Beatrice Offshore Windfarm Ltd

Beatrice Marine Growth Removal Marine Licence Application

Environmental and Invasive Non-Native Species Assessment

ASSIGNMENT A101013-S00
DOCUMENT A-101013-S00-A-REPT-001

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REV	DATE	DESCRIPTION	ISSUED	CHECKED	APPROVED	CLIENT
A02	23/01/2025	Re-Issued for Use	GK	AM	AM	-
A01	23/01/2025	Issued for Use	GK	AM	AM	-
R01	15/01/2025	Issued for Review	GK	JS	AM	-

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ACRONYMS

ACRONYM	DEFINITION
BOWL	Beatrice Offshore Wind Farm Ltd
BWM	Ballast Water Management
CPS	Cable Protection System
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ES	Environmental Statement
EU	European Union
GEN	General Policies
INNS	Invasive Non-Native Species
MARPOL Convention	International Convention for the Prevention of Pollution from Ships
MFRAG	Moray Firth Regional Advisory Group
ML	Marine Licence
NCMPA	Nature Conservation Marine Protected Area
OMP	Operation and Maintenance Programme
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic
OTM	Offshore Transmission Module
PMF	Priority Marine Feature
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
WTG	Wind Turbine Generator

1 INTRODUCTION

1.1 Background and need for marine growth removal

A cable defect has been identified on Cyan String inter-array cable BE-F06 to BE-G07 (OTM1) in the Beatrice Offshore Windfarm (BOWL) Array Area. BOWL is located approximately 13 km from the Caithness coast in northeast coast of Scotland and the cables and subsea structures have been installed between 2018 and 2019, achieving full generation in June 2019. The affected cable has been curtailed to 80% to preserve cable integrity but there is a high risk of complete failure. A cable failure would result in six Wind Turbine Generators (WTGs) going offline until the cable can be replaced; this could lead to a significant loss of available clean energy to the grid and an increase in carbon footprint. The cable is also critical as it acts as a back feed (reverse electric power flow in situations where grid is unavailable) between the two Offshore Transmission Modules (OTM). If the cable failed and there was an outage on either OTM, then a significant number of WTGs would need generators installed to preserve the assets, resulting in significant vessel activity and diesel usage through generators. A pro-active and planned cable replacement would, therefore, minimise operational disruption and potential associated environmental impacts.

Cable replacement requires the removal of the existing cable protection system (CPS), including the removal of J-tubes, using a diamond wire cutter and subsea clamp. To remove the CPS, the J-tube just above the flange / bellmouth will be cut using a diamond wire cutter. To mount the diamond wire cutter and subsea clamp, a maximum length of 1000 mm of marine growth around the circumference of the J-tubes (F06 J-tube and the OTM1 J-tube) will be removed ahead of mounting the diamond wire cutter (Figure 1-1; See Section 2 for details). The marine growth is removed to allow for the cutting to take place safely and effectively and to facilitate the installation of the new bellmouth once the cable replacement has taken place. The removal of the marine growth will take place at both ends of the cable using a Remotely Operated Vehicle (ROV) and an ROV handheld jetting lance. The marine growth, after its removal, will be left to fall on the seabed. It is likely that marine growth may remain in suspension for a limited period of time before it settles on the seabed due to tidal action and waves in the area but considering the oceanographic conditions and physical processes in the area, any dispersal of material is expected to be limited (see Section 2.2).

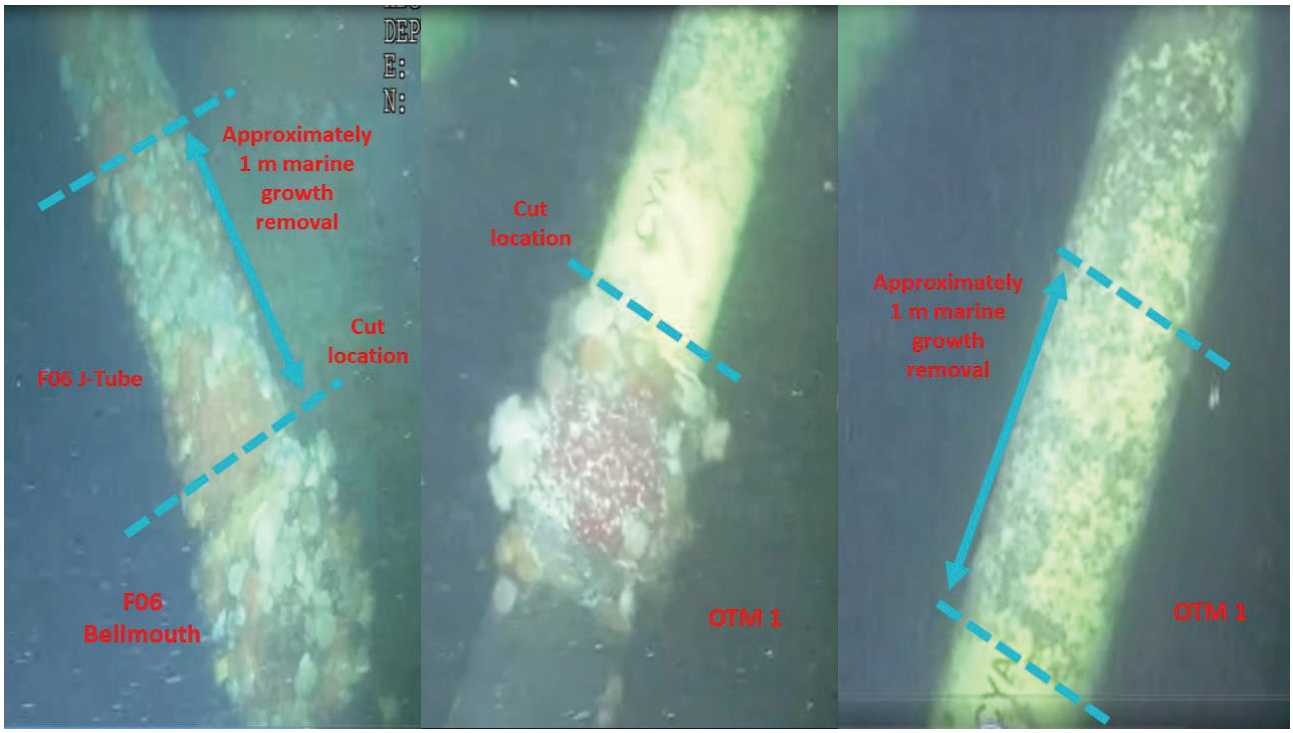

Figure 1-1 J-tube subsea survey images (F06 and OTM 1 ends)

The existing Marine Licence (ML) (MS-00010472) for BOWL covers the cable replacement itself (as confirmed by the regulator on 18th December 2024, Scottish Government's Marine Directorate – Licensing Operations Team (MD-LOT) during pre-application engagement), but a ML for removal of the marine growth from the J-tube and deposit of marine growth on seabed is needed. MD-LOT has advised that an Invasive Non-Native Species (INNS) Assessment must be carried out to support the application for a ML for the removal and deposit of marine growth. This document assesses the potential impacts from the operation on the environment, including potential for spread and introduction of INNS. The policies and legislation regarding the deposit of the marine growth is also considered in full.

