Hornsea Project Four

F2.15: Outline Cable Specification and Installation Plan (Tracked)

Request for Further Information
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Revision Summary

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01	29/09/2021	Orsted	David King, Orsted	Julian Carolan, Orsted
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Revision Change Log

Rev	*Page*	*Section*	*Description*
01	N/A	N/A	Document submitted to Examining Authority in response to written questions.
02	1	Cover page	Document title updated from 'Outline Offshore Cable Installation Plan' to 'Outline Cable Specification and Installation Plan'.
03	12	8.1.1.1	Additional bullet point text added in relation to project commitments in response to Examining Authority.
03	10-11	8	Addition of new section 'Outline HDD Exit Pit Backfilling'.
04	10-11	8	Addition of sentence in new section 'Outline HDD Exit Pit Backfilling'.
04	8	6	Addition of seabed preparation seasonal restriction in relation to herring spawning.
05	15	10	Updated to reflect red throated diver best practice protocols

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Glossary

Term	Definition
Commitment	A term used interchangeably with mitigation and enhancement measures. The purpose of Commitments is to reduce and/or eliminate Likely Significant Effects (LSEs), in EIA terms. Primary (Design) or Tertiary (Inherent) are both embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, Preliminary Environmental Information Report (PEIR) or ES). Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are acceptable.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
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 importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Energy Balancing Infrastructure (EBI)	The onshore substation includes energy balancing Infrastructure. These provide valuable services to the electrical grid, such as storing energy to meet periods of peak demand and improving overall reliability.
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 Directive and EIA Regulations, including the publication of an Environmental Statement.
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.
Export Cable Corridor (ECC)	The specific corridor of seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) from the Hornsea Four array area to the Creyke Beck National Grid substation, within which the export cables will be located.
High Voltage Alternating Current (HVAC)	High voltage alternating current is the bulk transmission of electricity by alternating current, whereby the flow of electric charge periodically reverses direction.
High Voltage Direct Current (HVDC)	High voltage direct current is the bulk transmission of electricity by direct current, whereby the flow of electric charge is in one direction.
Hornsea Project Four offshore wind farm	The term covers all elements of the project (i.e. both the offshore and onshore). Hornsea Four infrastructure will include offshore generating stations (wind turbines), electrical export cables to landfall, and connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Mitigation	A term used interchangeably with Commitment(s) by Hornsea Four. Mitigation measures (Commitments) are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, PEIR or ES).
National Grid Electricity Transmission (NGET) substation	The grid connection location for Hornsea Four.

Term	Definition
Onshore substation (OnSS)	Comprises a compound containing the electrical components for transforming the power supplied from Hornsea Project Four to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid. If a HVDC system is used the OnSS will also house equipment to convert the power from HVDC to HVAC.
Orsted Hornsea Project Four Ltd.	The Applicant for the proposed Hornsea Project Four Offshore Wind Farm Development Consent Order (DCO).

Acronyms

Acronym	Definition
CSIP	Cable Specification and Installation Plan
DCO	Development Consent Order
CBRA	Cable Burial Risk Assessment
CFE	Controlled Flow Excavation
DECC	Department for Environment and Climate Change
EBI	Energy Balancing Infrastructure
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ERYC	East Riding of Yorkshire Council
ES	Environmental Statement
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
LSE	Likely Significant Effects
MHWS	Mean High Water Springs
NGET	National Grid Energy Transmission
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OnSS	Onshore Substation
PEIR	Preliminary Environmental Information Report
PLGR	Pre-Lay Grapnel Run
RIAA	Report to Inform Appropriate Assessment
RTD	Red Throated Diver
SoS	Secretary of State

Units

Unit	Definition
m	meters
Km	kilometres

1 Introduction

1.1.1.1 Orsted Hornsea Project Four Limited (the 'Applicant') is proposing to develop the Hornsea Project Four Offshore Wind Farm (hereafter 'Hornsea Four') which will be located approximately 69 km from the East Riding of Yorkshire coast in the southern North Sea and will be the fourth project to be developed in the former Hornsea Zone. Hornsea Four will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall, and on to an onshore substation (OnSS) with energy balancing infrastructure (EBI), and connection to the electricity transmission network.

