Outer Dowsing Offshore Wind

Outline Plans

Outline Scour Protection and Cable Protection Management Plan
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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
CBRA	Cable Burial Risk Assessment
DCO	Development Consent Order
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
FEED	Front-End Engineering Design
GT R4	The Applicant. The special project vehicle created in partnership between Corio Generation (~~a wholly owned Green Investment Group portfolio company)~~and its affiliates), Gulf Energy Development and TotalEnergies
LAT	Lowest Astronomical Tide
MDS	Maximum Design Scenario
MMO	Marine Management Organisation
ODOW	Outer Dowsing Offshore Wind (The Project)
OP	Offshore Platform
ORCP	Offshore Reactive Compensation Platform
OSS	Offshore Substation
SPCPMP	Scour Protection and Cable Protection Management Plan
WTG	Wind Turbine Generator

Terminology

Term	Definition
The Applicant	GTR4 Limited (a joint venture between Corio Generation (and its affiliates), TotalEnergies and Gulf Energy Development), trading as Outer Dowsing Offshore Wind~~GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, Tota Energies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The Project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.~~
Array area	The area offshore within which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be positioned, including the ORBA.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor, in accordance with defined significance criteria.

Term	Definition
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.
Export cables	High voltage cables which transmit power from the Offshore Substations (OSS) to the Onshore Substation (OnSS) via an Offshore Reactive Compensation Platform (ORCP) if required, which may include one or more auxiliary cables (normally fibre optic cables).
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Inter-array cables	Cable which connects the wind turbines to each other and to the offshore substation(s), which may include one or more auxiliary cables (normally fibre optic cables).
Interlink cables	Cable which connects the Offshore Substations (OSS) to one another, which may include one or more auxiliary cables (normally fibre optic cables).
Maximum Design Scenario	The project design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed
Mitigation	Mitigation measures are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Order Limits within which the export cables running from the array to landfall will be situated.
Offshore Reactive Compensation Platform (ORCP)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents) housing electrical reactors and switchgear for the purpose of the efficient transfer of power in the course of HVAC transmission by providing reactive compensation.
Offshore Substation (OSS)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents), containing— (a) electrical equipment required to switch, transform, convert electricity generated at the wind turbine generators to a higher voltage and provide reactive power compensation; and (b) housing accommodation, storage, workshop auxiliary equipment, radar and facilities for operating, maintaining and controlling the substation or wind turbine generators.
Outer Dowsing Offshore Wind (ODOW)	The Project.

Term	Definition
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Project Design Envelope	A description of the range of possible elements that make up the Project's design options under consideration, as set out in detail in the project description. This envelope is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
Wind turbine generator (WTG)	A structure comprising a tower, rotor with three blades connected at the hub, nacelle and ancillary electrical and other equipment which may include J-tube(s), transition piece, access and rest platforms, access ladders, boat access systems, corrosion protection systems, fenders and maintenance equipment, helicopter landing facilities and other associated equipment, fixed to a foundation

Reference Documentation

Document Number	Title
6.1.3	Project Description
7.1	Report to Inform Appropriate Assessment
8.05	Outline Cable Specification and Installation Plan

1 Introduction

1.1 Background

1. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop Outer Dowsing Offshore Wind hereafter referred to as the ‘Project’. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm) approximately 54km offshore of the Lincolnshire coast, export cables to landfall, Offshore Reactive Compensation Platforms (ORCPs), onshore cables, connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Volume 1, Chapter 3: Project Description (document reference 6.1.3) for full details).
2. The detailed and final design of the Project will be determined post-consent.