1.2 Legislative and policy considerations

The proposed activity requires a marine licence under the Marine (Scotland) Act 2010 for the removal of substances or objects (marine growth) from the J-tube on the seabed using a vessel, and for the deposit of substances or objects (marine growth) within the Scottish marine area, either in the sea or on or under the seabed, from a vehicle, vessel, aircraft or marine structure[1]. The cable replacement itself is already covered under the existing BOWL marine licence MS-00010472. In considering an application for a marine licence to authorise the deposit of a substance or object, the Scottish Ministers must have regard to the practical availability of any alternative method of dealing with the substance or object. A consideration of the alternatives has been provided in Section 2.2. It is not possible to carry out this marine growth removal ex situ and it is also not operationally feasible to collect the marine growth for disposal

[1] *"Marine structure" means a platform or other artificial structure at sea, other than a pipeline*

elsewhere. All the marine growth to be removed has grown on the circumference of the J-tube (Figure 1-1) and is considered native to the area.

Any marine licence granted must also comply with national and international policies and legislation. A review of the relevant legislation and policies is provided below.

1.2.1 The Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention")

The OSPAR Convention is the current legislative instrument regulating international cooperation on environmental protection in the North-East Atlantic. The UK is a signatory party to the OSPAR Convention.

Disposing ("dumping") of most wastes or other matter at sea is prohibited by the OSPAR Convention (OSPAR Commission, 1992). "*Dumping*" means any deliberate disposal in the maritime area of wastes or other matter from vessels or aircraft or from offshore installations and any deliberate disposal in the maritime area of vessels or aircraft or offshore installations and offshore pipelines[2].

"*Dumping*" does not include:

- The disposal in accordance with the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 ("MARPOL Convention) relating thereto, or other applicable international law, of wastes or other matter incidental to, or derived from, the normal operations of vessels or aircraft or offshore installations other than wastes or other matter transported by or to vessels or aircraft or offshore installations for the purpose of disposal of such wastes or other matter or derived from the treatment of such wastes or other matter on such vessels or aircraft or offshore installations; and
- The placement of matter for a purpose other than the mere disposal thereof, provided that, if the placement is for a purpose other than that for which the matter was originally designed or constructed, it is in accordance with the relevant provisions of the Convention.

The OSPAR Convention states that the Contracting Parties shall in accordance with the provisions of the Convention, take all possible steps to prevent and eliminate pollution and take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected. "*Pollution*" is defined as the introduction by man, directly or indirectly, of substances or energy into the maritime area which results, or is likely to result, in hazards to human health, harm to living resources and marine ecosystems, damage to amenities or interference with other legitimate uses of the sea.

The compatibility of the marine growth deposit into the sea with the OSPAR Convention must be considered to ensure the activity is permitted. While the marine growth has grown in situ, and a small amount will be deposited in

[2] *"Offshore installation" means any man-made structure, plant or vessel or parts thereof, whether floating or fixed to the seabed, placed within the maritime area for the purpose of offshore activities. "Offshore activities" means activities carried out in the maritime area for the purposes of the exploration, appraisal or exploitation of liquid and gaseous hydrocarbons. A WTG and the associated cable therefore do not meet the definition of an offshore installation under the OSPAR Convention.*

situ, the deposit of the material could potentially be considered dumping, i.e. "*deliberate disposal in the maritime area of waste or other matter from vessels*", if the use of an ROV that connects to a vessel via a cable is considered the source of the dumping. Submarine cables (source of the marine growth) are not mentioned in the OSPAR Convention text so the applicability of the Convention text to the proposed activity is not clear. Regardless of the interpretation of the sources of the marine growth, dumping does not include "*placement of matter for a purpose other than the mere disposal thereof*". The purpose of the placement of the marine growth in the sea is to facilitate the safe and effective cable replacement and to maintain the cable integrity, providing essential clean energy to the grid. The deposit is not carried out for the sole purpose of disposal, and as such can be permitted under the OSPAR Convention rules. Furthermore, the OSPAR Convention's main purpose is to prevent and eliminate pollution and protect the maritime area against the adverse effects of human activities. As the OSPAR Convention considers pollution to be the introduction of substances into the maritime area which results, or is likely to result, in hazards to human health, harm to living resources and marine ecosystems, and the assessment carried out shows that the deposit of marine growth in situ is unlikely to result in any hard to the marine ecosystem, the proposal is not considered to breach the OSPAR Convention obligations.

1.2.2 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the "London Convention") and London Protocol 1996

The London Convention and the associated 1996 London Protocol update is an agreement to control pollution of the sea by dumping and covers the deliberate disposal at sea of wastes or other matter from vessels, aircraft, and platforms. The UK is a contracting party to the London Convention/Protocol.

"*Dumping*" in the London Protocol means any deliberate disposal into the sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea, any deliberate disposal into the sea of vessels, aircraft, platforms or other man-made structures at sea, any storage of wastes or other matter in the seabed and the subsoil thereof from vessels, aircraft, platforms or other man-made structures at sea and any abandonment or toppling at site of platforms or other man-made structures at sea, for the sole purpose of deliberate disposal (International Maritime Organization, 1996). "*Dumping*" does not include the disposal into the sea of wastes or other matter incidental to, or derived from the normal operations of vessels, aircraft, platforms or other man-made structures at sea and their equipment, other than wastes or other matter transported by or to vessels, aircraft, platforms or other man-made structures at sea, operating for the purpose of disposal of such matter or derived from the treatment of such wastes or other matter on such vessels, aircraft, platforms or other man-made structures, placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of the Protocol and abandonment in the sea of matter (e.g., cables, pipelines and marine research devices) placed for a purpose other than the mere disposal thereof). "*Wastes or other matter*" means material and substance of any kind, form or description under the London Protocol.

The London Protocol prohibits the dumping of any wastes or other matter with the exception of those listed in Annex 1. The wastes or other matter that may be considered for dumping (as long as the general objectives of the London Protocol are met) includes organic material of natural origin. As the London Protocol allows for "organic material of natural origin" to be dumped, the removal and subsequent deposit of the marine growth can be considered compliant with the London Protocol. The general objective of the London Protocol is for Contracting Parties shall

individually and collectively protect and preserve the marine environment from all sources of pollution and take effective measures, according to their scientific, technical and economic capabilities, to prevent, reduce and where practicable eliminate pollution caused by dumping or incineration at sea of wastes or other matter. "*Pollution*" means the introduction, directly or indirectly, by human activity, of wastes or other matter into the sea which results or is likely to result in such deleterious effects as harm to living resources and marine ecosystems, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.

As the assessment of the marine growth shows that the material does not contain any harmful materials or INNS, the material to be deposited is not likely to introduce any pollution to the sea. Therefore the activity is compliant with the London Convention/Protocol obligations.

