Cormorant Alpha Conductor Guide Frames and Alwyn Riser Decommissioning Environmental Appraisal

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ABBREVIATIONS

Abbreviation	Meaning
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
AR6	The Sixth Assessment Report published by the Intergovernmental Panel on Climate Change
AWMP	Active Waste Management Plan
Ba	Barium
BAC	Background Assessment Concentrations
BAP	Biodiversity Action Plan
BAT	Best Available Technique
BEIS	Department for Business, Energy and Industrial Strategy
BEP	Best Environmental Practice
CA	Comparative Assessment
CCC	Committee on Climate Change
Cd	Cadmium
CGBS	Concrete Gravity Base Structure
CH_4	Methane
CNRI	Canadian Natural Resources International Ltd
CNS	Central North Sea
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide Equivalent
CoP	Cessation of Production
CPR	Continuous Plankton Reader
Cr	Chromium
CSV	Construction Support Vessel
Cu	Copper
DECC	Department for Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DP	Decommissioning Programme
DSV	Dive Support Vessel
EA	Environmental Appraisal
EC	European Commission
EMS	Environmental Management System
EPS	European Protected Species
ERL	Effect Range Low
EU	European Union
EUNIS	European Nature Information System
EWC	European Waste Catalogue
GHG	Greenhouse Gas
GIS	Geographical Information Systems
GMS	Global Marine Services
Hg	Mercury

Abbreviation	Meaning
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
ICES	International Council for the Exploration of the Sea
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization
INTOG	Innovation for Targeted Oil and Gas
IOP	Institute of Petroleum
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
MarLIN	Marine Life Information Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MCZ	Marine Conservation Zone
MDAC	Methane-Derived Authigenic Carbonates
mLAT	Lowest Astronomical Tide
MMO	Marine Management Organisation
MPA	Marine Protected Area
N_2O	Nitrous oxide
NCMPA	Nature Conservation Marine Protected Area
NFFO	National Federation of Fisherman’s Organisations
NIFPO	Northern Irish Fish Producers Organisation
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NNS	Northern North Sea
NORM	Naturally Occurring Radioactive Material
NorOG	Norsk Olje and Gass
NO_x	Nitrous oxides
NSTA	North Sea Transition Authority
O_3	Ozone
OBM	Oil-based Mud
OESEA	Offshore Energy Strategic Environmental Assessment
OEUK	Offshore Energies United Kingdom
OGA	Oil and Gas Authority (Now the NSTA)
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	The Oslo Paris Convention
Pb	Lead
PCB	Polychlorinated Biphenyls
PMF	Priority Marine Feature
ROV	Remotely Operated Vehicle
SAC	Special Areas of Conservation
SAHFOS	Sir Alister Hardy Foundation for Ocean Science

Abbreviation	Meaning
SACFOR	Super-Abundant, Abundant, Common, Frequent, Occasional, Rare
SCANS-IV	Small Cetaceans in European Atlantic waters and the North Sea - Fourth Series Survey
SEEMP	Shipboard Energy Efficiency Management Plan
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SNH	Scottish Natural Heritage
SOPEP	Shipboard Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SO_x	Sulphur oxide
SPA	Special Protection Area
TAQA	TAQA Bratani Limited
THC	Total Hydrocarbon Content
UKBAP	United Kingdom Biodiversity Action Plan
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UKHO	UK Hydrographic Office
UKOOA	UK Offshore Operators Association
UNESCO	The United Nations Educational, Scientific and Cultural Organisation
VOCs	Volatile Organic Compounds
Zn	Zinc

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1 EXECUTIVE SUMMARY

1.1 Introduction and Background

This Environmental Appraisal (EA) assesses the potential environmental impacts resulting from the decommissioning of the Cormorant Alpha Conductor Guide Frames and Alwyn Riser. The purpose of this EA is to understand and communicate any potential significant environmental impacts associated with the proposed decommissioning of the Cormorant Alpha Conductor Guide Frames and Alwyn Riser (hereafter referred to as the Conductor Guide Frames and Alwyn Riser).

