method for cable protection would be burial, however as discussed in section 1.2, there may be some locations where array, export or interconnector cables cannot be buried due to cable crossings or substrate type and so alternative methods of protection may be required.

33. As previously discussed, cable burial is expected to be possible throughout the offshore cable corridor, with the exception of cable crossing locations. In order to provide a conservative and future-proof impact assessment, the following contingency estimates for cable protection are included in the assessment, should cable burial not be possible due to hard substrate which was not identified in the site characterisation surveys:

- Up to 10km of protection per cable pair (20km in total) for the whole offshore cable corridor;
    - Of which, 4km per pair (8km in total) could be within the Haisborough Hammond and Winterton Special Area of SAC (see the Outline Haisborough Hammond and Winterton SAC SIP (document 8.20);
- Up to 60km for array cables;
- Up to 6km for interconnector cables or 9.2km for project interconnector cables[2];
- The maximum width and height of cable protection for unburied cable would be 5m and 0.5m, respectively; and
- The maximum width and height of cable protection at cable crossings would be 10m and 0.9m, respectively.

3.2 Cables approaching turbines and platforms

34. It would necessary for cables to be surface laid as they approach each turbine and electrical platform in order for the cables to be connected into J tubes. An estimate of up to 100m length per cable entering and leaving each device is anticipated, i.e. 200m length per turbine and electrical platform.

[2] Either "Interconnector cables" would be installed or "project interconnector cables" would be installed. Under no scenario would both be required. (see section 5.4.12 of the ES Chapter 5 Project description for further information on when project interconnectors and interconnectors would be used.

3.3 Crossings

35. Where each Norfolk Boreas export cable is required to cross an obstacle such as an existing pipeline or cable (see Figure 3.1), protection would be installed to protect the obstacle being crossed. Each Norfolk Boreas cable would then be placed on top of the layer of protection with a further layer of cable protection placed on top.

36. There are up to 11 cables and two pipelines which the Norfolk Boreas export cables would need to cross (up to five cables and one pipeline within the Haisborough Hammond and Winterton SAC)[3]. Each crossing would require a carefully agreed procedure between the cable owners. Each crossing agreement will be finalised post consent and following further, pre-construction marine surveys. The maximum width and length of cable protection for cable crossings would be 10m and 100m, respectively. The maximum height of cable crossings is 0.9m.

3.4 Landfall

37. Cable protection may be required at each of the landfall Horizontal Directional Drilling (HDD) exit points. This could entail a footprint of up to $36m^2$, based on the use of one concrete mattress[4] (approximately 6m length x 3m width x 0.3m height) as well as rock placement (approximately 5m length x 5m width x 0.5m height) at each exit point (up to two cable pair exit points).

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[3] Data provided by KisOrca (2018) indicates that there are two in service cables and one disused cable that cross the offshore cable corridor, this data also concords with that supplied by The Crown Estate. However, data provided by Global Marine indicate that there could be a further eight out of service cables that cross the offshore cable corridor. There is very little confidence in Global Marine data as it is older (2010) and not verified by any other data set. However, it has been included here to capture the worst case scenario

[4] A concrete mattress is a proven way of providing protection to subsea cables. It comprises a grid of heavy cast concrete blocks linked by wire or sometimes rope.