1.2.3 International Convention for the Prevention of Pollution from Ships 1973 as modified by the Protocol of 1978, (the "MARPOL Convention")

The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The UK is a contracting party to the MARPOL Convention. The MARPOL Convention includes several categories of wastes/pollution but the most relevant one to the current application is the annex governing pollution from garbage (International Maritime Organization, 1973). Garbage includes food, domestic and operational waste, plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, and animal carcasses and is not relevant to the current application. The marine growth deposit is, therefore, considered to be MARPOL Convention compliant.

1.2.4 Waste Framework Directive

"*Waste*" is defined in Article 3 of the EU Waste Framework Directive (2008/98/EC) as 'any substance or object which the holder discards or intends or is required to discard' (European Parliament and of the Council, 2008). The Waste (Scotland) Regulations 2012 implement the Waste Framework Directive obligations in Scotland. Furthermore, the Environmental Protection Act 1990 section 34 makes it the duty of everyone who produces, keeps or manages controlled waste, or as a broker or dealer has control of such waste, to take all such measures available to that person as are reasonable in the circumstances to apply the waste hierarchy set out in Article 4(1) of the Waste Directive. "*Controlled waste*" means household, industrial and commercial waste or any such waste. Consideration of the alternatives to the deposit / disposal of the marine growth on the seabed has been provided in Section 2.2 of the document, which also fulfils the requirement for consideration of alternatives in the Marine (Scotland) Act 2010. The assessment concludes that the in situ deposit of the marine growth is the best option for management of the material.

1.2.5 Scotland's National Marine Plan

Scotland's National Marine Plan (Scottish Government, 2015) sets out the policies for sustainable management of Scotland's seas and all marine licensing decisions in Scotland must consider and align with its policies. The General Policies ("GEN") state the high-level objectives of the plan that all proposals must take into account. The following policies were considered in relation to the marine growth removal and deposit proposal:

- GEN 5 Climate change: Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change.

The alternatives to deposit of the marine growth at sea would extend the time required for the removal operations. This would require additional vessel time and fuel use, increasing the emissions from the overall operation. As no environmental impacts are predicted from the marine growth removal (see consideration of other policies below), the chosen option of deposit in situ is in line with General policy 5. Furthermore, the operation is required to replace a section of the cable to ensure the functioning of six WTG which contribute to generation of renewable energy.

- GEN 9 Natural heritage: Development and use of the marine environment must:
  (a) Comply with legal requirements for protected areas and protected species.
  (b) Not result in significant impact on the national status of Priority Marine Features (PMFs).
  (c) Protect and, where appropriate, enhance the health of the marine area.

The designated sites assessment provided to support the marine licence application demonstrates that no impacts on any protected areas or species, PMFs or Annex I habitats are anticipated due the marine growth removal. The marine growth removal and deposit is a highly localised activity, and the material is deposited in the vicinity of the removal. The material subject to removal does not contain any harmful components or INNS that could lead to adverse effects on the environment.

- GEN 10: Invasive non-native species: Opportunities to reduce the introduction of invasive non-native species to a minimum or proactively improve the practice of existing activity should be taken when decisions are being made.

The INNS assessment provided in this document to support the marine licence application demonstrates that no INNS have been detected at the site and the marine growth removal will not lead to introduction or spread of INNS in the marine environment.

- GEN 11 Marine litter: Developers, users and those accessing the marine environment must take measures to address marine litter where appropriate. Reduction of litter must be taken into account by decision makers.

The material to be removed and deposited does not contain any marine litter and is composed of organic, naturally occurring marine growth. While the material is intended for disposal in situ, it does not constitute litter and is not is it harmful for the environment.

1.3 Consultation

Pre-application engagement with the regulator, MD-LOT, has been carried out prior to the submission of the marine growth removal and deposit marine licence application. This engagement was carried out to confirm the marine licensing requirements for the cable replacement, including the marine growth removal and deposit aspect, and the assessment required to support the marine growth removal and deposit application. During this engagement MD-LOT confirmed that a marine licence for the marine growth removal and deposit was required but the cable replacement was already covered under the existing BOWL marine licence (MS-00010472). MD-LOT also advised that an INNS assessment should accompany the marine growth removal and deposit marine licence application to

ensure that INNS will not be introduced or spread as a result of the activity, and that a full consideration of the applicable marine policies should be provided.

The Moray Firth Regional Advisory Group has been made aware of the proposed marine growth removal and deposition on 15th January 2025 as per the requirements of the Beatrice Offshore Wind Farm Operation and Maintenance Programme.

2 METHODOLOGY

2.1 ROV inspection survey – mass / volume of marine growth to be removed

An ROV inspection survey was conducted in September 2024, which identified limited marine growth at the work area. At the BE-F06 J-tube it is estimated that there is approximately 10 mm thickness of hard marine growth and very limited, to zero, soft marine growth (e.g., anemones). At the OTM 1 J-tube, marine growth was negligible and assumed to be 0 - 5 kg. To mount the diamond wire cutter and subsea clamp, a maximum length of 1000 mm of marine growth around the circumference of the J-tubes (F06 J-tube and the OTM1 J-tube) needs to be removed (Figure 1-1). The marine growth removal is also required for the installation of the new bellmouth following cable replacement. The new bellmouth ensures the long-term integrity of the new cable.

Table 2-1 summarises the calculations regarding the marine growth to be removed, based on potential thickness and volume recorded for the F06 cable. The biomass of marine growth is higher at the F06 than the OTM1 end (Figure 1-1). While 10 mm growth thickness is likely based on the ROV surveys, calculations based on 20 mm thickness have used to account for the worst-case scenario removal. The total estimated weight to be removed is 23.24 kg but a conservative value of 47.29 kg is provided as a worst case. A marine licence for removal and deposit of a maximum of 50 kg is applied for to account for removal from both cables ends.

Table 2-1 Marine growth volume and mass to be removed and deposited from the F06

Marine growth thickness (mm)	Volume (m^3)	Weight (Te)	Weight removed (kg)
10	0.018	0.023	23.24
20	0.036	0.047	47.29

2.2 Consideration of alternatives

The three alternative options for the marine growth removal and deposit that were considered are presented below:

1. Leave the marine growth on the J-tube and carry out the replacement

The cutting operation of the J-tube requires the removal of marine growth to mount the diamond wire cutter and perform the cut effectively. The new subsea clamp and bellmouth also require a minimum level of marine growth on the J-tube to be installed safely and correctly as per manufacturers' instructions.

The clamp is pulled onto the J-tube using a winch so any marine growth remaining would likely be removed during this operation. It would also increase the risk to personnel as the pull-in force required to install the clamp and bellmouth would increase. In addition, the presence of marine growth once the new bellmouth is installed would likely impact the seal and the subsea clamp's ability to secure to the J-tube. Negatively impacting the long-term

integrity of the repair and result in further rectification works required. Therefore, it was decided this was not a viable option.

2. Collect the marine growth using a ROV

The option of removing and simultaneously collecting the marine growth, was investigated. BOWL has consulted market and industry experts and no vendors could confirm that 100% would be recovered. Thus, this option was unlikely to have a 100% recovery / efficiency and would require significant additional vessel time, resulting in additional fuel use and associated emissions. Based on the limited amount of marine growth to be removed this was not considered as a feasible option.