The Cormorant Alpha platform, located in the United Kingdom Continental Shelf (UKCS) Block 211/26a approximately 104 km northeast of Shetland and 41 km west of the UK/Norway median line, was installed in 1978 and began production in December 1979. TAQA Bratani Limited (TAQA) acquired the asset from Shell in 2008.

Following Cessation of Production (CoP) of the Cormorant Alpha platform on the 10th of September 2024, several associated subsea and structural components are now being prepared for decommissioning. This EA specifically covers the removal of the Conductor Guide Frames and the Alwyn Riser.

The Alwyn Riser has not been in use since CoP in 2024, as it was dependent on the Cormorant Alpha platform for export. The riser is connected to the pipeline at a seabed flange located at the base of the Cormorant Alpha Concrete Gravity Base Structure (CGBS). The removal scope includes the full recovery of the riser from this seabed connection point to the termination point at the platform.

The Conductor Guide Frames, which form part of the structural support system for the platform's well conductors, are also included within the decommissioning scope. These three Conductor Guide Frames are located on the south face of the Cormorant Alpha platform between legs C3 and C4 on the exterior of the CGBS and will be removed as part of the planned decommissioning activities.

1.1.1 Pipelines and Installations

- Alwyn Riser; and
- Cormorant Alpha Conductor Guide Frames

1.2 Regulatory Context

The decommissioning of offshore oil and gas infrastructure in the UKCS is principally governed by the Petroleum Act 1998, as amended by the Energy Act 2008, which sets out the requirements for a formal Decommissioning Programme (DP) and the approval process. The Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) which sits within the Department for Energy Security and Net Zero (DESNZ) - previously the Department for Business, Energy and Industrial Strategy (BEIS) - published Guidance Notes on Decommissioning of Offshore Oil and Gas Installations and Pipelines under the Petroleum Act 1998 (BEIS, 2018). This Guidance describes a proportionate EA process that culminates in a streamlined EA Report to support the DP. The EA process focuses on scoping out of non-significant impacts and presenting a detailed assessment of potentially significant impacts.

The Guidance Notes (BEIS, 2018) also state that subsea installations (e.g. drilling templates, wellheads, and other subsea structures) must, where practicable, be completely removed for reuse or recycling or final disposal on land.

1.3 Proposed Schedule

The precise timing of the decommissioning activities is not yet confirmed and will be subject to market availability, contractual agreements and alignment with other decommissioning projects. The upper section of the Alwyn Riser will be removed in 2026 as part of the Cormorant Alpha topsides removal preparations. The remaining section of the Conductor Guide Frames and Alwyn Riser shall be removed in 2027 as part of the main Cormorant Alpha topsides removal campaign.

1.4 Options for Decommissioning

TAQA applied a Comparative Assessment (CA) process consistent with the relevant BEIS (2018) guidance to identify the preferred decommissioning approach for the Alwyn Riser. The Alwyn Riser was assigned to Group 11. Group 11 was included among those for which full removal was selected as the decommissioning method during the scoping phase and therefore were not assessed further during the CA process. Furthermore, a CA has not been carried out for the Conductor Guide Frames covered by this EA. The Conductor Guide Frames are being fully removed, recovered, and returned to shore for recycling and disposal and therefore, a CA is not required. This is outlined further in Section 3.2. If any challenges prevent full removal, TAQA will work with OPRED to agree suitable alternative decommissioning measures.

1.5 Environmental and Socio-Economic Baseline

The key environmental and social sensitivities surrounding the Cormorant Alpha platform are summarised in Table 1-1. Data from the Cormorant Alpha Environmental Baseline Survey (Benthic Solutions, 2020) and Drill Cuttings Assessment (Benthic Solutions, 2024) is included.

