Onshore Converter Station

Code of Construction Practice

Appendix 2 Watercourse Crossing Method Statement

Requirement 22 (2)(b)

(Applicable to Work Numbers 62 to 69)

Prepared by:	Checked by:	Approved by:
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Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
1	23/06/2021	Kay Griffin	Phil Rew-Williamson	David Boyd
2	21/12/21	Kay Griffin	Phil Rew-Williamson	Gareth Mills
3	07/04/22	Kay Griffin	Phil Rew-Williamson	Gareth Mills

Description of Revisions			
Rev	**Page**	**Section**	**Description**
1	ALL	ALL	New Document
2	ALL	ALL	Document amended in accordance with consultee comments (SCC, 7/7/21) and project design information
3	ALL	ALL	No comments received. Watercourse crossing ref (WC2) will now be a permanent rather than a temporary crossing.

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1. INTRODUCTION AND SCOPE

1.1. Project Overview

1. East Anglia Three Limited (EATL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Business, Energy and Industrial Strategy (DBEIS) on 7 August 2017 for the East Anglia THREE Offshore Windfarm (EA THREE). The DCO granted consent for the development of a 1200MW offshore windfarm and associated infrastructure and is live until 28 August 2022. The DCO has now been subject to three non-material variations:

- In March 2019 EATL submitted a non-material change application to DBEIS to amend the consent to increase the maximum generating capacity from 1,200MW to 1,400MW and to limit the maximum number of gravity base foundations to 100. In June 2019 DBEIS authorised the proposed change application and issued an Amendments Order.
- In July 2020 EATL submitted a second non-material change application to DBEIS to amend the parameters of its offshore substations and wind turbines. On 15 April 2021 DBEIS authorised this proposed change application and issued an Amendments Order.
- In August 2021 EATL submitted a third non-material change application to DBEIS to amend the consent to remove the maximum generating capacity of 1,400MW and to amend the parameters of its wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). The application is currently in the consultation phase.

2. The onshore construction works associated with EA THREE will have a capacity of 1400MW and transmission connection of 1320MW. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the converter station at Bramford, passing the northern side of Ipswich. As a result of the strategic approach taken, the cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE Offshore Windfarm (EA ONE), thereby substantially reducing the impacts of connecting to the National Grid (NG) at the same location. The infrastructure to be installed for EA THREE, therefore, comprises:

- The landfall site with one associated transition bay location with two transition bays containing the connection between the offshore and onshore cables;
- Two onshore electrical cables (single core);
- Up to 62 jointing bay locations each with up to two jointing bays;
- One onshore converter station, adjacent to the EA ONE Substation;
- Three cables to link the converter station to the National Grid Bramford Substation;
- Up to three onshore fibre optic cables; and
- Landscaping and tree planting around the onshore converter station location.

3. Since the granting of the DCO, the decision has been made that the electrical connection for EA THREE will comprise a high voltage direct current (HVDC) cable rather than a high voltage alternating current cable and, therefore, the type of substation that will be required is a HVDC converter station. The substation will be referred to here as a 'converter station' and this amended terminology has been agreed with the relevant authorities on 15 October 2020. It has also been determined that only one converter station will be constructed rather than two and that the converter station will be installed in a single construction phase.

1.2. Purpose and Scope

4. This Watercourse Crossing Method Statement (WCMS) sets out the crossing methods that will be applied during the installation of the EA THREE Converter Station (Converter Station). This document forms Appendix 2 of the Code of Construction Practice (CoCP), and has been prepared to fulfil DCO Requirement 22 which states:

> *22.—(2) The code of construction practice must include (...)*
> *(b) watercourse crossing method statement.*

5. The scope of this document relates to the WCMS associated with the construction of the Converter Station. The works in this stage comprise Work No.s 62 to 69, located to the north of the existing NG substation and adjacent to the EA ONE Substation (Figure 1 Site Context Plan). WCMS has been produced for each stage of the onshore construction works, where relevant and are provided under separate cover.