3. Remove the marine growth and deposit in situ

Considering all the parameters mentioned above (e.g., integrity of the replacement, atmospheric emissions, small amount of marine growth to be removed) it was concluded that the removal of the marine growth and its deposit in situ was the best option i.e. most environmentally friendly and most efficient. Section 2.4 details the potential impacts that may arise from this option.

2.3 Removal and deposit of marine growth

Marine growth will be removed using a ROV-handled jetting lance. The ROV jetting lances are commonly used for marine growth removal and are used within the subsea industry for other options like coating and concrete removal. The jetting lance uses water at high pressure directed towards the surface to be cleaned. Following its removal from the J-tube, the marine growth will be left to fall on the seabed; depending the local oceanographic conditions that will prevail at the timing of operations it is likely that marine growth will remain in suspension for a limited period of time. The BOWL Environmental Statement (ES) indicates relatively low current speeds at the offshore array area (Arcus, 2012d) and thus limited dispersal for the marine growth can be expected. Furthermore, the J-tube sits approximately 3-4 m from the seabed, further limiting any marine growth dispersal and time spent in suspension.

An ROV survey will be conducted prior to the overall cable repair work starting to establish existing conditions. The removal of marine growth is a short-term operation expected to be completed within hours to days. A ML for a full year is applied for to account for weather delays and vessel availability contingency.

2.4 Potential impact pathways

The methods and equipment to be used for the cable replacement are covered by the existing ML (MS-00010472) and are not addressed further in this document.

The only potential impact pathway for the dispersal of INNS from the removal of marine growth and its deposition on the seabed would be through any already existing INNS on the inter-array cable to be replaced. As mentioned in Section 2, the volume/mass of marine growth to be removed is very small (a maximum of 50 kg). Additionally, no INNS were identified in the inter-array area during the original site surveys to support the construction of BOWL

(Arcus, 2012a). Finally, the application of a series of INNS-related mitigation measures during construction and operation / maintenance phases of BOWL (GoBe Consultants Ltd and RPS, 2015) has minimised the risk for the dispersal of INNS and thus the presence of INNS in the marine growth to be removed is expected to be unlikely.

This Environmental and INNS Assessment examines potential environmental impacts for benthic features and designated sites with benthic qualifying interest. This Assessment focuses on potential environmental impacts that can arise from INNS, smothering, and de-oxygenation associated with the deposition and decomposition of marine growth on the seabed.

Impacts on marine mammals, fish, and birds have not been assessed further as no potential impact pathways that could affect them as a result of the removal and deposit in situ of marine growth, have been identified. For example, no significant noise or vessel disturbance is anticipated considering the localised, temporary and transient nature of the proposed operations. In addition, no seabed disturbance is expected as the equipment to be used for marine growth removal will not get in contact with the seabed. Other than marine growth, there will be no other material / substance deposited in the marine environment.

No potential impacts on other sea users are anticipated considering the localised and temporary nature of the removal and deposition in situ of the marine growth.

3 ENVIRONMENTAL AND INNS ASSESSMENT

3.1 Environmental and INNS assessment methodology

The importance of relevant receptors (benthic species and communities) is defined as low, medium, or high, taking into consideration criteria such as extent, rarity, protected status, following the process followed in BOWL Environmental Impact Assessment (EIA) (Arcus, 2012a, c).

The magnitude of any potential effects is assessed as negligible, small, medium, or large taking into account the known sensitivity of the receptor to the worst-case effects that are expected (Arcus, 2012a, c). Sensitivities of the main receptors have been outlined using information available in Arcus (2012a, c) as well as in MarESA sensitivity assessments (MarLIN, 2025) and Feature Activity Sensitivity Tool (FeAST, 2025).

The significance level of the effect is then assessed using both of the above factors, i.e. importance of the receptor and the expected magnitude of the effect. The level of effects is assessed as negligible, minor, moderate or major significance following information in 'Section 4: EIA Process and Methodology' (Arcus, 2012c).

3.1.1 INNS present in Scottish waters

The Scottish Government (2025) and NatureScot (2024) provide a list with INNS that have been recorded in Scottish waters[3]. Specifically, these are:

- Wireweed (*Sargassum muticum*). This species is found on hard surfaces in shallow coastal water rarely deeper than 5 m. Originally introduced into the Isle of Wight, now spreading along whole of south coast of England, additional locations in west Wales and some parts of Scotland and Ireland;
- Green sea-fingers *(Codium fragile subsp. tomentosoides*). It occurs on rock and coralline algae in pools and on open rock from the mid to lower shore. In shallow subtidal waters it can be found attached to cobbles, in seagrass beds, and on oyster reefs. It also grows on artificial structures such as ropes, seawalls, piers and pontoons. It mainly inhabits protected bays and estuaries but also occurs on semi-exposed shores. This seaweed occurs throughout the British Isles. It is common in the Scilly Isles, along the south coast of England, west coast of Scotland, Orkney, and throughout N. Ireland. There are also scattered records from Wales, and the east coast of England;
- Red alga (*Dasysiphonia japonica). Dasysiphonia japonica* is generally found subtidally, in sheltered to semi-exposed sites, either on natural shores or in artificial habitats such as marinas and harbours. It can grow on rocks, boulders, cobbles or shells, often as a dense turf, or epiphytically on other species of algae. *D. japonica* is presently distributed along European coast from Italy in the Mediterranean Sea to the northwest coast of southern Norway;
- Acorn barnacle (*Austrominius modestus*). It can inhabit almost the entire intertidal zone but is most common from mid-shore to shallow subtidal areas of estuarine and sheltered marine habitats. It attaches to a variety of substrates including rocks, stones, hard-shelled animals and artificial structures including ships. In Britain

[3] *INNS that are present in the British Isles but yet to reach Scotland are not considered in this assessment.*

it is distributed around most English and Welsh coasts, at a few locations around Scotland and some Scottish islands;

