EMEC | Berth 5 Subsea Cable-End Relocation

Project-specific Environmental Monitoring Programme

EMEC Billia Croo Wave Test Site

April 2026

Purpose

Mitigation and monitoring measures have been identified following a review of the project specific environmental impacts, taking into consideration the site-wide environmental description or environmental appraisal and associated guidance provided by EMEC. This document describes cable-specific identified mitigation, monitoring and management measures associated with the proposed project including any statutory reporting mechanisms. For a detailed description of the project, please refer to the Project Information Summary.

Document History

Revision	Date	Description	Originated by	Reviewed by	Approved by
001	16/10/2025	Draft	AM (EMEC)	DL (EMEC)	DL (EMEC)
002	09/12/2025	Final Draft	AM (EMEC)	DL (EMEC)	DL (EMEC)
002.1	26/02/26	Updated draft post licensing clarification from MD-LOT	AM (EMEC)	DL (EMEC)	DL (EMEC)
002.2	21/04/2026	Updated draft	AM (EMEC)	DL (EMEC)	DL (EMEC)

Disclaimer

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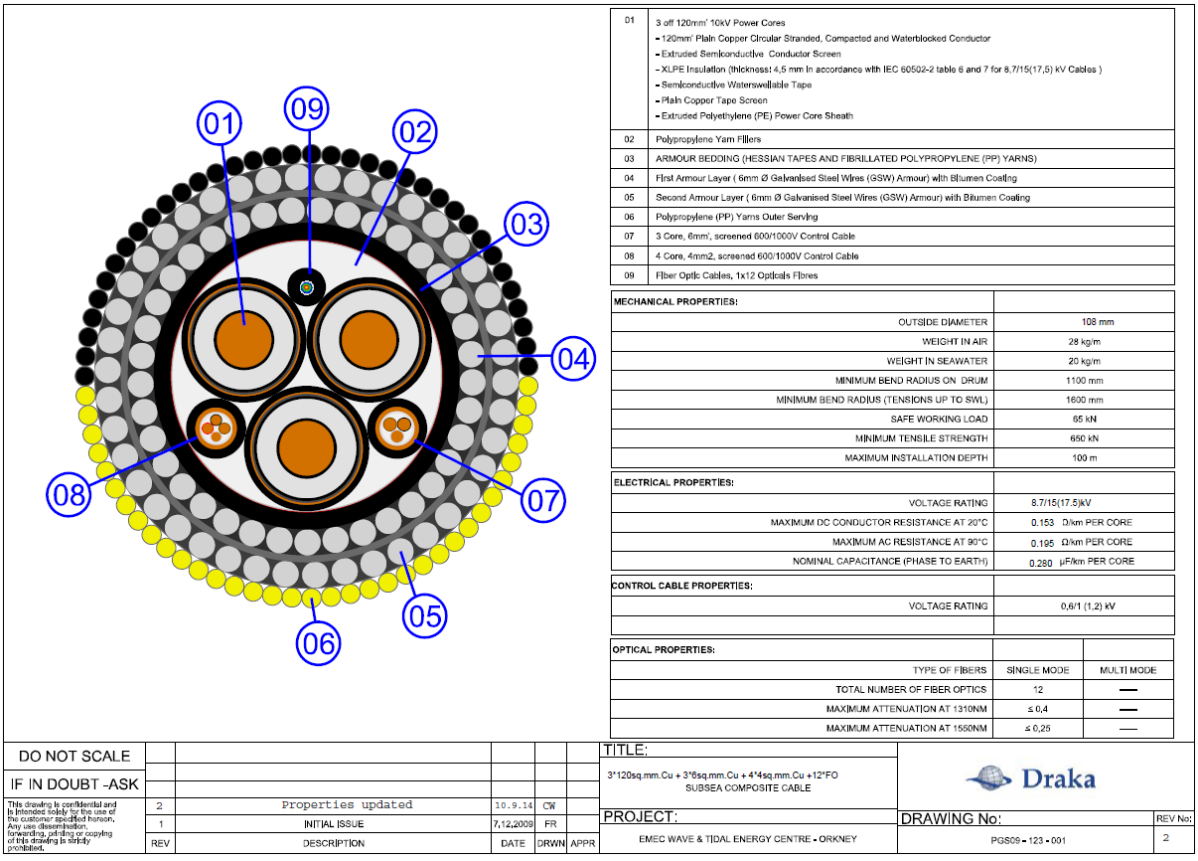
1 Technology

1.1 Cable Overview

The cable is a Draka cable as per specifications on Figure 1. The connector which will be installed at the end of EMEC's subsea cable is an ETA dry-mate connector (DMC) design as shown in Figure 2.



