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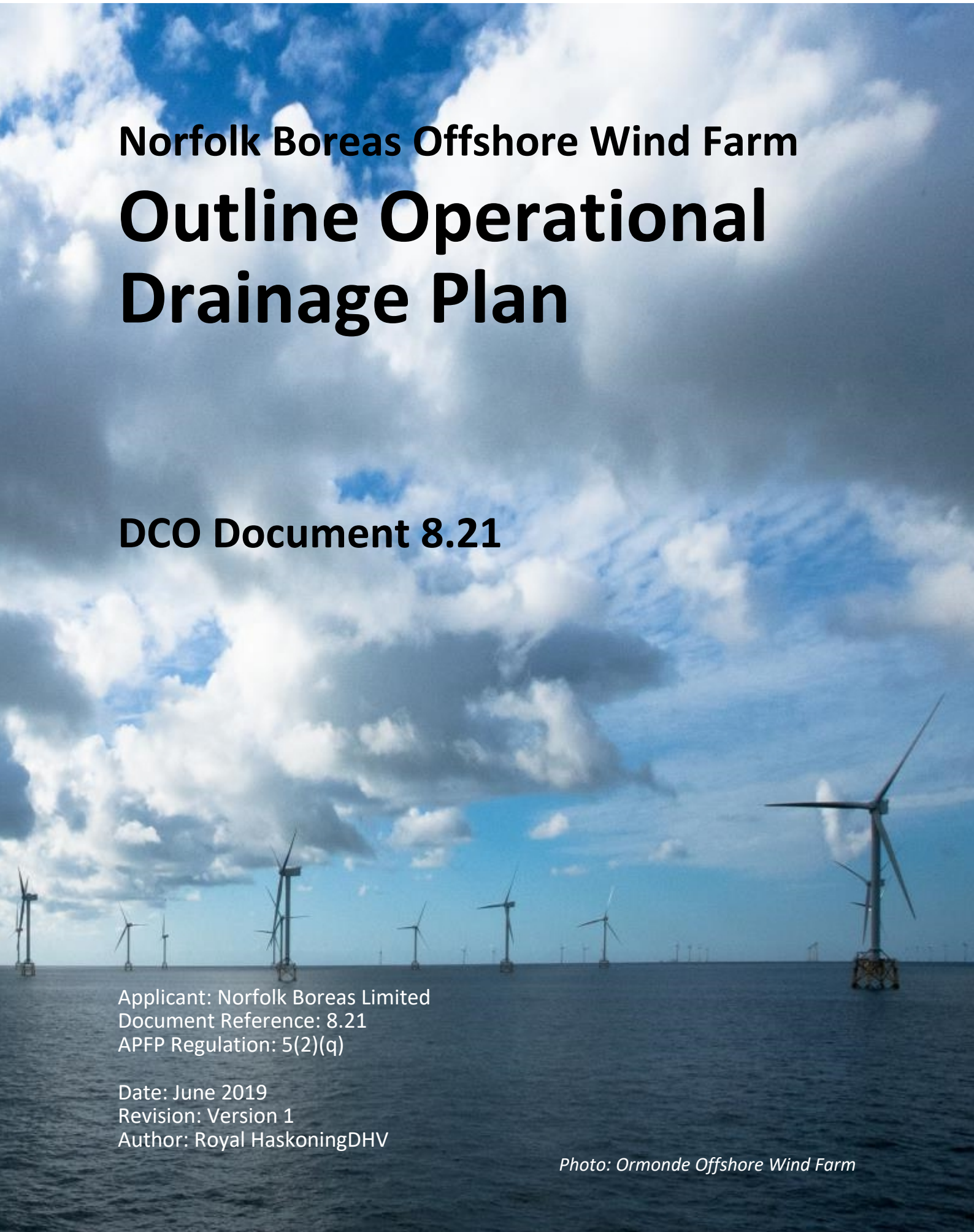

Norfolk Boreas Offshore Wind Farm

Outline Operational Drainage Plan

DCO Document 8.21

Applicant: Norfolk Boreas Limited
Document Reference: 8.21
APFP Regulation: 5(2)(q)

Date: June 2019
Revision: Version 1
Author: Royal HaskoningDHV

Photo: Ormonde Offshore Wind Farm

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
17/05/2019	01D	First draft for Norfolk Boreas Limited review	RA	CD/VR	AD/JL
21/05/2019	01F	Final for DCO submission	RA	CD/VR	JL

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Glossary of Acronyms

BRE	Buildings Research Establishment
DCO	Development Consent Order
ES	Environmental Statement
NPPF	National Planning Policy Framework
NPS	National Policy Statement
SuDS	Sustainable Drainage System
VWPL	Vattenfall Wind Power Limited

Glossary of Terminology

Ducts	A duct is a length of underground piping, which is used to house electrical and communications cables.
National Grid substation extension	The permanent footprint of the National Grid substation extension.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard
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.
The Applicant	Norfolk Boreas Limited
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.

1 INTRODUCTION

1. Norfolk Boreas Limited ('the Applicant', an affiliate company of Vattenfall Wind Power Limited (VWPL)) is seeking a Development Consent Order (DCO) for the Norfolk Boreas Offshore Wind Farm (herein referred to as 'the project' or 'Norfolk Boreas').