6. Construction works at the Converter Station will be some of the first onshore connection works to commence. The access track and temporary laydown will be constructed in Summer 2022 with the remaining works being undertaken from Q2 2023.

7. This document provides information on the watercourses to be crossed to access the converter station site and temporary laydown, and the different types of crossing that will be used. It also details the control measures which will be implemented to safeguard surface water quality and ensure no adverse impact on local drainage, flood risks or fisheries. The information contained herein shall be used by the Principal Contractor to produce a detailed site-specific method statement for each watercourse crossing in order to obtain the required water crossing consent, in consultation with the Environment Agency, Suffolk County Council (SCC) and / or Internal Drainage Board (IDB) and in accordance with the SCC Policy for working on Watercourses in Suffolk Policy Appendix B to the Suffolk Flood Risk Management Strategy (2018).

8. The measures contained herein will be adhered to by the Principal Contractor and the implementation and compliance will be monitored by the Construction Management Team. These measures will only be revised with the agreement of Mid Suffolk District Council (MSDC), the Environment Agency, SCC and IDB (where relevant).

2. ABBREVIATIONS

CIRIA	Construction Industry Research and Information Association
DBEIS	Department of Energy, Business and Industrial Strategy
DCO	Development Consent Order
EA ONE	East Anglia ONE Offshore Windfarm
EA THREE	East Anglia THREE Offshore Windfarm
EATL	East Anglia THREE Limited
EATL	East Anglia Hub Three Limited
FEH	Flood Estimation Handbook
HVDC	High Voltage Direct Current
IDB	Internal Drainage Board
MSDC	Mid Suffolk District Council
NG	National Grid
SCC	Suffolk County Council
WC	Watercourse Crossing
WCMS	Watercourse Crossing Method Statement

3. PLAN GOVERNANCE

9. A member of EATL's construction team will be responsible for managing the implementation of this WCMS. Contact details for the WCMS Manager will be submitted to stakeholders for their records prior to commencement of construction.

4. TYPES OF WATERCOURSE CROSSING

10. There will be one permanent watercourse crossing and one temporary watercourse crossing for vehicle access for the Converter Station Stage.

11. Access across each watercourse will be achieved through the installation of a flume pipe and construction of an access road to enable plant and vehicles to cross the watercourse. In all cases, plant and vehicles will be prohibited from driving through watercourses. Twin pipe culverts will not be used.

12. Once installation of the Converter Station is completed, the temporary vehicle crossing will be removed and the watercourse / banks will be made good and as appropriate left to re-establish to their previous condition.

13. A description of the methods used to install the proposed flume pipes and the necessary control methods is provided in the following section. All works will be undertaken in accordance with the SCC Policy for Working on Watercourses in Suffolk Policy (SCC, 2018).

4.1. Flume Pipe Installation

14. Flume pipe culverts are constructed by installing one or more sections of pipe in the watercourse, which is then ramped over, to allow uninterrupted flow of water within the watercourse and a continuous running track for construction vehicles. These pipes are surrounded with concrete bags, as shown in Diagram 1, before a temporary road is laid over the top. Additional concrete bags are installed each side of the road to prevent mud falling over the side and temporary safety fencing erected where necessary. The concrete bags will ensure that flow over the deck can still occur if the pipes become blocked or an extreme flood event occurs. Access crossings will have temporary headwalls at both ends to reduce the risk of hardcore material making up the access/haul road from collapsing into the watercourse.