01	3 off 120mm² 10kV Power Cores - 120mm² Plain Copper Circular Stranded, Compacted and Waterblocked Conductor - Extruded Semiconductive Conductor Screen - XLPE Insulation (thickness± 4,5 mm in accordance with IEC 60502-2 table 6 and 7 for 8,7/15(17,5) kV Cables) - Semiconductive Waterswellable Tape - Plain Copper Tape Screen - Extruded Polyethylene (PE) Power Core Sheath
02	Polypropylene Yarn Fillers
03	ARMOUR BEDDING (HESSIAN TAPES AND FIBRILLATED POLYPROPYLENE (PP) YARNS)
04	First Armour Layer (6mm Ø Galvanised Steel Wires (GSW) Armour) with Bitumen Coating
05	Second Armour Layer (6mm Ø Galvanised Steel Wires (GSW) Armour) with Bitumen Coating
06	Polypropylene (PP) Yarns Outer Serving
07	3 Core, 6mm², screened 600/1000V Control Cable
08	4 Core, 4mm2, screened 600/1000V Control Cable
09	Fiber Optic Cables, 1x12 Opticals Fibres

MECHANICAL PROPERTIES:	
OUTSIDE DIAMETER	108 mm
WEIGHT IN AIR	28 kg/m
WEIGHT IN SEAWATER	20 kg/m
MINIMUM BEND RADIUS ON DRUM	1100 mm
MINIMUM BEND RADIUS (TENSIONS UP TO SWL)	1600 mm
SAFE WORKING LOAD	65 kN
MINIMUM TENSILE STRENGTH	650 kN
MAXIMUM INSTALLATION DEPTH	100 m

ELECTRICAL PROPERTIES:	
VOLTAGE RATING	8.7/15(17.5)kV
MAXIMUM DC CONDUCTOR RESISTANCE AT 20°C	0.153 Ω/km PER CORE
MAXIMUM AC RESISTANCE AT 90°C	0.195 Ω/km PER CORE
NOMINAL CAPACITANCE (PHASE TO EARTH)	0.280 µF/km PER CORE

CONTROL CABLE PROPERTIES:	
VOLTAGE RATING	0,6/1 (1,2) kV

OPTICAL PROPERTIES:		
TYPE OF FIBERS	SINGLE MODE	MULTI MODE
TOTAL NUMBER OF FIBER OPTICS	12	—
MAXIMUM ATTENUATION AT 1310NM	≤ 0,4	—
MAXIMUM ATTENUATION AT 1550NM	≤ 0,25	—

DO NOT SCALE
IF IN DOUBT -ASK

REV	DESCRIPTION	DATE	DRWN	APPR
2	Properties updated	10.9.14	CW	
1	INITIAL ISSUE	7,12,2009	FR	

TITLE:
3*120sq.mm.Cu + 3*6sq.mm.Cu + 4*4sq.mm.Cu +12*FO
SUBSEA COMPOSITE CABLE

PROJECT:
EMEC WAVE & TIDAL ENERGY CENTRE - ORKNEY

Draka

DRAWING No: PGS09 - 123 - 001

REV No: 2

Figure 1. Draka cable specification

Figure 2. Dry Mate Half Connector with abandonment cap

2 Environmental Monitoring

The following sections describe the potential key environmental impact(s) considered relevant to the works associated with the Berth 5 subsea cable end relocation at EMEC's Billia Croo test site. Within the following sections is a summary of the proposed monitoring and mitigation measures relating to each potential impact pathway for the relevant project phase. Any key findings from the monitoring will be disseminated to the regulator, Marine Directorate, and appropriate advisory bodies, e.g., NatureScot.

2.1 Disturbance/Displacement

Increased anthropogenic activity within the marine environment can potentially cause changes in the behaviour of receptors, particularly sensitive receptors such as cetaceans, seals, basking sharks and marine birds. There is potential to cause spatial displacement of essential activities for certain species due to increased activity in the area. This is likely to be most prevalent during the installation phase when there will be marked increase in vessel traffic accessing the site. To determine the significance of such a potential impact, there is a requirement to understand the importance of the habitat and the availability of alternative habitat elsewhere. The frequency of the impact in terms of duration will also be crucial in determining the significance of the impact.