- Japanese skeleton shrimp (*Caprella mutica*). Typically found on a range of natural substrata including hydroids and attached or drifting macro-algae (seaweed), and also artificial substrata such as ropes, buoys, boat hulls and floating pontoons. Often found associated with areas of human activity; marinas, harbours, aquaculture sites. In the UK the Japanese skeleton shrimp has been recorded from southern and southwest England, the west coast of Scotland and the Western Isles;
- Leathery sea squirt (*Styela clava*). Leathery sea squirts are found at hard surfaces, shallow, sheltered water. They have been recorded around the coast of England, Wales and western Scotland;
- Orange tipped sea squirt (*Corella eumyota*). Mainly marinas and harbours, but capable of colonising natural habitats, e.g., shores. It is established from Oban around the south coast of England to Lowestoft. Also known as an introduced species in a few marinas around the coast of Ireland;
- Orange ripple bryozoan (*Schizoporella japonica*). It is usually found in harbours and marinas, on hard substrates such as pilings and hulls; or intertidally on rocks, boulders and on shellfish such as oysters and mussels. In the UK the orange ripple bryozoan has been recorded in northern Ireland and north coast of Scotland, Orkney and Shetland Islands;
- American lobster (*Homarus americanus*). Most likely to be found in shallow coastal waters among boulders, but other habitats and deep water. In the UK only a few isolated records have taken place in southern England and east coast of Scotland;
- Carpet sea squirt (*Didemnum vexillum*). They are found on hard substrates, they are common to depths below 30 m and been found down to 65 m. It was first found in Scotland, in the Firth of Clyde in 2009, and was confirmed as present in Loch Creran in 2016;
- Pacific oyster (*Magallana gigas*). Lives permanently attached to any hard substrate in intertidal and shallow subtidal zones of estuaries and coastal waters. In the UK the Pacific oyster is farmed at several locations around UK coasts and estuaries. Escapees have established populations in estuaries in the south-west and south-east of England, and sparse settlements are known from the north coast of Wales near Conwy;
- Japanese kelp, wakame (*Undaria pinnatifida*). May be found on hard surfaces, including man-made structures from the low tide mark down as far as 15 m in clear water. Wakame has been found on the south coast of England, the Channel Islands and also in Scotland;
- Slipper limpet (*Crepidula fornicata*). It is found on a wide range of habitats particularly in wave-protected bays, estuaries or sheltered sides of wave-exposed islands. So far it has been found in south-west, south and south-east Britain as far north as Pembrokeshire on the west coast, and Yorkshire on the east coast.

Considering the depth distribution, distance from shore and preferred type of substrate for the above-mentioned INNS (Scottish Government 2025; NatureScot 2025a) it is concluded that the carpet sea squirt and slipper limpet are the two species that could most likely be present in environmental conditions that resemble those of BOWL (e.g., relatively coarse sediments, water depth approximately 40 m) (Arcus 2012a).

The slipper limpet has been recorded to smother bivalves and alter seabed habitat while carpet sea squirt has the potential to colonise, and smother offshore gravel habitat, alter habitat and outcompete other species for space.

The Benthic Ecology chapter of the BOWL ES for the windfarm (Arcus, 2012a) and its offshore transmission works (Arcus, 2012b) does not mention INNS being present in the OWF area. The two-year post construction monitoring at BOWL in 2020 and 2021 did not record any instances of INNS being present at the site (APEM, 2021; APEM 2022).

In addition, the examination of ROV footage collected in 2022 and 2024 from the area of marine growth removal and its comparison with publicly available information about INNS in Scotland (e.g., Scottish Government 2025; NatureScot 2025a) do not indicate the presence of INNS on the J-tubes.

The Operation and Maintenance Programme (OMP) (BOWL, 2024) includes the commitment for marine growth management, including surveys (starting in 2019), to determine the rates of marine growth colonisation. The OMP includes the requirement to engage with the Moray Firth regional Advisory Group (MFRAG) should any marine growth removal and deposition take place to agree on potential further monitoring requirements. This consultation was carried out by email on 15th January 2025.

In addition, the Environmental Management Plan (EMP) for BOWL (GoBe Consultants Ltd and RPS, 2015) sets out a series of measures for the management of INNS including, but not limited to, requirements for all vessels to be compliant with the International Convention for the Control and Management of Ship's Ballast Water and Sediments (BWM Convention), use of antifouling systems, application of biofouling management measures (see GoBe Consultants Ltd and RPS, 2015). In addition, as part of the OMP and EMP, regular marine growth surveys take place (e.g., ROV surveys). Surveys that took place in 2021 showed that marine growth across BOWL was minimal while the examination of ROV footage from 2022 and 2024 has not indicated the presence of INNS in the area where marine growth removal and deposit on seabed will take place (Figure 3-1). Figure 3-1 shows the typical marine growth on the J-tubes at the locations of cable replacement. The section shown in the images is further up from the J-tube to provide for the clearest possible image quality, but the marine growth types are consistent throughout the cable at both ends. Considering all these, it is anticipated that the presence of INNS in the area of proposed operations should be regarded as highly unlikely.

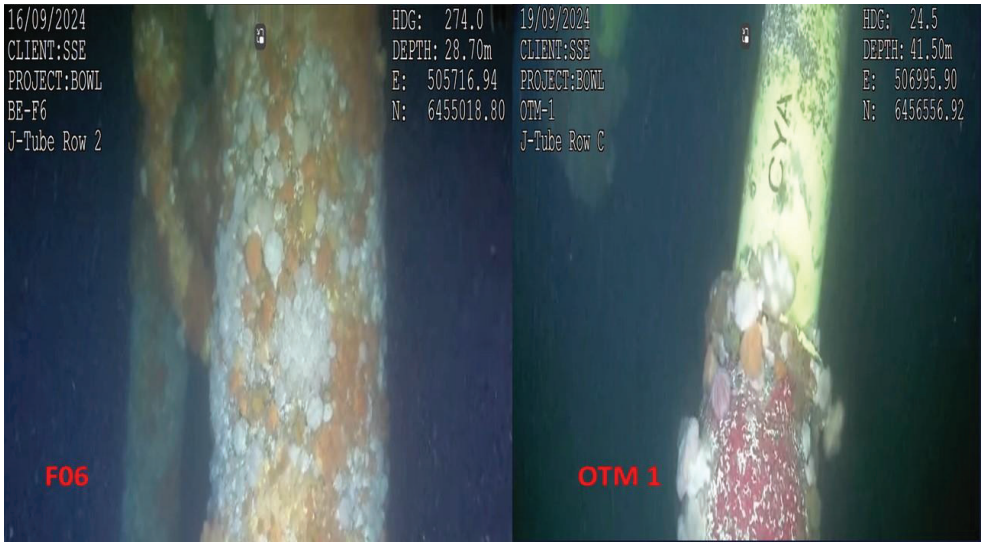

Figure 3-1 Underwater video surveys of the J-tube in September 2024

3.1.2 Designated sites

Nature Conservation Marine Protected Areas

The area of proposed operations do not overlap with any Nature Conservation Marine Protected Area (NCMPA). The closest NCMPA is the 'East Caithness Cliffs' NCMPA which is found 16.8 km to the west of the BOWL (Figure 3-2). This NCMPA is designated for black guillemot (NatureScot, 2014). Taking into account type of the designated features of the NCMPA (i.e. seabird) it is concluded that the removal and deposition of marine growth is not capable of affecting, other than insignificantly, this NCMPA and will not hinder the achievement of its conservation objectives i.e. 'to conserve' (NatureScot, 2014) due to lack of potential impact pathways due to the distance to the site.

The closest NCMPA to BOWL that has been designated for the protection of benthic features is the Noss Head NCMPA. This NCMPA, which is found 22.1 km to the north of BOWL (Figure 3-2), has been designated for the protection of 'Horse mussel beds' (NatureScot, 2024).

Considering the distance between the area of proposed operations and the Noss Head NCMPA (22.1 km) it is concluded that smothering / decomposition of marine growth cannot have an impact on 'Horse mussel beds' of Noss Head NCMPA.