1.2 Purpose of this Document

3. This Outline Scour Protection and Cable Protection Management Plan (SPCPMP) outlines the key principles of how the Applicant 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 the Project. The final SPCPMP will detail the need, type, sources, quantity and installation methods for scour protection and cable protection, with details updated and resubmitted for approval if changes to it are proposed following cable laying operation.
4. The final detailed design (e.g., numbers of wind turbines, layout configuration, foundation type and requirement for scour protection) will be determined post-consent. At that stage, a final SPCPMP which accords with this outline SPCPMP will be submitted to the Marine Management Organisation (MMO) for approval in accordance with the conditions of the dMLs.
5. For the purposes of the EIA, realistic worst-case scenarios in terms of potential impacts/effects have been adopted to provide a precautionary and robust impact assessment.
6. It is noted that, with the exception of cable/pipeline crossing locations, cable burial is expected to be possible throughout the majority of the offshore array area and export cable corridor; this is based on current design assumptions and understanding of ground conditions. However, as a precaution, an estimate for cable protection is included within the impact assessment in order to address any situation where cable burial is not ultimately possible (e.g., due to unexpected hard substrate being encountered during the pre-construction surveys or cable burial).

7. Geophysical and geotechnical surveys were undertaken for the Project array area and Export Cable Corridor (ECC) in 2021 and 2022. The geotechnical campaigns comprised gravity cores (up to 5m depth) and cone penetration tests (CPTs), alternating along the length of the ECC. These data are complemented by the shallow seismic refraction and sub-bottom profiler data collected through the geophysical survey campaign. As such, the understanding is good and robust relative to this stage in the project. Further geophysical and geotechnical surveys will be completed prior to construction to inform the final project design.
8. Consideration has been given to cable burial and the need for cable protection across the entire cable route. This includes considerations within the Inner Dowsing, Race Bank and North Ridge (IDRBNR) Special Area of Conservation (SAC) through which the offshore export cable route passes. Mitigation measures relevant to this SPCPMP that will be implemented include:
    - Across Entire ECC and Array Area:
        - Where reasonably practicable, subsea cable burial will be the preferred option for cable protection. Cable burial will be informed by the cable burial risk assessment (CBRA);
        - Where reasonably possible, cables will be buried to reduce the impacts of EMF on sensitive receptors and minimise the requirement for additional cable protection.
        - Where reasonably possible, the Project will undertake up to two attempts to bury cables before cable protection is used;
        - Outside the Inner Dowsing, Race Bank and North Ridge SAC, cables will be micro-sited around biogenic reef, where practicable;
    - Within IDRBNR SAC:
        - Cables will be microsited around any known *S. spinulosa* reef within the Inner Dowsing, Race Bank and North Ridge SAC;
        - Any cable protection required over the sandbanks within the Inner Dowsing, Race Bank and North Ridge SAC will be removable (i.e. mattresses or rock bags or other demonstrably removable protection); and
        - If any disused cables are encountered during installation within the Inner Dowsing, Race Bank and North Ridge SAC, where reasonably possible, relevant sections will be cut and removed to avoid cable crossings; .
9. This document is structured as follows:
    - Introduction;
    - Foundation Scour Protection;
    - Cable Protection (including specific requirements and measures within the IDRBNR SAC);
    - Sources of Scour and Cable Protection;
    - Installation Methods of Scour and Cable Protection; and
    - Summary.

2 Foundation Scour Protection

10. This section will contain details of the scour protection to be used for the relevant foundations (transmission or generation) (where required for engineering purposes).

11. The effects of scour, its location, extent and depth, are influenced by the marine processes acting upon offshore infrastructure, such as, for example, cables and turbine and offshore platform (OP) foundations. Depending on metocean conditions, and the design of the associated infrastructure, scour and cable protection will sometimes be required around foundations and cables to limit or prevent the development of scour or to mitigate the effects of currents and waves causing erosion of the seabed.

12. The final quantities and extent of scour protection will be dependent on current speed, sediment type and the foundation details. However, Table 2.1~~Table 2.1~~ - Table 2.4~~Table 2.4~~ below provide the maximum design scenario (MDS) for scour protection by foundation type (for all structures) that may be required, summarised from the project design information provided in Volume 1, Chapter 3 (Document Reference 6.1.3).

~~12.~~13. Ecological based solutions for scour protection will be prioritised, where practicable.