As the proposed testing location at the Billia Croo test site is close to the coastline, bird species utilising coastal breeding sites may be affected by the increased vessel traffic in the area. In addition, there is the potential to affect birds foraging success or moulting, if the testing is located within a key foraging area or a moulting site. Vessels are only expected to be onsite for a period of one to two weeks in which cable works and vessel mooring removal should be completed. The temporary nature of the increase vessel traffic onsite is not expected to cause any significant impacts to seals, cetaceans, basking sharks and marine birds in the vicinity of the Billia Croo scale test site.

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway within disturbance/ displacement.

Table 1. Proposed monitoring and mitigation measures relevant to the impact pathway disturbance/displacement

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
Recovery and Relocation			
Vessel activity – noise and presence may cause minor disturbance/displacement (including when transiting to and from site)	Cetaceans, seals, basking sharks, seabirds	**Mitigation**: Comply with the Scottish Marine Wildlife Watching Code (SMWWC), including the following measures: • Steady course and speed throughout operation. • Reduction of speed upon	Any non-compliance with the SMWWC will be reported to the regulator as soon as notified by the vessel skipper.

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
		sighting of receptor. • Minimum approach distances will be adhered to. • Sudden changes in speed, direction and engine noise will be avoided. • Vessel will maintain at least 50m distance from coast during seabird breeding season. Vessels will only be onsite for the minimum period of time required.	
Potential cable works and mooring anchors – noise and presence may cause minor disturbance/displacement	Cetaceans, seals, basking sharks	**Mitigation**: The Scottish Marine Wildlife Watching Code (SMWWC) will be adhered to.	Any non-compliance with the SMWWC will be reported to the regulator as soon as notified by the vessel skipper.
Operation			
Presence of cable may cause very minor disturbance	Cetaceans, seals, basking sharks	No mitigation or monitoring is proposed	N/A

2.2 Acoustic impact

Noise disturbance can occur from the presence of vessels, drilling activities, anchoring, and survey activities. The creation of noise must be placed in the context of the existing environment, as other anthropogenic sources of marine noise may already be present within the area and mask the impact of any additional acoustic outputs. It is unlikely acute effects such as non-auditory/auditory tissue damage would be experienced because of the acoustic outputs from this project but behavioural effects due to disturbance are possible.

Noise disturbance effects may cause mobile species, such as cetaceans, seals and fish to move away from the immediate proximity of the installation site over the short term, but the impact is likely to be highly localised and temporary. Currently there is little known regarding importance of hearing underwater and hearing thresholds for diving birds but there is the

potential for it to cause displacement, avoidance, reduction in foraging success or it may have no effect.

It is anticipated that the activities related to the Berth 5 cable works and associated vessel moorings will be completed in as short a timescale as possible, therefore, it is not expected that any significant effects to marine mammals, fish or marine birds will result from the associated activities. Additionally, no piling is expected to occur within the project.

Any protocols outlined in this plan will be adhered to during operations.

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway within acoustic impact.

Table 2. Proposed monitoring and mitigation measures relevant to the impact pathway acoustic impact

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
Recovery and Relocation			
Vessel activity – noise from increased activity will cause minor acoustic impact	Cetaceans, Seals, Basking Sharks	**Mitigation**: The Scottish Marine Wildlife Watching Code (SMWWC) will be adhered to. **Monitoring:** Potentially monitoring noise using static and drifting passive acoustic recorders if funding is available.	Any non-compliance with the SMWWC will be reported to the regulator as soon as notified by the vessel skipper. A report will be produced if the data collection is conducted.
Operation			
Noise from cable generating may cause minor acoustic impact	Cetaceans, Seals, Basking Sharks	**Monitoring:** Potentially monitoring noise using static and drifting passive acoustic recorders if funding is available.	A report will be produced if data collection is conducted

2.3 Collision and Entanglement Risk

It is thought there is a low risk of the potential exists for cetaceans, seals and basking shark to become entangled in mooring/wire lines of the size and dimensions required to temporarily moor the associated vessels that will be used during this operation.

Entangled animals may drown or starve because they are restricted by mooring lines. It is assumed the mooring lines used within this project will not present a risk to diving seabirds.

Marine mammals and basking sharks may suffer physical trauma and infections from a striking event involving vessels used during cable works. In addition, entangled animals may also be unable to avoid vessels like they normally would, thus increasing the risk of collision. However, with the temporary nature of the works and cables used alongside personnel being present during all operations being sufficient enough to deter entanglement, this is unlikely to occur.

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway within collision and entanglement risk.