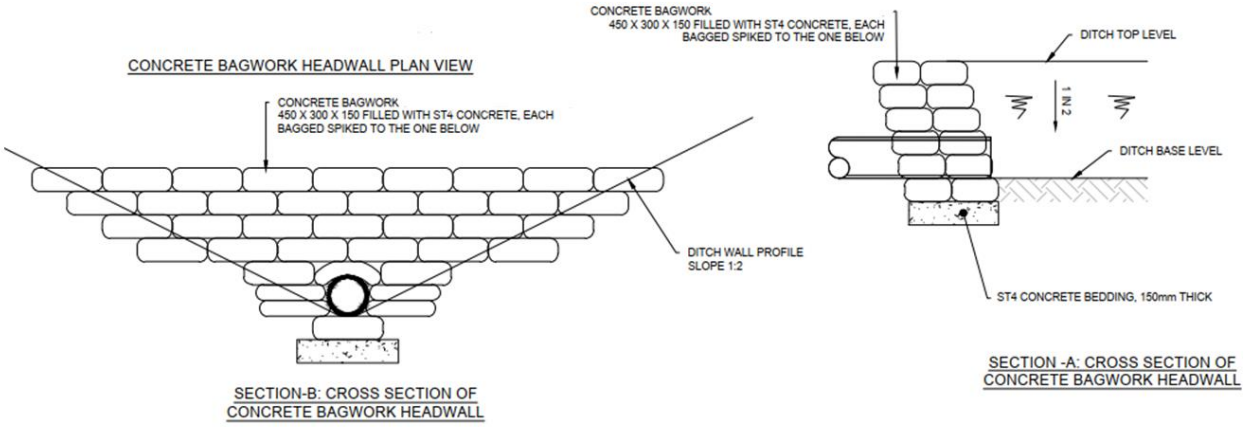

Diagram 1 Indicative Concrete Bagwork

15. Monitoring will take place on a regular basis, in accordance with the Onshore Converter Station Surface Water and Foul Drainage Management Plan (EA3-GRD-CON-PLN-IBR-000107), to ensure that no material from the running track over the temporary flumes enters the watercourse. If this does occur, the material will be removed immediately.

16. Flume pipes will be sized in accordance with expected flows and will be oversized to compensate for any expected high flows. Hydraulic analysis will be undertaken to inform the appropriate size of flumes, see Section 6 for further details.

17. These works shall not reduce the capacity or restrict the flow of the watercourse. The temporary flume pipe (WC1) will be in place for the duration of the construction period, with full restoration of the site, including the dismantling of any flume pipes being undertaken once the Converter Station has been constructed. The permanent flume pipe (WC2) will remain in situ to enable access to the landscaping areas to the north.

18. A typical time frame for installing crossings using flumes ranges from 3-5 days. Typical removal time frames to reinstate crossings would be in the range of 3-6 days.

5. WATERCOURSE INFORMATION

19. A total of two watercourse crossings have been identified to access the Converter Station works. These comprise field ditches (i.e. ordinary watercourses) that often run dry. Specific details of each watercourse are presented on the crossing schedule presented in Table 7-1 in Section 7 and a plan showing the watercourse crossing locations is presented in Figure 2.

20. There are no watercourse crossings required with respect to the cable access and trackway located in Work No. 62.

6. HYDRAULIC ANALYSIS

21. In order to ensure appropriate design of the flume pipe crossings, understanding is required of the flow regimes of the subject watercourses under a range of flow conditions (from typical to larger, flood events). Hydraulic analysis is also required to size appropriate flumes. These analyses will be undertaken at the detailed design stage and will be submitted with the watercourse crossing application for each crossing.

22. The objectives of these assessments will therefore be to:

- Quantify the typical and flood flow regimes of each watercourse in the crossing schedule that is to be crossed by flume pipe.
- Undertake hydraulic calculations to size flumes; and
- If deemed necessary, undertake flood risk modelling for the proposed crossing structure.

23. The assessments will be conducted utilizing best practice hydrological and hydraulic modelling methodologies and software and in line with guidance provided by the CIRIA, Culvert, Screen and Outfall Manual (CIRIA, 2019), the Environment Agency Flood Estimation Guidelines (Environment Agency, 2020) and the Flood Estimation Handbook (UK Centre for Ecology & Hydrology, 2014 (FEH)).

6.1. Hydrological Flow Analysis

24. An hydrological assessment will be undertaken for the catchments draining the two watercourse crossings locations, identified as WC1 and WC2, as indicated in Figure 2. The waterways to be crossed are classified as Ordinary watercourses.