2 Purpose

2.1.1.1 The main purpose of this document is to provide as much clarity as possible on how and when detailed information relating to the Hornsea Four cable installation process (inclusive of any site preparation and/or cable protection works) will come forward and how the specific activities are controlled within the Development Consent Order (DCO), so that it provides greater confidence in the Applicant's assumptions relating to site preparation, cable burial and deployment of cable protection measures. This document serves as an outline of the Cable Specification and Installation Plan (CSIP) to be presented pre-construction and presents detail on:

- The proposed structure of the CSIP; ~~and~~
- Cable burial and protection decision making process; and
- A commitment to a best practice protocol for red throated diver and common scoter during the construction of Hornsea Four.

3 Commitments

3.1.1.1 The Applicant has developed a range of Commitments to eliminate or reduce impacts and effects as far as possible. All Commitments identified for Hornsea Four are detailed within the Commitments Register (see **Volume A4, Annex 5.2: Commitments Register**).

3.1.1.2 The Commitments Register includes a number of commitments relevant to detailed design (see **Table 1**~~**Table 1**~~).

Table 1: Commitments.

Commitment ID	Measure Proposed	How the measure will be secured
Co57	Where offshore export cables must cross third party infrastructure, such as existing cables and pipelines, both the third-party asset and the installed cables will be protected.	DCO Schedule 11, Part 2 - Condition 13(1)(h) and; DCO Schedule 12, Part 2 - Condition 13(1)(h) (Cable specification and installation plan)
Co83	Primary: Where possible, cable burial will be the preferred option for cable protection.	DCO Schedule 11, Part 2 - Condition 13(1)(h) and; DCO Schedule 12, Part 2 - Condition 13(1)(h)

Commitment ID	Measure Proposed	How the measure will be secured
		(Cable specification and installation plan)
Co176	Tertiary: A Cable Specification and Installation Plan will be produced prior to construction of the offshore export cable which will include; details of cable burial depths; a detailed cable laying plan which ensures safe navigation is not compromised; details of cable protection for each cable crossing; and proposals for monitoring of offshore cable.	DCO Schedule 11, Part 2 - Condition 13(1)(h) and; DCO Schedule 12, Part 2 - Condition 13(1)(h) (Cable specification and installation plan)
Co187	Secondary: The installation of the offshore export cables at landfall will be undertaken by Horizontal Directional Drilling or other trenchless methods.	DCO Requirement 17 (Code of construction practice); and DCO Schedule 12, Part 2 - Condition 13(1)(h) (Cable specification and installation plan)
Co188	Secondary: No cable protection will be employed within 350 m seaward of MLWS	DCO Schedule 11, Part 2 - Condition 13(1)(h) and; DCO Schedule 12, Part 2 - Condition 13(1)(h) (Cable specification and installation plan)
Co189	The Dogger Bank cable crossing will be positioned east of Smithic Bank (as identified at https://data.gov.uk/dataset/d19f631c-27c0-4c74-804f-d76a4632b702/annex-i-sandbanks-in-the-uk-v2-public) and seaward of 20 m depth contour.	DCO Schedule 11, Part 2 - Condition 13(1)(h) and; DCO Schedule 12, Part 2 - Condition 13(1)(h) (Cable specification and installation plan)

4 Proposed Structure of the Cable Specification and Installation Plan

4.1.1.1 It is proposed that the CSIP would be developed in line with standard industry best practice approaches to the CSIP documentation and therefore adopts the following structure:

1) Introduction
2) Project Context
3) Scope and Objectives of the CSIP
4) Statements of Compliance
5) Updates and Amendments to the CSIP
6) Technical Specifications of Cables
7) Cable Burial Risk Assessment (CBRA)
8) Sandwave Clearance Plan
9) Cable Laying Plan and Installation Methodology
10) Cable Protection Plan
11) Monitoring of Cables Plan

5 Cable Burial and Protection Decision Making Process

5.1.1.1 The use of rock, mattresses or any other form of cable protection is considered a last resort to ensuring cable asset integrity. Burial of cables will always be the preferred protection solution as this provides the best protection for cables (see commitment Co83 in **Volume A4, Annex 5.2: Commitments Register**).

5.1.1.2 The Applicant acknowledges that it will be important for there to be ongoing dialogue between Hornsea Four and the relevant Statutory Nature Conservation Bodies (SNCBs) as the CSIP is being developed.