Table 3. Proposed monitoring and mitigation measures relevant to the impact pathway collision and entanglement risk

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
Recovery and Relocation			
Vessel collision with large marine organisms	Cetaceans, Seals, Basking Sharks	**Mitigation**: The Scottish Marine Wildlife Watching Code (SMWWC) will be adhered to.	Any non-compliance with the SMWWC will be reported to the regulator as soon as notified by the vessel skipper.
Entanglement of large marine organisms in potential temporary boat moorings	Cetaceans, Seals, Basking Sharks	**Mitigation**: Mooring lines will be kept onsite for as short a period as possible. **Monitoring:** mooring lines will be monitored during associated operations and maintenance activities	Any events will be reported to the regulator as soon as possible on return to shore.

2.4 Biofouling and non-native species (NNS) introduction

Biofouling is the settlement of biological organisms on man-made structures. Fouling is often a gradual accumulation of organisms which develops over time. Biofouling may consist of microorganism such as bacteria or protozoa or macro-organisms such as barnacles or seaweed. Once relocated, the cable, and will continue to be laid onsite for an extended period of time. This period is expected to provide fouling species an opportunity to settle and grow to maturity. The spread of non-native organisms can occur through a variety of means including shipping, transport of fish or shellfish, scientific research and public aquaria. These invasive non-native species can threaten marine diversity. Various guidelines and standards have been referred to in developing the proposed mitigation and monitoring measures (IMO, 2011).

It is anticipated that a certain level of biofouling will accumulate, although it is not expected to pose a significant risk to introducing non-native species as movements will be limited to Orkney waters only with a local contractor supporting with the works.

However, the introduction of hard substrate into the marine environment may also act as a ‘stepping-stone’ for non-native species. A cable may act as a location for non-native species to grow in the area and thus provide a stepping-stone for colonization. Detrimental impacts of non-native species on native biota can occur through competition, predation, herbivory, habitat alteration and disease.

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway within biofouling and the introduction/transfer of non-native species.

Table 4. Proposed monitoring and mitigation measures relevant to the impact pathway biofouling and introduction of non-native species

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
Recovery and Relocation			
Introduction of non-native species (via vessel or onboard equipment)	Benthic species and habitats, and benthic fish and shellfish	**Mitigation**: Where possible & practical local vessel and equipment will be used, reducing the potential for introduction of NNS. Compliance with good practice measures.	Any deviance from the good practice measures will be reported.

2.5 Habitat Creation

The relocation and physical presence of the cable will inherently result in direct habitat loss. However, colonisation of the introduced structures may have the potential to function as artificial reefs or fish aggregating devices.This artificial substrate could alter the nature and composition of the species present and may enable non-native species to colonise and potentially spread to other areas.

Increase in the local reef extent on or near the cable with its existing presence has not presented itself greatly, therefore, diminishing the significance of this impact. However, continuing operations and maintenance activities will present opportunities to assess this.

Cetacean, seal and seabird distribution may be influenced by prey distribution and associated prey habitat. The physical presence of the cable may offer enhanced foraging efficiency for some species.

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway within habitat creation.

Table 5. Proposed monitoring and mitigation measures relevant to the impact pathway habitat creation

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
All Phases			
Fish aggregation device (FAD) effect and colonisation of fouling organisms due to introduction of cable in new location	Benthic species and habitats, and fish and shellfish	No significant impacts are expected due to short-duration and temporary works; therefore, no specific monitoring measures are proposed.	N/A

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
Creation of habitat around installed infrastructure	Benthic species and habitats, and fish and shellfish	**Monitoring**: There is a likelihood of reef effects around the cable. There is no proposed monitoring measure however, when the opportunity arises, any video footage, if taken, of the cable will be analysed and reviews during operations and maintenance will take place, if possible, to quantify the level of reefing taking place.	Findings from analysis will be reported to the regulator as and when available.

2.6 Seabed Clearance

During the recovery and relocation of the Berth 5 subsea cable, the deployment of vessel moorings will cause a temporary loss of benthic habitat. Small amounts of lost habitat may diminish populations of species that are recorded as rare. However, the vessel moorings and tend to have a small footprint and are temporary deposits.

With most of the cable staying in place at its current location, and only the end being terminated and relocated with no use of drills, etc., on the seabed: it is expected there will not be a significant loss of seabed habitat with these works

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway within seabed clearance.