According to the MarESA sensitivity assessment (Tillin *et al.*, 2024) the sensitivity of 'Horse mussel beds[4]' to the introduction or spread of INNS is high while there is low resistance and very low resilience. However, considering the small volume/mass of marine growth to be removed (maximum of 50 kg) the relatively large distance between BOWL and Noss Head NCMPA, and the fact that the examination of ROV footage from 2022 and 2024 from the area did not indicate the presence of INNS, it is concluded that any impacts are highly unlikely. According to NatureScot (2024) the conservation objectives for 'Horse mussel beds' in the Noss Head NCMPA is to conserve the habitat's extent, function, quality and composition of its characteristic biological communities. Taking into account the small volume/mass of marine growth to be removed, the fact that the presence of INNS were not mentioned in BOWL ES (Arcus 2012a, b), the implementation of INNS-related mitigation measures (GoBe Consultants Ltd and RPS, 2015; BOWL, 2024) and the relatively large distance between BOWL and Noss Head NCMPA, it is concluded that the removal and deposition in situ of marine growth is not capable of affecting, other than insignificantly, on the NCMPA.

Special Areas of Conservation

The area of proposed operations does not overlap with any Special Area of Conservation (SAC) (Figure 3-2). The closest SAC is the 'East Caithness Cliffs' which is found 18.8 km to the west of BOWL. This SAC is designated for the protection of 'Vegetated sea cliffs of the Atlantic and Baltic Coasts' (JNCC, 2025). Taking into account the type of the designated features of this SAC and due to the lack of impact pathway caused by the distance, it is concluded that the removal and deposition of marine growth is not going to have a likely significant effect on this SAC, or any other SACs located further away.

[4] *The biotope 'Modiolus modiolus beds on open coast circalittoral mixed sediment' has been used as a proxy for the habitat 'Horse mussel beds'.*

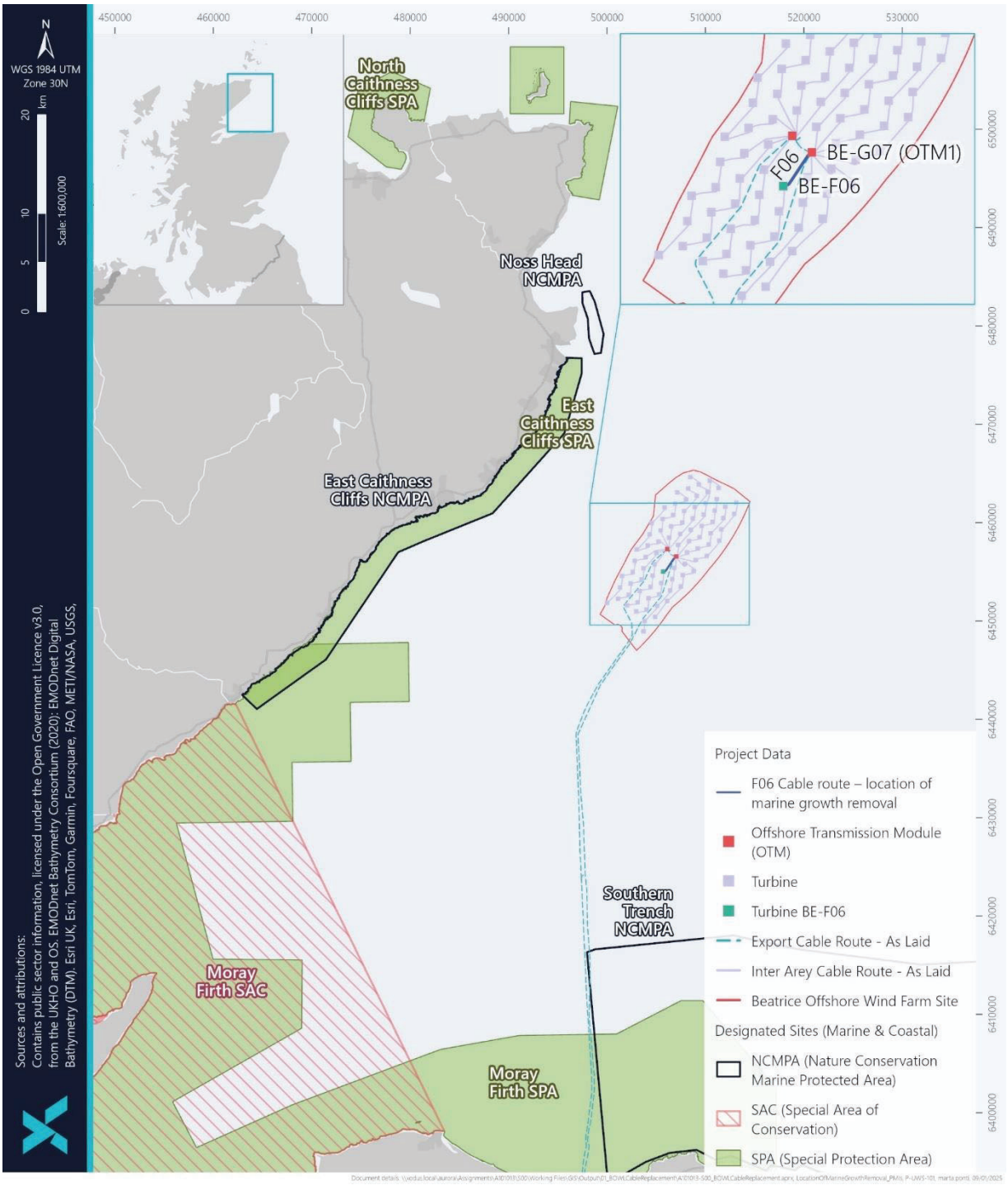

Figure 3-2 Marine designated sites in the vicinity of the proposed operations

3.1.3 Priority Marine Features

The presence of PMF features (species/habitats) in the BOWL area is limited (Figure 3-3). The PMF features that are recorded in the vicinity of the proposed operations is the species *Arctica islandica* (ocean quahog) and the habitat 'Subtidal sands and gravels' (Tyler-Walters *et al.*, 2016). PMF features recorded in the wider area include 'Maerl or coarse shell gravel with burrowing sea cucumbers', 'Horse mussel beds' and 'Kelp beds' (Figure 3-3). Considering that the closest PMF features at BOWL are ocean quahogs *A. islandica* and 'Subtidal sands and gravels' an assessment of sensitivity of these two features to INNS, is carried out below.

Arctica islandica (ocean quahog)

The Benthic Ecology chapter of the Environmental Statement (Arcus, 2012a) mentions that records of ocean quahog have not been made in areas inside the BOWL Array Area; the closest records of ocean quahog were found in slightly deeper and muddier sediments in the region of the Beatrice oil platform, roughly 2 to 16 km south west of BOWL, with just a single record on the south end of the Smith Bank just within the survey area (Arcus, 2012a). Occasional further records on the Smith Bank area were reported by McIntyre in the 1950s (McIntyre, 1958). This information is in line with publicly available information about the limited presence of ocean quahog in the area of proposed operations (e.g., within approximately 6 km from the cable to be replaced) (Figure 3-3).