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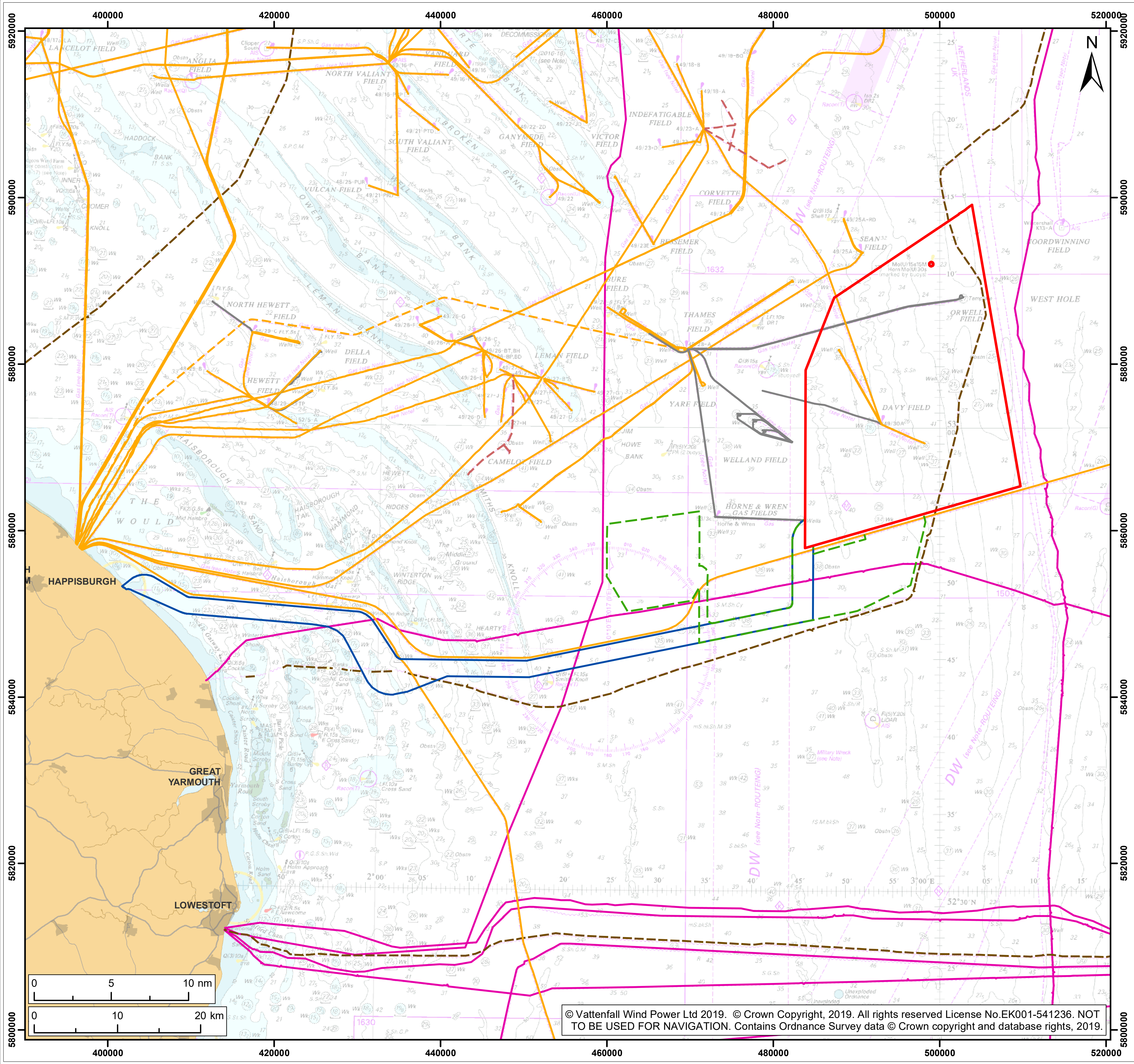

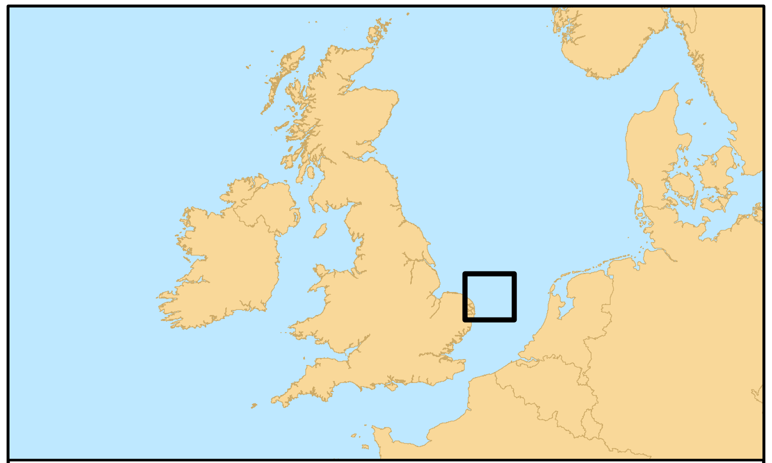

Legend:

- Norfolk Boreas site
- Offshore cable corridor
- Project interconnector search area

Pipelines[1]

- Abandoned
- Active
- Precommission
- Not in use

Sub-sea Cables[2]

- Active
- Disused

[1] Oil & Gas UK Ltd, 2019.
[2] KisOrca, 2018.