Table 6. Proposed monitoring and mitigation measures relevant to the impact pathway seabed clearance

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
All project phases			
Seabed clearance and habitat loss/disturbance from installation and removal of temporary vessel mooring equipment	Benthic species and habitats, and fish and shellfish	**Mitigation:** Drop-camera will be used during cable retrieval and relocation and if any sensitive receptors are identified during installation, then these areas will be avoided through micro-siting of the cable and	N/A

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
		lines/chains on the seabed.	
Recovery/ relocation causes damage to cultural heritage or archaeological objects within the site.	Cultural heritage and archaeological objects	**Mitigation:** The appropriate consultation with Historic Environment Scotland (HES) will be undertaken if cultural heritage or archaeological objects are found during this operation.	The regulator and HES will be consulted if any cultural or archaeological objects are found during the operation.
Potential scouring/habitat disturbance due to movement of temporary mooring lines	Benthic species and habitats, and fish and shellfish	**Mitigation:** Drop-camera surveys will be conducted during deployment and decommissioning	Any damage to the seabed will be reported to Marine Directorate and NatureScot.

2.7 Discharges to the Marine Environment

Benthic species may be exposed to materials such as paints and antifouling compounds originating directly from the cable. Accidental spillages from installation or maintenance vessels could also occur. Spillages pose a risk to marine mammals, fish, seabirds and benthic communities and can cause direct effects at the time of the spill or can result in chemical accumulation in body tissues leading to lagged effects on health and breeding success.

The following table summarises the proposed monitoring and mitigation measures for the relevant project phase relating to each potential impact pathway for discharges to the marine environment.

Table 7. Proposed monitoring and mitigation measures relevant to the impact pathway discharges to the marine environment

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
All project phases			
Leakage of chemicals from vessels involved with recovery and relocation can enter the food-web at any trophic level.	Potentially whole local ecosystem	**Mitigation:** Vessel crews should follow standard procedures to avoid fuel and chemical spills. Suitable spill kits should be onboard all vessels involved in the project.	Any incidents will be reported to the regulator as soon as possible.

Relevant Project Phase	Impact Pathway	Receptor	Proposed Mitigation/Monitoring Measure
Operation			
Corrosion of materials used within cable components introduce toxins to environment and disrupt ecosystem dynamics.	Potentially whole local ecosystem	**Mitigation:** N/A	N/A

3 Cultural Heritage Impacts

3.1 Prehistoric sites

Inferences can be made on the potential for the survival of prehistoric deposits in the area of Billia Croo from coring, bathymetric, side scan sonar (SSS) and sub-bottom profile (SBP) data obtained by various surveys in and close to the test site and observations made during numerous diving operations at various devices and in the general area by SULA Diving.

SSS surveys combined with data from SBP surveys and other studies indicate that there is a transition from exposed bedrock (inshore) to mobile sandy sediments around the 20-25 m contour. Surficial deposits in the area of the EMEC test site are predominantly mobile or featureless sand interspersed with intermittent glacial erratics and patches of coarser sediment interpreted as glacial till deposits since they tend to correlate with areas of deeper sediment deposition and a change in seabed topography. Where present, deposits appear to be 1-10 m thick, overlying bedrock.

In summary, in the offshore lease area, the extension area, and the route to shore at Billia Croo (inshore lease area), the potential for the survival of prehistoric deposits is negligible-low, especially because most of the site is exposed bedrock, or mobile sediments comprising sandy gravels and gravelly sands.

3.2 Shipwrecks, aircraft and obstructions

No marine cultural heritage statutory designations have been identified in the Billia Croo test site area. There are no UK Hydrographic Office (UKHO) reports showing the existence of any wrecks within the area and none shown on the relevant UKHO charts.

A total of fifteen shipwrecks were identified for this area. No exact wreck positions are known, but the records must be taken as indicative of the potential for wrecks (and artefacts) having been present in the area at some point in time. Considering the nature of the shoreline, the weather and sea conditions experienced along this coast, it is unlikely that the vessels remain intact and in the reported area of foundering, or that any remains survive. The majority of vessels lost in the area were wooden sailing ships stranded in the shallows and many are listed as being broken up and salvaged at the time. Those that came ashore in heavy weather were inevitably broken up by the sea on the rock-strewn coastline. Similarly, later vessels of iron construction were the result of stranding's and, given the exposed rocky nature of the coastline and environmental conditions in the area, are not likely to remain intact unless buried in sediment

Multi-beam bathymetry and side scan sonar tend not to be able to distinguish between the wreck and the geology of the seabed. Magnetometry is the only method of determining if a wreck may be present. Given that the area is mostly exposed bedrock and any sediment being shallow and mobile, it is unlikely that much, if anything, survives and nothing has been observed during SULA Diving investigations in the area.

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