Table 1-1 Key Environmental and Social Sensitivities for the Wider Cormorant Alpha Area

Physical Characteristics
In the Cormorant Alpha survey area, water depth ranges from 145 Lowest Astronomical Tide (mLAT) to the west and 153 mLAT to the east (Benthic Solutions, 2020). The wider Cormorant Alpha area is not located on any large-scale features of functional significance such as shelf deeps, shelf banks and mounds, seamounts or continental slopes (NMPi, 2026). Sediment analysis across the Cormorant Alpha survey area indicated a heterogenous mixture of sediment across sampling stations, composed primarily of sand, with small contributions of fines and gravel. Sands dominated the stations within the Cormorant Alpha survey area, ranging from 74.7% - 89.9% of the sediment composition. The mean particle size ranged from 0.16 mm to 0.34 mm (Benthic Solutions, 2020). Under the European Nature Information System (EUNIS) habitat classification, the most widespread seabed type around the Cormorant Alpha survey area is MD52: “Atlantic offshore circalittoral sand” which represents offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. This habitat type falls within the broad habitat Priority Marine Feature (PMF) “offshore sands and gravels” In addition, localised areas of EUNIS habitat complex MD32: “Atlantic offshore circalittoral coarse sediment” are predicted to occur. Numerous small seabed depressions (approximately 20-30 cm in depth and up to 1 m wide) were recorded within 250 m and in the northeast to southeast region of the Cormorant Alpha platform (Benthic Solutions, 2020). However, no features characteristic to large pockmarks were identified and ground-truthing did not identify Methane-Derived Authigenic Carbonates (MDAC) within the depressions (Benthic Solutions, 2020). There is one cuttings pile located at the Cormorant Alpha platform. The cuttings pile lies mainly on top of the CGBS cell top but also overspills onto the seabed. The Cormorant Alpha cuttings pile is estimated to cover an area of 12,210 m^2 with a pile volume of approximately 9,278 m^3 which is categorised as a “medium cuttings pile” (5,000-20,000 m^3, as per Norsk Olje Gass (NorOG) guidance (2016); Benthic Solutions, 2024). The core sediments from the Cormorant Alpha cuttings pile were typically dominated by “cohesive silty sand” (80% of the cores analysed) throughout and were almost exclusively dominated by the fines fraction. The

mean particle size was 0.04 mm and the cores closest to the pile centre exhibited distinctive layers of 'dark greyish olive' drilling material and 'pale brown' layers which are usually associated with chemical additives (Benthic Solutions, 2024).

Sediment Chemical Composition

Natural barium (Ba) levels around the Cormorant Alpha platform ranged from 432 mg kg^{-1} to 2,960 mg kg^{-1} with a mean of 1.456 mg kg^{-1} and were found to exceed the UK Offshore Operators Association (UKOOA; 2001a) 95th percentile (577.6 mg kg^{-1}) for the 8 out of 10 stations sampled >125 m from platform centre (Benthic Solutions, 2020). When Ba was measured by fusion techniques, higher values were recorded ranging from 294 mg kg^{-1} to 23,600 mg kg^{-1} with peak concentrations recorded within the cutting pile (mean 10,884 mg kg^{-1}; Benthic Solutions, 2024).

At three stations adjacent to the Cormorant Alpha platform, concentration of several metals exceeded UKOOA (2001a) 95th percentile including chromium (Cr), copper (Cu), Lead (Pb) and Zinc (Zn). Metal levels in sediments around the Cormorant Alpha platform decreased with distance from the installation (Benthic Solutions, 2020).

Total hydrocarbon content (THC) concentrations in the surface sediments sampled from around the Cormorant Alpha platform ranged from 26 mg kg^{-1} to 7,580 mg kg^{-1} with a mean of 561 mg kg^{-1}. THC levels were elevated above the UKOOA 95th percentile for the Northern North Sea (NNS; 20.32 mg kg^{-1}) at 90% of the stations sampled. Higher levels were found close to the Cormorant Alpha platform where most of the stations within 190 m exceeded the Oslo Paris Convention (OSPAR, 2006) 50 mg kg^{-1} limit. Levels of THC were found to decrease with distance from the platform (Benthic Solutions, 2020).