Ocean quahog is listed in the OSPAR Convention's List of Threatened and Declining Species (OSPAR, 2008) and are a Scottish PMF (Tyler-Walters *et al.*, 2016). Introduction of INNS is not assessed in the FeAST (2025) sensitivity assessment, while in MarESA (Tyler-Walters and Sabatini, 2017) it is mentioned that there is no evidence about the sensitivity of ocean quahog to introduction or spread of INNS. Acknowledging its conservation status, it is concluded that ocean quahog has **medium sensitivity** to INNS. Any introduction of INNS could affect the long-term functioning of ocean quahog populations; therefore, it is acknowledged that there is a potential risk from non-native species. Nonetheless, based on the localised and temporary and nature of marine growth removal and deposition, the small volume and mass of marine growth (Table 2-1) the fact that no INNS have been recorded (Arcus, 2012a) and the implementation of INNS-related mitigation measures (GoBe Consultants Ltd and RPS, 2015) the effect is defined as being of **negligible magnitude**. Taking into account the **medium sensitivity** of the receptor and the **negligible magnitude** of the effect, the overall effect of introduction and spread of INNS to ocean quahog from the marine growth removal and deposition is considered to be **negligible and not significant**.

According to the MarESA sensitivity assessment, ocean quahog has **no sensitivity** to light or heavy smothering; in addition, it has **no sensitivity** to de-oxygenation (Tyler-Walters and Sabatini, 2017). There will be small volume / mass of marine growth to be deposited on seabed and it is expected that some of it will be consumed by predators (e.g., fish, Mavraki *et al.*, 2021). Taking into account, the **no sensitivity** of the receptor and the **negligible magnitude** of the

effect, the overall effect of marine growth deposition (smothering / de-oxygenation) to ocean quahog is considered to be **negligible and not significant.**

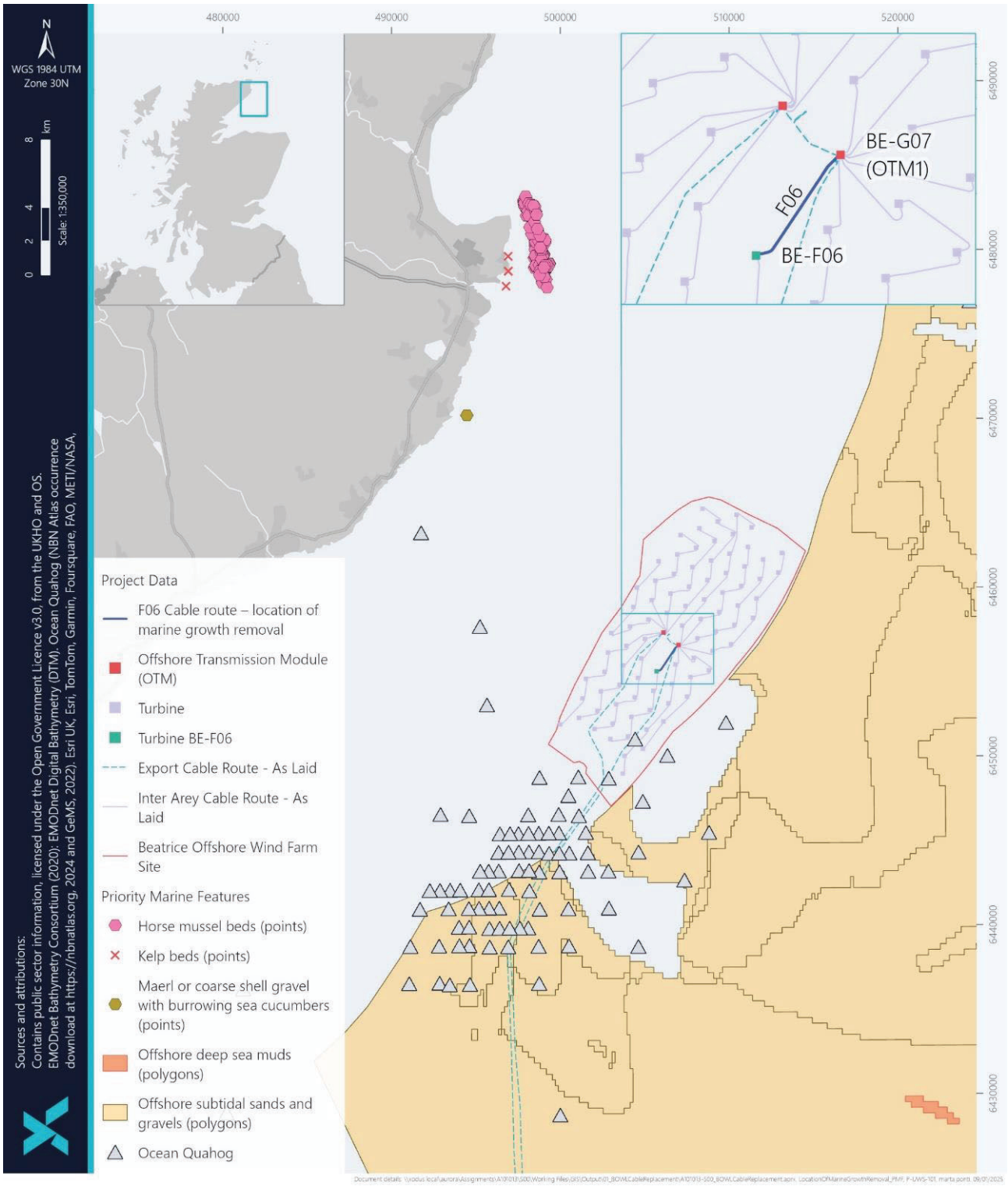

Figure 3-3 Priority Marine Features in the vicinity of the proposed operations

Subtidal sands and gravels

The Benthic Ecology chapter of the Environmental Statement (Arcus, 2012a) mentions that survey results have shown that the majority of the seabed is dominated by medium sands, often with varying amounts of shell fragments, whole shell or gravel. In addition, community classification against the JNCC biotope classification has shown the presence of four main biotopes, or biotope complexes, of which two are extensive within the survey area (SS.SCS.ICS.MoeVen *Moerella* spp. with venerid bivalves in infralittoral gravelly sand biotope and SS.SSA.CfiSa Circalittoral fine sand biotope complex) and two are patchy and/or limited in extent (a *Glycera lapidum* dominated version of the MoeVen biotope, and a variant of SS.SCS.CCS.MedLumVen *Mediomastus fragilis*, *Lumbrinereis* spp. and venerid bivalves in circalittoral coarse sand or gravel with high abundances of the fanworm *Jasmineira caudata*). These survey outputs indicate the presence of the PMF habitat 'Subtidal sands and gravels'. The sediments characterising this biotope are likely to be too mobile or otherwise unsuitable for most of the recorded INNS currently recorded in the UK. However, colonisation or establishment of INNS would likely change the biotope classification(s) and characterising species may be prey items for invasive mobile species. As such, the biotopes associated with this benthic habitat, such as '*Moerella* spp. with venerid bivalves in infralittoral gravelly sand' are considered to have a high sensitivity to INNS (Tillin and Watson, 2023). In particular, two species may be of concern including the slipper limpet *Crepidula fornicata*, which has been recorded to smother bivalves and alter seabed habitat, and the colonial ascidian *Didemnum vexillum*, which may have the potential to colonise and smother offshore gravel habitat, alter habitat and outcompete other species for space. Therefore, the introduction and establishment of INNS to the Array Area could result in long-term changes to the native biotopes.