Project:	Report:
Norfolk Boreas	Outline Scour Protection and Cable Protection Plan

Title:

Exisiting Cable and Pipelines

Figure: 3.1 | Drawing No: PB5640-007-005-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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3.5 Types of cable protection

38. As detailed in section 5.4.14.1 of Chapter 5 Project Description, the following cable protection options may be used and this would be determined during the final design of the project:

- Rock placement;
- Concrete mattresses;
- Grout or sand bags;
- Frond mattresses; and
- Uraduct or similar.

3.6 Cable protection quantities and location

39. The quantities, extent and location of cable protection would be dependent on the final design and findings of the pre-construction surveys. Table 2 provides an overview of the maximum area and volume of cable protection as well as providing an overview of where certain cable protection may be required.

Table 2 Maximum cable protection parameters

	Length (m)	Width (m)	Height (m)	Total maximum area (m^2)	Total maximum volume (m^3)	Location (see Figure 3.1)
Array cables						
Unburied (based on 10% of the total cabling)	60,000	5	0.5	300,000	150,000	Norfolk Boreas site
Approaching turbines (100m x 180 turbines)	18000	5	0.5	90,000	45,000	Norfolk Boreas site
Crossings (based on 10 crossings)	1000	10	0.9m in total, including existing cable	10,000	9,000	Norfolk Boreas site
Total array cable protection				400,000	204,000	
Interconnector cables*						
Approaching electrical platforms (100m x 2 platforms)	400	10	0.5	4,000	2,000	Norfolk Boreas site
Unburied (based on 10% of the total cabling)	6000	5	0.5	30,000	15,000	Norfolk Boreas site
Crossings (none)	N/A	N/A	N/A	N/A	N/A	N/A
Total interconnector cable protection				34,000	17,000	
Project interconnector cable*						
Project Interconnector cable protection - approaching electrical platforms, based on 1 AC cable and 1 pair of DC cables approaching the Platform in Norfolk Boreas and the Platform in NV East	400	10	0.5	4,000	2,000	200m approaching Norfolk Vanguard electrical platform in the Project interconnector search area and 200m approaching platform in the Norfolk Boreas site

	Length (m)	Width (m)	Height (m)	Total maximum area (m^2)	Total maximum volume (m^3)	Location (see Figure 3.1)
Unburied (based on 10% of the total cabling)	12,000	5	0.5	60,000	30,000	Project interconnector search area and 60km of cables in 40km of trench / unburied section within the Norfolk Boreas site
Crossings (based on 10 crossings)	1,000	10	0.9m in total, including existing cable	10,000	9,000	Project interconnector search area and 60km of cables in 40km of trench / unburied section within the Norfolk Boreas site
Total project interconnector cable protection				74,000	41,000	
Export cables						
Export Cable protection on approach to platforms	100	10	0.5	1,000	500	Norfolk Boreas site
Unburied in the offshore cable corridor (based on 10% of the total cabling)	20,000	5	0.5	100,000	50,000	Offshore cable corridor (up to 40,000m^2 could be within the Haisborough Hammond and Winterton SAC)
Unburied in the Norfolk Boreas site (based on 10% of the total cabling)	5,000	5	0.5	25,000	12,500	Norfolk Boreas site
Crossings (based on 26[5] crossings)	2,600	10	0.9m in total, including existing cable	26,000	23,400	Offshore cable corridor At location of existing cables and pipelines
Protection at the landfall HDD exit locations - mattress	12	3	0.3	36	11	Offshore cable corridor

[5] Data provided by KisOrca (2018) indicates that there are two in service cables and one disused cable that cross the offshore cable corridor, this data also concords with that supplied by The Crown Estate. However, data provided by Global Marine indicate that there could be a further eight out of service cables that cross the offshore cable corridor. There is very little confidence in Global Marine data as it is older (2010) and not verified by any other data set. However, it has been included here to capture the worst case scenario

	Length (m)	Width (m)	Height (m)	Total maximum area (m^2)	Total maximum volume (m^3)	Location (see Figure 3.1)
Protection at the landfall HDD exit locations – rock dumping	10	5	0.5	50	25	At the -5.5m LAT depth contour or deeper within the offshore cable corridor (approximate length of 1000m from the onshore drilling location)
Total export cable protection				152,086	86,436	

*Note that either interconnector cable or project interconnector cable could be required but never both.

4 SCOUR AND CABLE PROTECTION ASSESSMENT IN ES CHAPTERS

40. The offshore chapters of the ES (Chapters 8 – 18) present potential impacts relating to the presence of scour and cable protection during the operational phase of Norfolk Boreas, where relevant.