~~13.~~14. The total maximum volume of scour protection material being applied for, as set out in the DCO and the dMLs, is 3,134,850m^3.

Table 2.1: Maximum Design Parameters for Monopile Foundations

Parameter	WTG Minimum Size	WTG Maximum Size	OP	ANS
Maximum Seabed scour protection area (m^2)	4,300	4,700	5,390	1,800
Maximum scour protection volume per foundation (m^3)	12,900	14,100	16,170	5,400

Table 2.2: Maximum Design Scenario for Gravity Base Foundations

Parameter	WTG Minimum Size	WTG Maximum Size	OP	ANS
Maximum seabed scour protection area (m^2)	10,300	12,500	13,650	10,300
Maximum scour protection volume (m^3)	30,900	37,500	41,000	30,900

Table 2.3: Maximum Design Scenario for Pin Piled Jacket Foundations

Parameter	WTG Minimum Size	WTG Maximum Size	OP	ANS
Maximum seabed scour protection area (m^2)	1,000		9,600	1,000

Parameter	WTG Minimum Size	WTG Maximum Size	OP	ANS
Maximum scour protection volume (m^3)	3,000		28,800	3,000

Table 2.4: Maximum Design Scenario for Suction Bucket Jacket Foundations

Parameter	WTG Minimum Size	WTG Maximum Size	OP	ANS
Maximum seabed scour protection area (m^2)	7,800	8,850	17,050	3,750
Maximum scour protection volume (m^3)	23,400	26,550	51,150	11,250

~~14.~~15. The options for scour protection around foundations include:

- Rock Placement;
- Mattresses; or
- Rock Bags.

~~15.~~16. The amount of scour protection required will vary for the different foundation types being considered for the Project (Table 2.1~~Table 2.1~~ to Table 2.4~~Table 2.4~~). Flexibility in scour protection choice is required at this stage to ensure that anticipated changes in available technology and Project economics can be accommodated within the final Project design.

3 Cable Protection

3.1 Introduction

~~16.~~17. The preferred method for cable protection in all cases will be burial to a sufficient depth as informed by the final CBRA. However as noted above, there may be some locations or situations where array, offshore export or interlink cables cannot be buried for a number of possible reasons, including, for example, cable and/or pipelines crossings or unsuitable ground conditions, such that alternative methods of protection may be required.

~~17.~~18. In order to provide a conservative and future-proofed impact assessment, contingency estimates for cable protection have been included within the ES and RIAA should cable burial not be possible, due to unforeseen seabed and ground conditions not identified in the site characterisation surveys. These are summarised under Section 3.2; specific requirements for cable protection within the IDRBNR SAC are set out under Section 3.6.

~~18.~~19. As there will be a transition from the fully buried cables to the J-tubes of the foundations (which sit above the surface), the shallow buried and surface laid cable will require protection on the approach to the WTGs or offshore platforms. The specific length for this transition for all cables (array, interlink and export) will be defined post-consent.

3.2 Cable Protection Quantities and Location

~~19.~~20. The quantities, extent and location of cable protection will ultimately be dependent on the final design and findings of the pre-construction surveys and finalisation of the CBRA.

~~20.~~21. Table 3.1~~Table 3.1~~ provides an overview of the maximum area and volume of cable protection for the various cable types.

22. The total maximum volume of cable protection material being applied for, as set out in the DCO and the dMLs, is 3,201,665m^3.

~~21.~~23. ~~-~~If cable protection is required in the nearshore (defined as the inner depth of closure out to 7.1m water depth), concrete mattresses will be utilised, a description of concrete mattresses is set out in Section 6.11.5.2 of ES Chapter 3 Project Description (APP-058).