25. The analysis outputs will provide estimated watercourse flows (bank full flow (Q)) that can be used in the design of temporary and permanent crossing flumes.

26. The hydrological analysis for the crossings WC1 and WC2 will be undertaken using FEH methodologies and Microdrainage software for the following flow conditions that could be expected to be experienced during the construction works:

- Typical 'summer' flow conditions – Q80 (flow equaled or exceeded for 80% of the time during a typical year)
- High flow conditions – QMED (Median flow - equivalent to approximately the 1 in 2 year flow rate)

27. The hydrological assessments will be contained in the watercourse crossing applications.

6.2. Hydraulic Analysis

28. A hydraulic assessment of each crossing will also be undertaken in order to calculate the recommended flume diameter or pumping arrangements. Indicative flume diameters may be constrained by either the estimated channel depth or base width and would not include a freeboard allowance.

29. The hydraulic assessments undertaken will be included with the watercourse crossing applications.

30. Prior to construction further consultation will be held with the relevant permitting authorities (IDB/SCC or the Environment Agency) to confirm the design standards required for sizing the required flumes.

7. WATERCOURSE CROSSING SCHEDULE

31. Table 7.1 presents a schedule identifying each of the two watercourse crossing locations, the watercourse dimensions and any specific constraints.

32. Prior to construction further consultation will be held with the relevant permitting authorities (IDB/SCC or the Environment Agency) on all watercourse crossing locations and detailed methods statements will be produced to accompany the permit/license applications as required.

Table 7-1 Watercourse Crossing Schedule

Watercourse Features					General Description of Watercourse and Crossing	Site Photograph
Crossing Reference Number	Feature Reference Number	Easting	Northing	Type of watercourse		
WC1	DRX-1	609757	246334	Ordinary	Drainage ditch running approximately north/south. Proposed construction is a is 6.0 m long, 450mm diameter, PVC pipe. Crossing is temporary and will be removed after completion of the construction of the converter station.	This is a new drainage ditch that is to be installed as part of the early works at the converter station site. The drainage ditch will take water from the north and east of the site and will discharge to the new SUDS pond that is also to be constructed. The ditch will be approximately 3.6m wide and 1.5m deep. The temporary flume crossing will be installed at the same time as the construction of the drainage ditch.
WC2	DRX-2	609795	246339	Ordinary	Drainage ditch running approximately east/west. Proposed construction is a is 16.0m long, 450mm diameter, concrete pipe. Crossing will remain in situ after completion of the construction of the converter station to enable access to the landscaping areas to the north.	Ditch course 2.3m wide, channel depth 1.4m, dry at time of survey, with fields on both sides and low growing vegetation. 

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8. CONTROL MEASURES

39. Impacts will be minimised by applying sound design principles to the structures, following best working practices during their construction. The general provisions as listed in below should be referred and adhered to, all watercourse crossings will require some level of consent either by the Environment Agency, IDB or SCC (see Section 14.6 of Code of Construction Practice). The consent conditions associated with each crossing will be strictly followed.

Contractor Checklist for Watercourse Crossings
Ensure all necessary consent conditions from Environment Agency / IDB/ SCC are in place.
Comply with all consent conditions from Environment Agency / IDB/ SCC for watercourse crossings.
Ensure all required pre-construction ecological surveys have been completed before starting works.
Take account of activities of other users of the water environment in planning works.
Have access constructed of suitable material and in a manner that will not give rise to rutting, ponding and silt run-off.
All construction machinery operating in-stream should be mechanically sound to avoid leaks of oils, hydraulic fluid. Where practicable plant for in stream works should contained with bio- fuel and biodegradable hydraulic oils.
Ensure oil absorbent booms are in place downstream from where the culvert will be installed before the work commences.
All in-stream works must be carried out in accordance with an approved method statement.
Check if there are any timing restrictions to works because of protected species (e.g. spawning salmonids, otter, water vole etc) or landowner commitments