5.1.1.3 Further detail on consultation relating to sandwave clearance activities and cable protection installation are outlined in Figure 1~~Figure 1~~, Figure 3~~Figure 3~~ and Figure 4~~Figure 4~~. Pre-installation consultation would be undertaken following contractor appointment and detailed design. Consultation would be led by the Hornsea Four engineering and consenting teams alongside the installation contractor (e.g. an environmental compliance officer, if appropriate) also in attendance. The purpose of this consultation would be to inform contractor planning of installation campaigns and ensure all environmental considerations are properly communicated to contractors.

5.1.1.4 **Section 6** and **Section 7** provide further detail on consultation to be undertaken and information provided during these consultations, in relation to sandwave clearance and cable protection. to ensure a holistic and coherent strategy.

6 Outline Sandwave Clearance Plan

6.1 Overview

6.1.1.1 This document will be a live document which will relate to sandwave clearance activities. The purpose of this document will ultimately be to demonstrate compliance with the consent with regard to the extent, nature and location of any sandwave clearance activity.

6.2 Outline Document Structure

6.2.1.1 It is proposed that the Sandwave Clearance Plan will contain information on:

- The maximum design scenario presented within the Environmental Statement (ES), Report to Inform Appropriate Assessment (RIAA) and the DCO;
- The location, timing and methodology of any proposed sandwave clearance works (and if relevant, disposal activity);
- Roles and responsibilities and key contacts; and
- Communication procedures and timescales.

6.2.1.2 The Sandwave Clearance Plan will include information on compliance with a seasonal restriction in relation to sandwave clearance. At Deadline 7 in the Hornsea Four Examination process, in order to provide the MMO with comfort about impacts from increased suspended sediment concentrations and smothering on spawning herring, the Applicant has committed to a restriction on seabed preparation activities using either dredgers or flow tools (Controlled Flow Excavation (CFE)) between 21st August to 23rd October (inclusive) each year. This restriction relates to the area of the Order limits seaward of MHWS out to the westernmost extent of Works No. 3(a) (being the HVAC Booster Station Works Area) as this is the area in closest proximity to the core herring spawning grounds north of Flamborough Head.

6.3 Consultation

6.3.1.1 Consultation on the clearance proposals will centre around:

- Presentation of final ground model based on site specific pre-construction geophysical and geotechnical data obtained from the pre-construction site investigation works;
- Details of locations where sandwave clearance is required to install cable below reference seabed level;
- Expected volumes of sediment to be dredged and disposed, if relevant;
- Proposed locations for disposal, if relevant, including:
    - Consideration of Habitats of principal importance (Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act;
    - Consideration of Archaeological Exclusion Zones (AEZ); and
    - Proximity to dredge location.

- Mechanisms for communication to contractors emphasising the need to act with care and minimise seabed impacts. To include toolbox talks, provision of accurate shapefiles for key habitats (e.g. reefs);
- Discussion of contractor briefings, which may include agreed thresholds with reference to maximum design scenarios and DCO commitments; and
- Monitoring proposals for sandwave clearance.

6.3.1.2 The consultation process with SNCBs and contractors, with indicative timelines, is shown in Figure 1~~Figure 1~~. All consultation with SNCBs and contractors will be led by the Hornsea Four team.