2. VWPL 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.

3. Norfolk Boreas Limited have therefore included the following two scenarios within the DCO application:

   - **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.

4. For details of the scenarios are presented in Chapter 5 Project Description of the Environmental Statement (ES) (document reference 6.1.5), including a further detailed comparison provided in Appendix 5.1 (document reference 6.3.5.1).

5. Under each scenario an onshore project substation will be constructed and the existing Necton National Grid Substation will be extended. These works will be in slightly different locations under each scenario (see Chapter 5 of the ES for more details, document reference 6.1.5) however, the operational drainage principles adopted will be the same under both scenarios. Therefore, the two scenarios have not materially affected the drafting of this document and the operational drainage outlined in section 2 will be adopted under both scenarios. The single exception to this is with respect to permanent structures in ordinary watercourses which will not be required for Scenario 1 as set out in paragraph 18.

6. The final Operational Drainage Plan for the project will be drafted post consent and based on the detailed design of the final development scenario which will be taken forward to construction.

2 OPERATIONAL DRAINAGE

7. The permanent above-ground infrastructure associated with the onshore project substation (Work No. 8A and 8B) and National Grid substation extension (Work No. 10A, 10B and 10C) will result in a change from existing greenfield agricultural land use to create a permanent increase in impermeable area.

8. Within Environmental Statement Chapter 20 Water Resources and Flood Risk (document reference 6.1.20) and Appendix 20.1 Flood Risk Assessment (document reference 6.3.20.1) a commitment has been made that surface water drainage requirements for the operational onshore project infrastructure will be designed to meet the requirements of the National Planning Policy Framework (NPPF) and National Policy Statement (NPS) EN-5. Runoff will be limited, where feasible, through the use of infiltration techniques which can be accommodated within the area of development. The drainage strategy will be developed according to the principles of the Sustainable Drainage Systems (SuDS) discharge hierarchy. Generally, the aim will be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable, that is: i) into the ground (infiltration); ii) to a surface water body; iii) to a surface water sewer, highway drain or another drainage system; or iv) to a combined sewer.

9. This document provides further details of the principles that will inform the final Operational Drainage Plan. The final Operational Drainage Plan is secured through Requirement 32 of the draft Development Consent Order (DCO).

2.1 Principles for the development of an Operational Drainage Plan (Work Nos. 8A, 8B, 10A, 10B and 10C)

10. Detailed infiltration testing will be undertaken in accordance with Buildings Research Establishment (BRE) Digest 365 Soakaway Design within the above ground operational areas associated with the onshore project substation (Work No. 8A and 8B) and for the National Grid substation extension (Work No. 10A, 10B and 10C)) for the design of SuDS features along the length and proposed depth of any SuDS feature.

11. If infiltration is proven to be unfavourable, then Greenfield runoff rates for the site shall be agreed. The post development runoff rates will be attenuated to the equivalent Greenfield rate for all rainfall events up to and including the 1% annual probability (or 2 l/s/ha). Where applicable confirmation should be sought from the relevant Internal Drainage Board that the proposed rates and volumes of surface water runoff from the development are acceptable.

12. Provision of surface water infiltration / attenuation storage should be sized and designed to accommodate the volume of water generated in all rainfall events up to

and including the critical storm duration for the 1 % annual probability rainfall event, including allowances for climate change.

13. Detailed designs, modelling calculations and plans of the drainage conveyance network will be prepared to demonstrate the:

- 3.33 % annual probability critical rainfall event to show no above ground flooding on any part of the site.
- 1% annual probability critical rainfall event plus 20% climate change event to show, if any, the depth, volume and storage location of any above ground flooding from the drainage network ensuring that flooding does not occur in any part of a building or any utility plant susceptible to water (e.g. electricity equipment required) within the development.

14. The design of any drainage structures will include appropriate freeboard allowances. Plans will be submitted showing the routes for the management of exceedance surface water flow routes that minimise the risk to people and property during rainfall events in excess of 1% annual probability rainfall event.

15. Details of how temporary works or temporary storage areas that will generate surface water runoff will be controlled to prevent a temporary increased risk of flooding. These details will also include the strategy/plans which will be provided to reinstate land to the pre-development state.

16. Finished ground floor levels should have a freeboard such that all infrastructure is 300mm above expected flood levels from all sources of flooding, including fluvial flooding associated with the ordinary watercourse, tidal flooding and any above ground storage or flooding from the proposed drainage scheme.

17. All surface water management features will be designed in accordance with The SuDS Manual (CIRIA C697, 2007), or the updated version of The SuDS Manual (CIRIA C753, 2015).

18. A maintenance and management plan detailing the activities required and details of who will adopt and maintain all the surface water drainage features for the lifetime of the development will be included in the final Operational Drainage Plan. For Scenario 2 this will also include any permanent structures within ordinary watercourses within the development boundary, such as culverts. For Scenario 1 no permanent structures within ordinary watercourses are required and therefore details for maintenance and management of such structures will not be included in the final plan.