Within the cuttings pile, THC levels ranged between 63,800 mg kg^{-1} to 427,000 mg kg^{-1}. All core sections recorded over 1,000 times the OSPAR (2006) 50 mg kg^{-1} threshold. Stations on the seabed, beyond the physical pile boundary, continued to show elevated THC levels above the 50 mg kg^{-1}, on surface layers only (Benthic Solutions, 2024).

Seabed Habitats and Species

The most abundant taxa found within the Cormorant Alpha survey area consisted of polychaetes (*Galathowenia oculata* and *Eclysippe vanelli*), bivalves (*Axinulus croulinensis* and *Adontorhina similis)* and echinoderms (*Asterias rubens* and *Amphiura filiformis*). The epifauna present is generally noted as sparse (in direct contrast to the infauna) and taxon mostly belong to phyla Cnidaria and Bryozoa (Benthic Solutions, 2020).

The Benthic Solutions survey assessed the density of burrow openings located between 250 m - 500 m northeast and northwest from the Cormorant Alpha platform and found that the density of small burrows (<3 cm) across the two transects were recorded as 'occasional' on the SACFOR scale, with no large burrows recorded. Seapens such as *Virgularia mirabilis* or *Pennatula phosphorea* were mostly observed at stations CA_EBS_02, CA_EBS_03, CA_EBS_07, CA_EBS_10, which are located 250 m, 500 m, 250 m and 500 m from the Cormorant Alpha platform, respectively (Benthic Solutions, 2020).

Two individuals of the environmentally sensitive species ocean quahog (*Arctica islandica)* were identified at two stations 200 m southeast and southwest of the Cormorant Alpha platform (Benthic Solutions, 202). Previous surveys of marine protected areas (MPA) designated for the protection of *A. islandica* populations have shown only sparse populations reported by O'Connor (2016). The distribution of *A. islandica* is relatively wide in the North Sea (OSPAR, 2009a). In summary, the presence of ocean quahog individuals over the whole area of interest must be assumed, however the presence of aggregations is unlikely.

Fish and Shellfish
ICES rectangle 51F1 represents a spawning ground for Norway pout *Trisopterus esmarkii,* whiting *Merlangius merlangus*, haddock *Melanogrammus aeglefinus,* saithe *Pollachius virens* and cod *Gadus morhua* (Ellis *et al*., 2012; Coull *et al*.,1998). Spawning areas for most species are not fixed and may vary annually, and mapped distributions represent the widest known extent rather than precise boundaries (Coull *et al*., 1998). Cod is the only species with a high-intensity spawning ground in ICES rectangle 51F1, while all other species exhibit low or undetermined spawning intensity (Coull *et al*., 1998; Ellis *et al*., 2012). Haddock, saithe, Norway pout and cod produce pelagic eggs, whereas herring *Clupea harengus* are benthic spawners but are not reported to spawn within ICES rectangle 51F1 where the Cormorant Alpha platform is located. ICES rectangle 51F1 also represents a potential nursery ground for blue whiting *Micromesistius poutassou*, European hake *Merluccius merluccius*, haddock, herring, ling *Molva molva*, mackerel *Scomber scombrus*, Norway pout, spurdog *Squalus acanthias* and whiting. Blue whiting is the only species with a high-intensity nursery ground in the area, while all other species occur at lower nursery intensity (Coull *et al*., 1998; Ellis *et al*., 2012). Fisheries sensitivity maps produced by Aires *et al*. (2014) detail the likelihood of aggregations of 0 group (first-year) fish occurring across the UKCS. Maps showing the probability of presence or aggregation for 0 group anglerfish *Lophius piscatorius*, blue whiting, cod, European hake, haddock, Dover sole *Solea vulgaris*, herring, mackerel*,* horse mackerel *Trachurus trachurus*, Norway pout, plaice *Pleuronectes platessa*, sprat *Sprattus sprattus* and whiting are available on the National Marine Plan Interactive (NMPI; 2026). For anglerfish and European hake, the maps indicate probability of presence rather than aggregation. Modelling indicates medium densities of juvenile anglerfish, Norway pout and whiting within International Council for the Exploration of the Sea (ICES) rectangle 51F1, with all other species occurring at low densities (Aires *et al.,* 2014).
Seabirds
In the NNS the most numerous seabird species present are likely to be northern fulmar *Fulmarus glacialis*, black-legged kittiwake *Rissa tridactyla* and common guillemot *Uria aalge*. Seabird oil sensitivity in the vicinity of the Cormorant Alpha platform is considered low (score of 5) throughout the year. Oil sensitivity is considered medium (score of 4) across multiple surrounding Blocks in September through to December. However, in Block 211/26 containing the Cormorant Alpha platform, oil sensitivity is low throughout the year.
Marine Mammals
White-sided dolphin *Leucopleurus acutus*, harbour porpoise *Phocoena phocoena*, white beaked dolphin *Lagenorhynchus albirostris* and minke whale *Balaenoptera acutorostrata* have been recorded in ICES rectangle 51F1 (Reid et al., 2003). Minke whales are frequently recorded as seasonal visitors. Grey seal *Phoca vitulina* and harbour seal *Halichoerus grypus* densities are low in Block 211/26, densities are predicted to be between 0 and 1 per 25 km^2 for both species.
Conservation
There are no Nature Conservation Marine Protected areas (NCMPAs), Special Areas of Conservation (SAC) or Special Protection Areas (SPAs) within 40 km of the Cormorant Alpha platform. The closest protected site is the Pobie Bank Reef SAC, approximately 63 km southwest of the Cormorant Alpha platform. The seabed in the vicinity of the Cormorant Alpha platform is located within a wider area of 'subtidal sand and gravels', a seabed type designated as a PMF in Scottish waters, which supports fish populations.