Table 3.1: Maximum Design Parameters for Cable Protection

Parameter	Maximum design parameters		
	Array cable	Interlink	Offshore export cables
Height of rock berm (m)	1.5	1.5	1.5
Width of rock berm at seabed (m)	12	12	12
Percentage of route requiring protection (%)	22.75	18.75	21.4

Parameter	Maximum design parameters		
	Array cable	Interlink	Offshore export cables
Cable protection: maximum rock size (m) (if required to protect from anchor strike)	D50 = 0.125	D50 = 0.125	D50 = 0.125
Cable protection area (m^2)	1,030,357	278,438	1,220,870
Rock placement volume for cable protection volume (m^3)	944,494	255,234	1,115,579
Number of crossings	30	16	38
Cable/pipeline crossings: length of rock berm at seabed (m)	500	500	500
Cable/pipe crossings: rock berm area (m^2)	240,000	128,000	304,000
Cable/pipe crossings: rock berm total volume (m^3)	270,000	144,000	342,000

3.3 Types of Cable Protection

3.3.1 Rock Placement

~~22.~~24. Rocks of different grade sizes are placed from a fall pipe vessel over the cable. Initially smaller stones are placed over the cable as a covering layer. This provides protection from any impact from larger grade size rocks, which are then placed on top.

~~23.~~25. This rock grading generally has mean rock size in the range of 90 to 125mm and maximum rock up to 250mm. The rocks generally form a trapezium shape, up to a maximum of 2m above the surrounding seabed level (depending on the requirements of the Cable Burial Risk Assessment (CBRA)) with a 3:1 gradient. The trapezium shape is designed to provide protection from both direct anchor strikes and anchor dragging.

~~24.~~26. It may be necessary to place larger sized rocks if protection from larger anchors is required (e.g., rocks of up to circa 500mm diameter where cables cross busier shipping routes).

~~25.~~27. See Volume 1, Chapter 3: Project Description, for full details pertaining to Rock Placement.

3.3.2 Mattresses

~~26.~~28. Mattresses generally have dimensions of approximately 6m by 3m by 0.3m. They are formed by interweaving a number of concrete blocks with rope and wire. They are lowered to the seabed on a frame. Once positioning over the cable has been confirmed, the frame release mechanism is triggered, and the mattress is deployed. This single mattress placement will be repeated over the length of cable which is either unburied or has not achieved target depth. Mattresses provide protection from direct anchor strikes but are less capable of dealing with anchor drag. Should this protection method be used for crossings, a mattress separation layer may first be laid on the seabed.

~~27.~~29. See Volume 1, Chapter 3: Project Description, for full details pertaining to Mattresses.

3.3.3 Rock Bags

~~28.~~30. Rock bags consist of various sized rocks constrained within a rope or wire netting containment. They are placed via a crane and deployed to the seabed in the correct position.

~~29.~~31. See Volume 1, Chapter 3: Project Description, for full details pertaining to Rock Bags.

3.3.4 Seabed Spacers

~~30.~~32. Seabed spacers consist of plastic, metal, or concrete, half shell sections that are bolted together forming a circular protection barrier around the cable and are used to pin the cable in place. Additionally, rock may be placed on top to provide protection from anchors or fishing gear. As they are placed onto the cable during installation, they cannot be used for remedial protection. Thus, their only use is for crossings or areas, such as exposed or shallow rock area, where it is known that burial will not be achieved.

~~31.~~33. See Volume 1, Chapter 3: Project Description, for full details pertaining to Seabed Spacers.

3.4 Landfall

~~32.~~34. At the submarine Horizontal Directional Drilling (HDD) exit pits, rock bags and or mattresses, or stabilising structures or weight collars may be used to temporarily pin the HDD ducts prior to cable installation. Mattresses may also be placed underneath the ducts within the exit pits to ensure they remain stable throughout the lifetime of the Project. It is likely that up to three mattresses would be used per HDD exit, which could result in a temporary footprint of $54m^2$.

~~33.~~35. Rock bags, concrete stabilisation and mattresses used to pin the HDD ducts will be removed prior to cable installation, with the exit pits filled in using the excavated sediment. Where possible, the cable will be buried from HDD exit pits seaward using the cable installation tool, however, cable protection may be required seaward of the HDD pits if the cable installation tool cannot install within the exit pits.