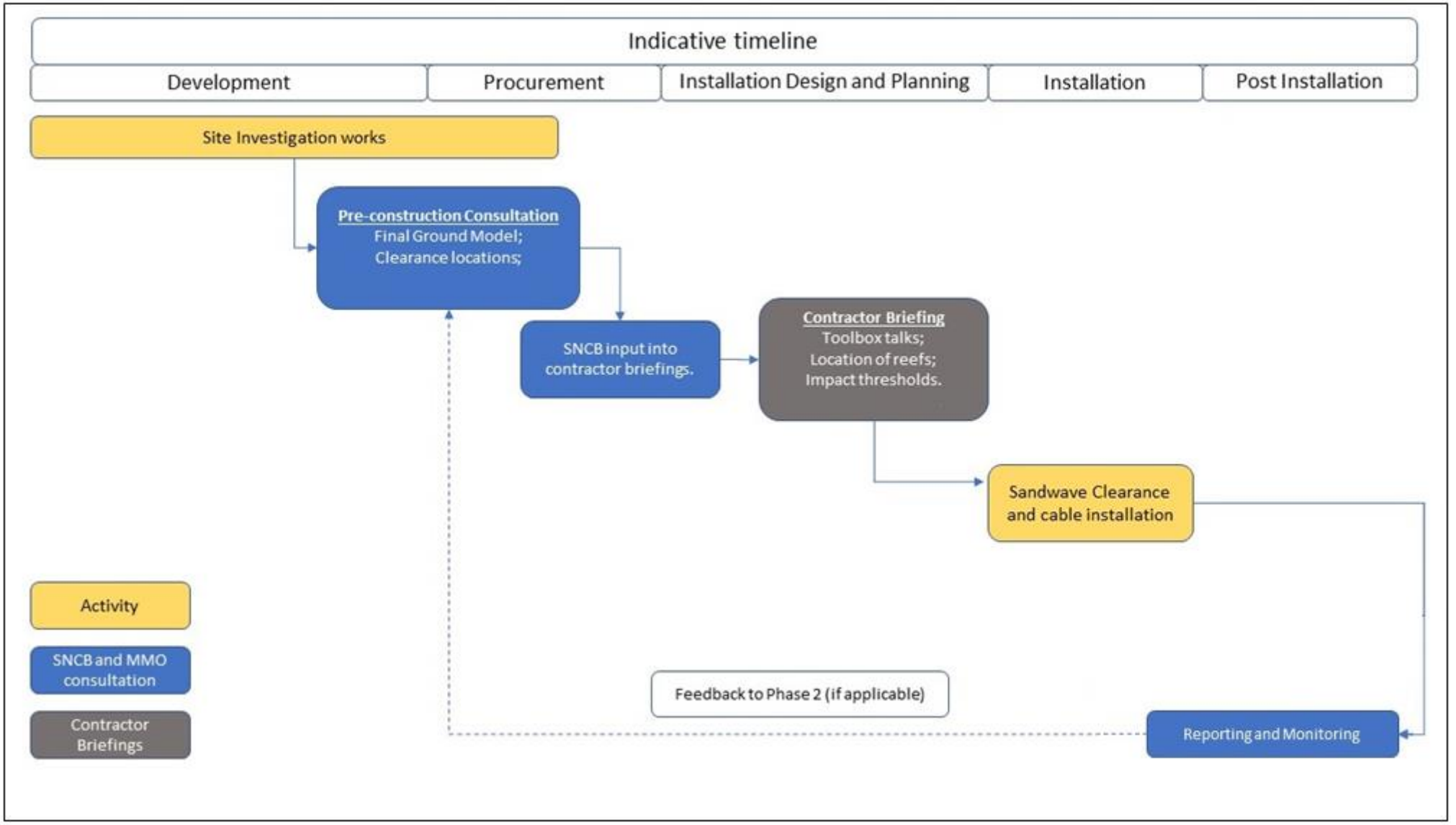

Figure 1. Outline Sandwave Clearance Plan consultation.

7 Outline Cable Protection Plan

7.1 Overview

7.1.1.1 This document will be a live document which will relate to installation of cable protection measures. The purpose of this document will ultimately be to demonstrate compliance with the consent with regard to the extent, nature and location of any cable protection activity.

7.2 Outline Document Structure

7.2.1.1 It is proposed that the Cable Protection Plan will contain information on:

- The maximum design scenario presented within the DCO, ES and the RIAA;
- Roles and responsibilities and key contacts; and
- Communication procedures and timescales.

7.2.1.2 It is proposed that the Cable Protection Plan will distinguish between any protection required for the crossing of existing assets (e.g., cables and or pipelines), and remedial cable protection requirements.

7.2.1.3 The consultation process with SNCBs and contractors, with indicative timelines, is shown in Figure 3~~Figure 3~~ for crossings and Figure 4~~Figure 4~~ for remedial protection. All consultation with SNCBs and contractors will be led by the Hornsea Four team.

8 Outline HDD Exit Pit Backfilling

8.1 Overview

8.1.1.1 Material from the initial excavation of HDD exits pits will be utilised for backfilling in the first instance. In the event that material excavated from the HDD exit pits is winnowed by background hydrodynamic processes, necessitating the winning of seabed material for infilling, the area of sediment removal would be limited to the area within the hashed area presented in Figure 2~~Figure 2~~.