The following fish species are listed as PMFs: blue whiting, cod, herring, ling, mackerel, Norway pout, saithe, spurdog and whiting. Cod are also listed on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2008). Free-swimming megafauna is limited to only a few species, being mainly dominated by members of the order Gadiformes. Numerous small seabed depressions were recorded within 250 m of the Cormorant Alpha platform and in the northeast to southeast region of the Cormorant Alpha survey area. However, no features characteristic to large pockmarks were identified and ground-truthing did not identify MDAC within the depressions. Ocean quahog are listed on the OSPAR list of threatened and/or declining species and habitats and are designated as a PMF. Two individuals were recorded within the Cormorant Alpha survey area at stations CA_EBS_02 and CA_EBS_05, located 200 m southeast and 200 m southwest of the platform respectively, however they were not observed in aggregations. The habitat 'Seapen and burrowing megafauna communities' is also on the OSPAR list of threatened and/or declining habitats and species and is a PMF. Surveys identified evidence of this habitat within the Cormorant Alpha survey area. The density of small burrows was recorded as 'occasional' on the SACFOR scale across the two transects sampled around the Cormorant Alpha platform (CA_EBS_08 and CA_EBS_10; between 200 m and 500 m from the Cormorant Alpha platform).
Fisheries and Shipping
The Cormorant Alpha platform is located in ICES rectangle 51F1. This region is primarily targeted for demersal species with a negligible contribution from pelagic and shell fisheries. Fishing effort is dominated by demersal trawl fishing gears. Total annual fishery landings by weight and value are considered broadly comparable to other high performing ICES rectangles. Shipping density in the Block 211/26 is low, with a localised increase in vessel activity around surface installations including the Heather Alpha platform, due to the presence of operational and maintenance vessels.
Other Sea Users
The Cormorant Alpha platform is located in a well-developed area for oil and gas extraction. The closest surface infrastructure is the TAQA owned North Cormorant platform, located 15 km north northeast of the Cormorant Alpha platform. The closest third-party surface infrastructure is Heather Alpha platform, located 17 km south southwest of the Cormorant Alpha platform. There are 23 wrecks within 40 km of the Cormorant Alpha platform, with the closest wreck located approximately 8 km west southwest of the Cormorant Alpha platform. The are no known interactions between the adjacent facilities and the proposed Conductor Guide Frames and Alwyn Riser decommissioning activities. There are no planned or operational renewable energy sites, cables or pipelines or designated military practice and exercise areas within 40 km of the Cormorant Alpha platform.