3.5 Cable & Pipeline Crossings

~~34.~~36. Within the Project offshore ECC and array area, there are several gas pipelines that connect to production wells in this part of the southern North Sea, as well as some telecommunication cables, which the array, interlink and/or export cables will have to cross. The design and methodology of these crossings will be confirmed post-consent. As an example of this type of crossing, a berm of rock would be placed over the existing asset for protection, known as a pre-lay berm, or separation layer. The Project cable would then be laid across this at an angle close to 90 degrees. The Project cable would then be covered by a second post lay berm to ensure that the export cable remains protected and in place.

~~35.~~37. The rock berms will be inspected at intervals to be determined by the Project and may need to be replenished with further rock placement dependent on their condition.

3.5.1 Biogenic Promoting Protections

~~36.~~38. It should be noted that technology may be developed by the time of construction such that remedial protection measures are available that may promote increased biodiversity through creation of suitable habitat (e.g., protection measures that are designed to act as 'artificial reefs'). The use of such measures will be considered post-consent on an area-by-area basis. Such measures may be used in conjunction with other remedial protection measures.

3.6 Cable protection approach and requirements within the IDRBNR SAC

~~37.~~39. The Applicant is committed to minimising the placement of cable protection within the IDRBNR SAC and particularly avoiding the use of non-removable cable protection (i.e. loose rock) on the designated sandbank features of that site (see Outline Cable Specification and Installation Plan (document 8.5)).

~~38.~~40. The Applicant has, through the extensive preliminary cable burial design and assessment process undertaken in the pre-application phase (as outlined in document 8.5), concluded that cable burial of the offshore export cables will be possible throughout the sandbank features of the SAC.

~~39.~~41. However, to allow for the unlikely event that adverse ground conditions or poor cable burial performance is encountered as the cable installation passes over/through the sandbank features of the SAC, placement of removable cable protection (including e.g. rock bags or concrete mattresses), covering up to 5% of the cable length for a total area of 5,760m^2 over the two sandbanks which the ECC overlaps with (Inner Dowsing and North Ridge) has been assessed in the ES.

~~40.~~42. More widely within the SAC, and outside of the sandbank features, due to the quaternary sediment potentially being a thin layer over the bedrock/underlying hard sediments, cable protection to be required in the worst case is up to 20% of the cable length. This is included within the total cable protection parameters for the export cables, described above. The Project has committed to micrositing the cable through the SAC to avoid areas of biogenic reef identified during the pre-construction surveys.

4 Sources of Scour and Cable Protection

~~41.~~43. This section will contain information pertaining to the sources of scour and cable protection.

5 Installation Methods of Scour and Cable Protection

~~42.~~44. This section will contain information pertaining to the installation methods of scour and cable protection.

6 Summary

~~43.~~45. This document comprises the Outline Scour Protection and Cable Protection Management Plan (SPCPMP). Within the document, the Applicant has summarised the need, type, quantity, source and installation methods of scour and cable protection; this information has been drawn from, and is described in greater detail, within the Project Description (Volume 1, Chapter 3 (Document Reference 6.1.3)).

~~44.~~46. The requirements for scour and cable protection material have been defined to a sufficient extent to allow the assessment of potential impacts arising on the receiving environment within the relevant offshore ES chapters (and relevant parts of the RIAA).

~~45.~~47. The specification for the scour and cable protection requirements set out within the project design envelope is intended to enable the required level of flexibility to be retained in the final engineering design process. Therefore, the assessments have been carried out on a maximum design scenario basis. With respect to cable protection material, cable burial is the preferred method of protection and additional cable protection material will only be used in those circumstances where sufficient burial is not possible or where cables must cross existing seabed assets such as cables and pipelines. Special consideration has been given to the use of cable protection material in the IDRBNR SAC and in relation to the designated features of that site.

~~46.~~48. The defined volumes of scour and cable protection are set out in the DCO and the dMLs.

~~47.~~49. As detailed requirements for scour and cable protection will be finalised post-consent, the dMLs also require the preparation of a final SPCPMP for approval by the MMO