8.1.1.2 The hashed area in Figure 2~~Figure 2~~ captures the minimum (blue dashed line) HDD exit pit location (400 m from the Transition Joint Bay (TJB) otherwise referred to as the HDD entry pit) and maximum (pink dashed line) HDD exit pit location (1,500 m from the TJB). A 100 m buffer is applied seaward of the maximum to facilitate the sediment removal. The area 100 m landward of the minimum is excluded from sediment removal to minimise potential environmental effects.

8.1.1.3 The final locations of the HDD exit will be confirmed post-consent and communicated to the regulator and other stakeholders (e.g. East Riding of Yorkshire Council (ERYC) and Natural England).

289000
290000
291000
5993000
5992000
5991000
N
GRID NORTH
Furthest HDD Exit Point (1500m From Eastward Edge of Work Numbers 6, 6b, 9a and 9c)
Closest HDD Exit Point (400m from Eastern Edge of Work Numbers 6, 6b, 9a and 9c)
License Text:
© OpenStreetMap (and) contributors, CC-BY-SA
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Date: 26/07/2022
Author: WILGI
Name: HOW040605_PotentialSedimentRemovalAreaforHDDExitPitBackfilling_MAP_20220726

Hornsea Four

Potential Sediment Removal Area for HDD Exit-Pit Backfilling

- Potential Sediment Removal Area for HDD Exit-Pit Backfilling
- 1500m from Eastern Edge of Work Numbers 6, 6b, 9a and 9c
- 400m from Eastern Edge of Work Numbers 6, 6b, 9a and 9c
- Approximate Mean Low Water Springs
- Approximate Mean High Water Springs
- Work Numbers 6, 6b, 9a and 9c
- Indicative Transition Joint Bay / HDD Entry Pit
- DCO Order Limits (v7)

All tidal levels are calulated based on seabed/beach elevations at the time of data aquisition.

Coordinate system: ETRS 1989 UTM Zone 31N
Scale@A3: 1:10,000

0 50 100 150 200 250 Meters

0 200 400 600 800 Feet

REV	REMARK	DATE
	First Issue	26/07/2022

Potential Sediment Removal Area for HDD Exit-Pit Backfilling
Document no: HOW040605
Created by: WILGI
Checked by: RICYO
Approved by: JULCA

Ørsted

Figure 2. Potential Sediment Removal Area for HDD Exit-Pit Backfilling

9 Consultation

9.1 Pre-construction consultation – Design of crossings

9.1.1.1 Consultation relating to the need for cable protection associated with the crossing of existing assets will focus on providing clarity on matters including:

- Asset to be crossed and operator;
- Proximity to assets;
- Location of rock protection and features affected;
- Type of protection – type and grain sizes;
- Volume of rock protection;
- Area of seabed affected by crossing (with reference back to DCO commitments); and
- Mechanisms for communication with contractors emphasising the need to act with care and minimise seabed impacts as much as practical. To include toolbox talks, provision of accurate shapefiles for key habitats (e.g. reefs) and agreed thresholds for when work stops are required, with reference to maximum design scenarios and DCO commitments.
- Incorporation of relevant project commitments (see **Volume A4, Annex 5.2: Commitments Register**) designed to eliminate or reduce impacts and effects as far as possible including the commitment Co189 to ensure the Dogger Bank export cable crossing is positioned seaward of the 20 m depth contour.

9.2 Pre-construction consultation – Remedial Cable Protection

9.2.1.1 Consultation relating to the need for cable protection associated with any remedial cable protection will focus on the following areas:

- Discussion of the cable laying plan and installation methodology;
- Identify risks which may result in insufficient burial and mitigation taken to minimise the requirement for use of cable protection;
- Proposals for remedial burial operations, if required; and
- Mechanisms for communication to contractors as outlined above for crossings.