1.6 Impact Assessment Process

The impact assessment within this EA has been informed by several different processes, including identification of potential environmental issues through project Engineer and Marine Environmental Specialist review during a desktop scoping exercise.

An impact assessment exercise addressed the proposed decommissioning activities (Section 3.3) and any potential impacts these may pose. This assessment identified nine potential impact areas based on the chosen proposed removal method. Six potential impacts were scoped out of further assessment based on the low level of severity, or likelihood of significant impact occurring. An overview of the nine potential impacts is provided in Table 1-2, together with a rationale for the scoping decisions and proposed mitigation measures.

Based on the initial scoping, three aspects warrant further assessment within the EA as having potential environmental and/or socioeconomic impacts. These are emissions to air, disturbance to the seabed and disturbance to the drill cuttings pile. These aspects are assessed further in Sections 6.2, 6.3 and 6.4 of this EA respectively.

Table 1-2 Environmental Impact Scoping Summary for the Conductor Guide Frames and Alwyn Riser Decommissioning

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Emissions to air	Yes	• Potential to contribute to global climate change. Emissions during decommissioning activities, (largely comprising fuel combustion gases) will occur following CoP. Emissions generated by infrastructure, equipment and vessels associated with operation of the assets will be replaced by those from vessel use as well as the recycling of decommissioned materials. Emissions generated during the proposed decommissioning operations are considered to be of low consequence (not significant). However, due to stakeholder, scientific and public concern around the cumulative impact of greenhouse gases (GHGs), atmospheric emissions resulting from project activities are assessed further in Section 6.2.	See Section 6.2.
Disturbance to the seabed	Yes	• Presence of protected habitats and species in the Cormorant Alpha area. • Potential for disturbance to seabed during subsea decommissioning activities. • Seabed impacts may range in duration from temporary sediment suspension, cuttings disturbance or smothering to permanent impacts, such as the introduction of new substrate or any consequential habitat or community level changes which may transpire. Impacts to the seabed from project activities are considered to be of a moderate consequence (significant) and are therefore assessed further in Section 6.3.	See Section 6.3

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Disturbance to drill cutting pile	Yes	• Potential disturbance to cuttings pile located at the Cormorant Alpha platform. Potential impact of long-term discharges from degrading infrastructure on the receiving environment Removal activities at the Cormorant Alpha platform would result in the disturbance of the drill cuttings piles. It is therefore deemed necessary to understand how the removal activities and possible future interactions with fishing gear, will impact the lower water column and benthic communities. Impacts to drill cuttings piles from project activities are considered to have the potential to be of a moderate consequence (significant) and are therefore assessed further.	See Section 6.4

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Planned discharges to sea	No	• Discharges from vessels are typically well-controlled activities. Discharges to sea are considered to be of a negligible consequence (not significant) and are therefore not assessed further.	• International Convention for the Prevention of Pollution from Ships (MARPOL) compliance. • Treatment and maceration to International Maritime Organization (IMO) standards. • Bilge management procedures. • Vessel equipment maintained according to manufacturer's recommendations. • Vessel assurance procedures. • Contractor management procedures. • Compliance with the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended). • Compliance with the Offshore Chemical Regulations 2002 (as amended). • Regulator engagement on potential residual pipeline and subsea system discharges