It is acknowledged that there is a potential risk from non-native species to subtidal sands and gravels habitats. Nonetheless, based on the localised and temporary and nature of marine growth removal and deposition, the small volume and mass of marine growth (Table 2-1), the fact that no INNS have been recorded (Arcus, 2012a) and the implementation of INNS-related mitigation measures (GoBe Consultants Ltd and RPS, 2015) the effect is defined as being of negligible magnitude. Taking into account the high sensitivity of the receptor and the negligible magnitude of the effect, the overall effect of introduction and spread of INNS to subtidal sands and gravels from the marine growth removal and deposition is considered to be negligible and not significant.

According to the MarESA sensitivity assessment the habitat subtidal sands and gravels have low sensitivity to light smothering (i.e., material deposition up to 5 cm) and medium sensitivity to heavy smothering (material deposition from 5 to 30 cm). In addition, it has low sensitivity to deoxygenation (Tillin and Watson, 2023). There will be small volume / mass of marine growth to be deposited on seabed and it is expected that some of it will be consumed by predators (e.g., fish, Mavraki et al., 2021). Taking into account the low / medium sensitivity of the receptor and the negligible magnitude of the effect, the overall effect of marine growth deposition (smothering / de-oxygenation) to subtidal sands and gravels is considered to be negligible and not significant.

Annex I habitats

The Benthic Ecology chapter of the Environmental Statement (Arcus, 2012a) does not mention the presence of potential biogenic Annex I habitats as defined under the European Habitats Directive (e.g., *Sabellaria spinulosa* reefs or *Modiolus modiolus)*. However, a small patch of cobble and boulder reef dominated mostly by tubeworms and

barnacles and ascribed to the biotope SS.SCS.CCS.PomB *Pomatoceros triqueter*[5] with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles was identified in the north-west of the area, totalling 0.021 km^2 (Arcus, 2012a). Based on survey outputs used in the BOWL ES (Arcus, 2012a) it seems likely that one or two smaller patches of similar habitat occur elsewhere on the north-western boundaries of the Wind Farm site and towards the eastern boundary. This equates to potential Annex I habitat but of 'medium reefiness' (Limpenny *et al.*, 2010). Recent publicly available data do not show the presence of Annex I habitats within a radius of 5 km from the area of proposed operations; the closest record of Annex I habitat is 'Horse mussel beds' and is found approximately 22.1 km from the area of proposed operations (see also section below for 'Horse mussel beds' in the Noss Head NCMPA).

The species of colonial sea squirt as the carpet sea squirt (*Didemnum vexillum*) is native to Asia, is invasive in the UK, and can outcompete and smother native biological communities on rocky substrates. This species can form extensive mats over the substrata it colonises, binding boulders and cobbles, and altering the host habitat (Griffith *et al.*, 2009). While this invasive species is limited to sheltered rocky locations in the UK, based on some reports from the United States of America (USA) where this species has been reported in more exposed offshore locations (Lengyel *et al.*, 2009), it is deemed possible that the carpet sea squirt could colonise more exposed locations within the UK such as that in the Array Area. Other notable medium / low or unknown impact INNS include Japanese kelp *Undaria pinnatifida*, bryozoan *Schizoporella japonica* and Japanese wireweed *Sargassum muticum* (Marine Scotland, 2023). Overall, the carpet sea squirt is expected to pose the greatest threat to reef biodiversity.

When considering that the geogenic reef is possible vulnerable to such an invasive species, this receptor is considered to have high sensitivity.

It is acknowledged that there is a potential risk from non-native species to potential Annex I habitats. Nonetheless, based on the localised and temporary and nature of marine growth removal and deposition, the small volume and mass of marine growth (Table 2-1), the fact that no INNS have been recorded (Arcus, 2012a) and the implementation of INNS-related mitigation measures (GoBe Consultants Ltd and RPS, 2015) the effect is defined as being of negligible magnitude. Taking into account the high sensitivity of the receptor and the negligible magnitude of the effect, the overall effect of introduction and spread of INNS to subtidal sands and gravels from the marine growth removal and deposition is considered to be negligible and not significant.

According to MarESA sensitivity assessment, the biotope '*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles' has no sensitivity to light smothering while it has low sensitivity to heavy smothering; there is no evidence about its sensitivity to de-oxygenation (Tyler-Walters *et al.*, 2024). There will be small volume / mass of marine growth to be deposited on seabed and it is expected that some of it will be consumed by predators (e.g., fish, Mavraki et al., 2021). Taking into account the no / low sensitivity of the receptor and the negligible magnitude of the effect, the overall effect of marine growth deposition (smothering / de-oxygenation) to Annex I habitats is considered to be negligible and not significant.

[5] This species name Pomatoceros triqueter is the one mentioned in Arcus (2012a); however according to WoRMS (accessed on 13/01/2025) this species name is not valid anymore and has been replaced by Spirobranchus triqueter. The biotope name mentioned in MarLIN website is 'Spirobranchus triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles'.

3.2 Conclusion

No INNS were mentioned in the BOWL ES (Arcus, 2012a) while no indications for the presence of INNS were provided from the examination of ROV footage in 2022 and 2024 from the area that marine growth removal and deposit in situ will take place. In addition, the application of mitigation measures for INNS (Section 3.1.1) has minimised the risk of INNS being present on the cable to be replaced. The underwater surveys carried across BOWL in 2021 showed that marine growth was minimal. Based on the minimal amount of marine growth no further monitoring of marine growth will be carried out on top of what is already mentioned in OMP (2024).

The removal of a maximum of 50 kg of marine growth and its deposition on the seabed is not expected to increase the likelihood of introduction of any INNS at BOWL. Given the distance offshore, and the existence already of frequent, even if small and scattered, natural hard substrates in the form of cobble and boulders (Arcus, 2012a), it is very unlikely that removal and deposit of marine growth will make a difference to the introduction of any INNS. In addition, the small volume/mass of marine growth on the cable to be replaced (Table 2-1) highlights the negligible magnitude and the localised effects of the potential impact. In terms of smothering / deoxygenation it is concluded that any impacts will be negligible and not significant considering the overall low sensitivity of benthic receptors and the low magnitude of the impact (e.g., the deposited marine growth is expected to be consumed by predators and naturally decompose). The potential effect from marine growth removal and deposition in the dispersal of INNS, smothering, and de-oxygenation is, therefore, considered to be negligible and not significant.

A review of the relevant marine policies and legislation (Section 1.2) was also carried out to consider whether the proposed marine growth deposit in the sea agrees with the legal and policy obligations for marine waste and pollution management. The review concluded that the proposal is not capable of introducing pollution to the sea as only in situ deposit of local marine growth will take place and no adverse impacts from the activity are likely. Furthermore, the activity is not carried out for the sole purpose of disposal as it is required to facilitate essential cable replacement. The marine growth removal is therefore compatible with the relevant policy and legal requirements.

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