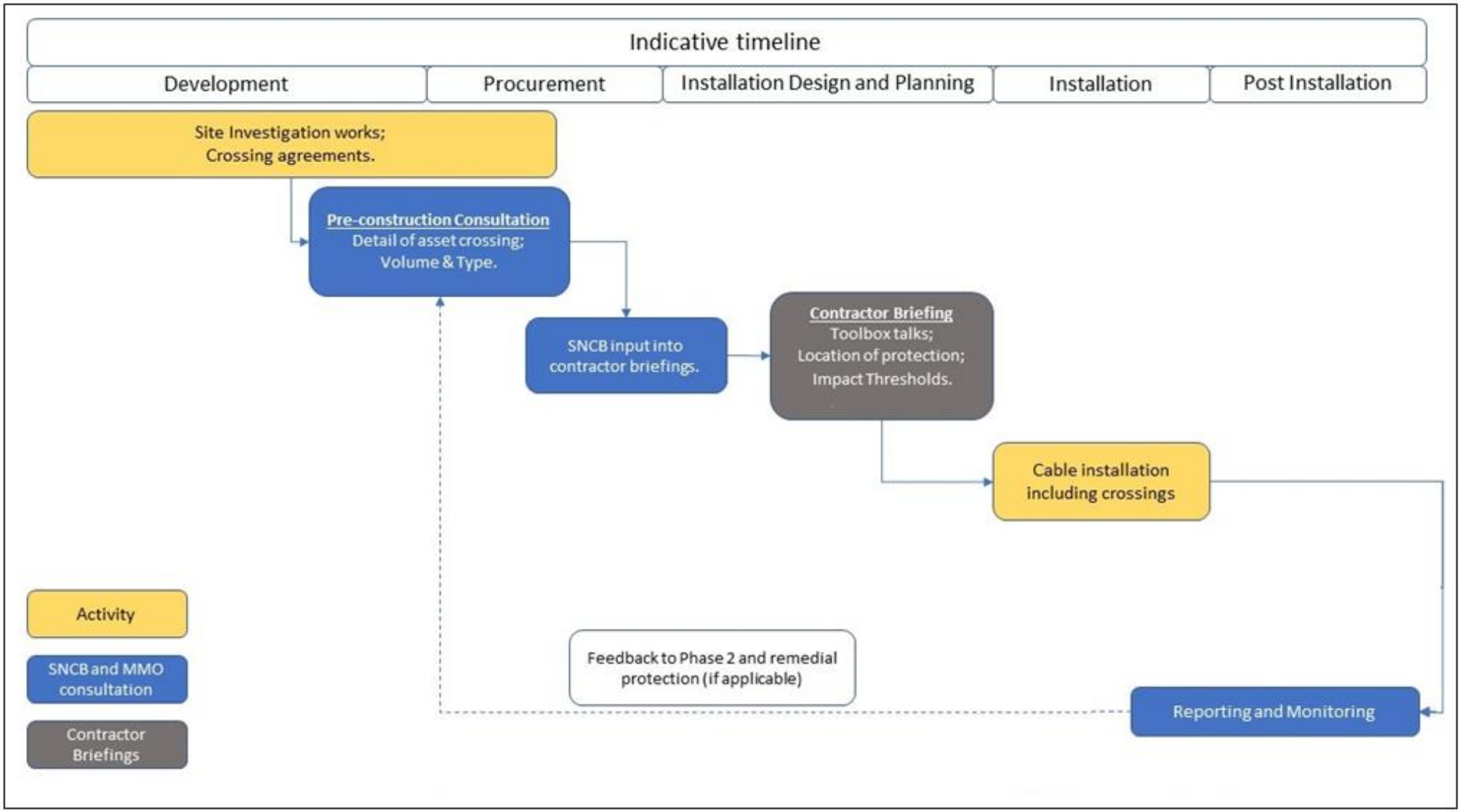

Figure 3. Outline consultation plan on cable crossings.