9. REFERENCES

CIRIA, 2019, Culvert, Screen and Outfall Manual, C786F, ISBN: 978-0-86017-891-0

Environment Agency, 2020, Flood Estimation Guidance, Technical guidance 197_08, June 2020 https://d5pbmt5s5gn3r.cloudfront.net/wp-content/uploads/2020/10/Flood-Estimation-Guidelines-2020-197_08.pdf

Suffolk County Council, 2018, Policy for working on Watercourses in Suffolk Policy Appendix B to the Suffolk Flood Risk Management Strategy March 2018, https://www.greensuffolk.org/app/uploads/2021/05/2018-10-01-Consenting-Works-Appendix-B-v2-LR.pdf

UK Centre for Ecology & Hydrology, 2014, Flood Estimation Handbook

609000 609500 610000 610500

246500 246000

Track Track Track BULLEN LANE BULLEN LANE Track Track

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

Works No.s Overview

Tye Lane Woodlands Farm Black Cottage Tye Lane Bullen Hall Farm Channel Hill Farm Burstallhill

69 65 64 67 62 63 66 68

EA THREE DCO Corridor
EA THREE Onshore Converter Station Layout Detail
EA THREE Onshore Converter Station Temporary Site Facilities Detail

EA THREE Converter Substation to National Grid Substation Cable Route
400kV AC Cable - Open Cut Section
400kV AC Cable - Ducted Section

EA THREE Onshore Converter Station Access Roads
Permanent
Temporary

EA THREE Cable Access Road
Haul Road
EA THREE Onshore Converter Station SUDs Pond
EA THREE Area to be Reprofiled

EA ONE Onshore Converter Station Access Road

Works No.s
65 62 66 63 67 64 68 69

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Rev	Date	By	Comment
B	04/04/2022	PW	Second Issue
A	31/03/2022	JRS	First Issue

Original A3 Plot Scale 1:5,000

0 100 200 Metres

Onshore Converter Station Stage

Figure 1: Site Context Plan

Drg No	05356.00006.12.0001.1 ONCS Site Context Plan
Rev	2
Date	04/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Dwgs\Wking\EA3\Onshore Substation\ONCS and Commencement Master\5356.00006.12.0020.1 ONCS Site Context.mxd

608500 609000 609500 610000 610500 611000

247000 246500 246000 245500

WC1
Easting: 609757
Northing: 246334

WC2
Easting: 609795
Northing: 246339

TYE LANE
Track
Track
Track
BULLEN LANE
Path (um)
BULLEN LANE
Track
Track
Path (um)
Track
THE CHANNEL
Track
Track
GP
GP
GP
Track

Coordinate System:

EA THREE DCO Corridor
EA THREE Onshore Converter Station Layout Detail
EA THREE Onshore Converter Station Temporary Site Facilities Detail

EA THREE Converter Substation to National Grid Substation Cable Route
400kV AC Cable - Open Cut Section
400kV AC Cable - Ducted Section

EA THREE Onshore Converter Station Access Roads
Permanent
Temporary

EA THREE Cable Access Road
Haul Road
EA THREE Onshore Converter Station SUDs Pond
EA THREE Area to be Reprofiled

EA ONE Onshore Converter Station Access Road

Crossing Name/Type
WC1 - Temporary Crossing
WC2 - Permanent Crossing

Statutory Main River
Surface Water Linear
Surface Water Area

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Rev	Date	By	Comment
B	12/04/2022	PW	Second Issue
A	22/12/21	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Onshore Converter Station Stage

Figure 2: Watercourse Crossings to be Subject to Hydrological Assessment

Drg No	05356.00006.12.0035.1 Watercourse Crossing
Rev	2
Date	12/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Dwgs\Wking\EA3\Onshore Substation\Doc Ref EA3-OND-CNS-REP-IBR-000005\5356.00006.12.0035.1 Figure 2 Watercourse Crossings to be subject to Hydrological Assessment.mxd