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Physical presence of vessels in relation to other sea users	No	• Limited in duration. • Similar vessels to those currently deployed for oil and gas installation, operation and decommissioning activities. • Vessel activity will not occupy 'new' areas. • Other sea users will be notified in advance of, and after, operations. • The decommissioning of the subsea infrastructure is expected to only require one Construction Support Vessel (CSV). The physical presence of vessels in relation to other sea users is considered to be of a negligible consequence (not significant) and is therefore not assessed further.	• Safety zones (where/when applicable and being mindful that arrangements will change at certain stages of the project). • United Kingdom Hydrographic Office (UKHO) standard communication channels including Kingfisher, Notice to Mariners and radio navigation warnings. • Use of Automatic Identification Systems (AIS) and other navigational controls.
Underwater noise emissions	No	• Aside from vessel noise and cutting activities, there will be no other noise generating activities. • Vessel presence and cutting activities will be limited in duration. • The project is not located within an area protected for marine mammals. The cutting methodology will be determined during the detailed engineering stage, and appropriate Marine Licence applications and a supporting environmental assessment will be submitted at that stage. With industry-standard mitigation measures and adherence to Joint Nature Conservation Committee (JNCC) guidance, EAs for offshore oil and gas decommissioning projects typically show no injury, or significant disturbance associated with these projects. The cutting technique is likely to be diamond wire, or possibly abrasive water jet. DESNZ (2023) guidance states that "Sound radiated from the	• Vessel management. • Minimal vessel use/movement. • Vessel sharing where possible. • Cutting activities will be minimised and carried out in isolation where possible. • Adherence to Marine and Coastal Access Act 2009 for Marine Licence.

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
		diamond wire cutting of a conductor or abrasive water jets is not easily discernible above the background noise." On this basis, underwater noise emissions are considered to be of minor consequence (not significant) and are therefore not assessed further.	
Resource use	No	• Limited raw materials required (largely restricted to fuel use). • Estimated total energy usage for the activities is 27,627 Gigajoules (GJ). Of this total, 22,317 GJ is associated with offshore operation of vessels and 4,458 GJ with the onshore recycling of materials. The remaining energy usage is associated with onshore transport, dismantling of materials Resource use is considered to be of a negligible consequence (not significant) and is therefore not assessed further.	• Minimal number of vessels deployed. • Use of low sulphur diesel. • Vessel equipment maintained according to manufacturer's recommendations. • Each vessel will have a Shipboard Energy Efficiency Management Plan (SEEMP) which contains information on minimising fuel consumptions.

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Onshore impacts/ Waste	No	The waste brought to shore will be managed in line with TAQA's Waste Management Strategy and in alignment with the principles of the Waste Hierarchy, as part of the project's Active Waste Management Plan (AWMP), using licenced waste contractors and in liaison with the relevant Regulators. Waste management activities associated with the proposed operations are subject to comprehensive regulatory oversight under applicable environmental legislation and established industry standards. All waste streams will be managed, stored, transported and disposed of in full compliance with statutory requirements and approved company procedures. Given the robust regulatory framework governing waste management, together with the well-defined and controlled nature of the processes involved, the potential for significant environmental effects is considered to be low. The measures in place ensure that any risks are effectively mitigated, and therefore waste management does not represent a pathway for likely significant adverse impacts. On this basis, waste management is assessed as being of minor consequence (not significant) and is not considered further within this assessment.	• 'Duty of Care' obligations. • Adherence to Waste Management Strategy. • Active waste tracking including close-out reporting. • Adherence to the Waste Hierarchy. • Selection of suitably authorised contractor(s) and facilities. • Communication with relevant Regulator(s) – e.g., the Scottish Environment Protection Agency (SEPA). • Project Waste Management Targets focussed on maximising reuse and recycling. • Supply Chain Action Plan.