41. It is important to highlight that the assessments presented in the ES are based upon the worst case scenario relevant to a given potential impact, as drawn from details pertaining to the type, quantity and location of scour and cable protection specified in the Project Description. Table 3 details the ES chapters and relevant impact assessments which consider these impacts.

Table 3 Impacts relating to the presence of scour and cable protection

ES Chapter	Impacts Considered
Chapter 8: Marine Geology, Oceanography and Physical Processes	
Table 8.16	Changes to the tidal regime due to the presence of structures in the Norfolk Boreas site (wind turbines and platforms) • Changes to tidal currents created by presence of wind turbines • Changes to waves created by presence of wind turbines
Table 8.16	Changes to the sediment transport regime due to the presence of structures in the Norfolk Boreas site
Table 8.16	Loss of seabed morphology due to the footprint of wind turbine foundation structures
Table 8.16	Morphological and sediment transport effects due to cable protection measures within the Norfolk Boreas site and project interconnector search area
Table 8.16	Morphological and sediment transport effects due to cable protection measures within the offshore cable corridor
Chapter 10: Benthic and Intertidal Ecology	
Table 10.12	Permanent loss of seabed habitat in the Norfolk Boreas site due to the presence of wind turbine and platform foundations, scour protection, array cables, interconnector cables, and cable protection.
Table 10.12	Permanent loss of seabed habitat in the offshore cable corridor due to cable protection
Table 10.12	Permanent loss of seabed habitat in the project interconnector search area due to cable protection
Table 10.12	Colonisation of turbines/cable protection/scour protection due to the presence of turbines, cable protection and scour protection
Chapter 11: Fish and Shellfish Ecology	
Table 11.13	Permanent loss of seabed habitat in the Norfolk Boreas site through the presence of wind turbine and platform foundations, scour protection, array cables, interconnector cables, and cable protection
Table 11.13	Permanent loss of seabed habitat in the offshore cable corridor and project interconnector search area due to cable protection
Table 11.13	Introduction of hard substrate in the Norfolk Boreas site through presence of submerged infrastructure, scour and cable protection and in the export cable corridor and project interconnector search area due to cable protection

ES Chapter	Impacts Considered
Chapter 14: Commercial Fisheries	
Table 14.12	Complete loss or restricted access to traditional fishing grounds due to due to the presence of turbines, cable protection and scour protection
Table 1412	Obstacles on the seabed post construction due to the presence of turbines, cable protection and scour protection
Table 14.12	Interference with fishing activities due to the presence of turbines, cable protection and scour protection
Table 14.12	Displacement of fishing activity into other areas due to the presence of turbines, cable protection and scour protection
Chapter 17: Offshore Archaeology and Cultural Heritage	
Table 17.16	Direct impact to potential heritage assets from cable repairs and Seabed contact by legs of jack-up vessels and / or anchors (maintenance)
Table 17.16	Indirect impact to heritage assets from changes to physical processes such as tidal current, waves, and seabed morphology and sediment transport within the project interconnector search area and Norfolk Boreas site and along offshore export cables
Table 17.16	Impacts to the setting of heritage assets and historic seascape character due to the presence of wind farm infrastructure and activities associated with operations and maintenance

5 SUMMARY

42. Norfolk Boreas Limited considers that details pertaining to the need, type, sources quantity, distribution and installation methods for scour and cable protection have been specified within the Project Description (Volume 1, Chapter 5) to a sufficient extent to allow assessment of potential impacts within relevant offshore ES chapters. It is noted that the specification of cable and scour protection within the project envelope enables a required level of flexibility to be retained in the final engineering of these aspects. In consideration of this flexibility, the assessments presented in the ES are based upon the worst case scenario relevant to a given potential impact, as drawn from the project envelope and presented in the relevant offshore ES chapter.

43. It should be noted that volumes of scour protection and cable protection are controlled within the DCO (see Schedule 1, Part 3, Requirement 5 and Requirement 11) and in the DMLs (Part 4, Condition 3). Condition 14(1)(e) in Schedules 9 and 10 (the Generation DMLs), Condition 9(1)(e) in Schedules 11 and 12 (the Transmission DMLs) and Condition 7(1)(e) in the Schedule 13 (the Project Interconnector DML) of the DCO requires that the final Scour Protection and Cable Protection Plan must be approved by the MMO.

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