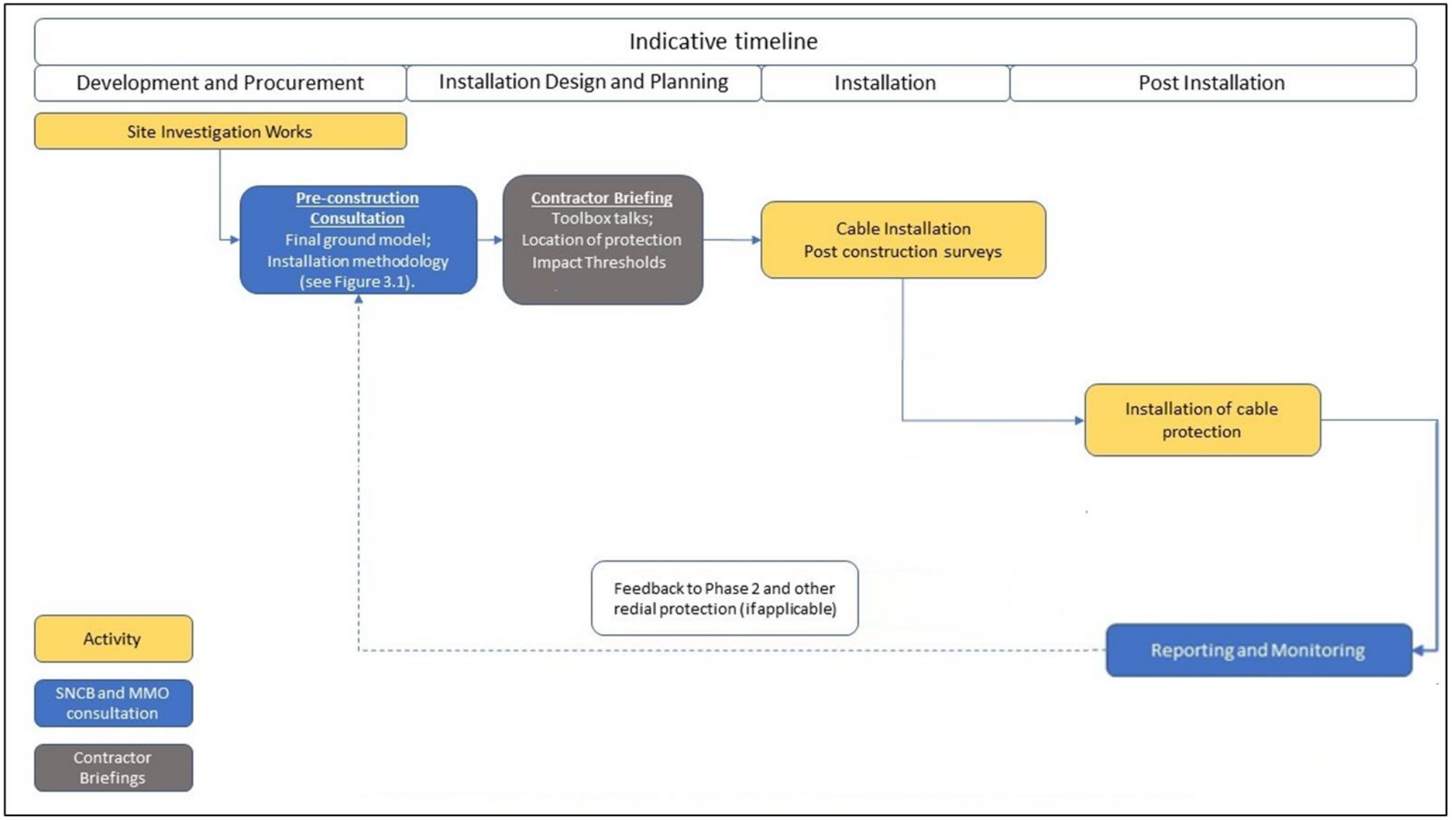

Figure 4. Outline consultation plan for cable burial and remedial cable protection.

10 Red Throated Diver Best Practice Protocols

10.1.1.1 Vessel disturbance: using best practice in the management of vessel traffic a significant disturbance to red throated diver (RTD) and common scoter can be avoided. The Applicant will have regard to best practice during the construction of Hornsea Four in accordance with this section. Example of relevant best practice include where reasonably practicable:

- avoid works within or within 2km of a Special Protection Area designed for RTD during the over winter period 1st Nov – 31st March inclusive
- selecting routes that avoid known aggregations of birds;
- restricting (to the extent reasonably possible) vessel movements to existing navigation routes (where the densities of divers are typically relatively low);
- maintaining direct transit routes (to minimise transit distances through areas used by divers);
- avoidance of over-revving of engines (to minimise noise disturbance); and,
- briefing of vessel crew on the purpose and implications of these vessel management practices (through, for example, tool-box talks).