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Unplanned events	No	• The Cormorant South Field System Oil Pollution Emergency Plan (OPEP) (TAQA, 2025) will be updated to cover the Conductor Guide Frames and Alwyn Riser decommissioning activities. Any spills from vessels in transit and outside the 500 m zones are covered by a separate Shipboard Oil Pollution Emergency Plan (SOPEP). • Vessel fuel inventories are split between a number of separate fuel tanks, significantly reducing the likelihood of an instantaneous release of a full inventory. • Dropped object procedures are industry-standard and there is only a very remote probability of interaction with any live infrastructure. The potential impacts are not anticipated to be significant and therefore do not warrant further assessment.	• Safety zones (where/when applicable and being mindful that arrangements will change at certain stages of the project). • UKHO standard communication channels including Kingfisher, Notice to Mariners and radio navigation warnings. • Use of AIS and other navigational controls. • OPEP in place for operations. • SOPEP on all vessels. • Navigational warnings in place. • Spill response procedures. • Contractor management and communication. • Lifting operations management of risk. • PON1/PON2 submissions. • Careful planning, management, and implementation of activities. • The location of any dropped or dislodged material will be accurately recorded and reported via Hydrographic Office and Kingfisher notification system.

1.7 Environmental Management

The project has limited activity associated with it beyond the main period of decommissioning. The main focus of environmental performance management for the project is to ensure that the activities taking place during the decommissioning period happen in a safe and acceptable manner. This includes ensuring that there are no unacceptable environmental consequences following decommissioning. The primary mechanisms by which this will occur are - TAQA's certified Environmental Management System (EMS) and Health, Safety, Security and Environment (HSSE) Policy.

To support TAQA's HSSE policy, a project Health, Safety and Environment (HSE) Plan will be developed to outline how HSE issues will be managed and how the policy will be implemented effectively. The plan will apply to all work carried out, both onshore and offshore. Performance will be measured to satisfy regulatory requirements, compliance with environmental consents and to identify progress on fulfilment of project objectives and commitments.

TAQA also operates a Waste Management Strategy and will develop an AWMP for the project to identify and describe the types of materials identified as decommissioning waste and to outline the processes and procedures necessary to support the DP for the Conductor Guide Frames and Alwyn Riser. The AWMP will detail the measures in place to ensure that the principles of the waste management hierarchy are followed during decommissioning.

TAQA is committed to working towards the government policy of Net Zero in line with the North Sea Transition Authority (NSTA) Stewardship Expectation 11. This commitment includes decommissioning activities and is intended to drive increased energy efficiencies and minimise emissions. TAQA seeks to influence its joint venture partners and suppliers to ensure that everyone is striving to reduce and manage the emissions associated with the Conductor Guide Frames and Alwyn Riser decommissioning.

In terms of activities in the NNS, the National Marine Plan (NMP) has been adopted by the Scottish Government to help ensure sustainable development of the marine area. The NMP has been developed in line with UK, European Union (EU) and OSPAR legislation, directives and guidance. With regards to decommissioning, the NMP states that 'where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. TAQA has given due consideration to the Scottish NMP during project decision making.

1.8 Conclusions

This EA has considered the objectives and marine planning policies of the NMP across the range of policy topics including biodiversity, natural heritage, cumulative impacts and the oil and gas sector. TAQA considers that the proposed decommissioning activities are in alignment with these objectives and policies.

Having reviewed the project activities and taken into consideration: the remote offshore location of the Conductor Guide Frames and Alwyn Riser; that the activities will have a small area of impact; that the benthos is likely to have a degree of natural resilience to suspension of natural and contaminated sediments; the availability of similar habitat within the context of the wider North Sea; as well as mitigation measures to limit impact, there is not expected to be a significant impact on the seabed environment or any European or nationally designated protected sites in proximity to the Conductor Guide Frames and Alwyn Riser decommissioning activities.

The decommissioning area is within a wider area of low level of fishing effort (days) per month. Overall, there is not expected to be an impact on commercial fisheries.

2 INTRODUCTION

In accordance with the Petroleum Act 1998, TAQA Bratani Limited (TAQA), an established United Kingdom Continental Shelf (UKCS) operator, on behalf of the Section 29 notice holders, is applying to The Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), to obtain approval for decommissioning the Conductor Guide Frames and Alwyn Riser associated with the Cormorant Alpha Platform, which ceased production in 2024.

This Environmental Appraisal (EA) has been conducted to assess the potential environmental impacts that may result from decommissioning the Cormorant Alpha Conductor Guide Frames and Alwyn Riser.

2.1 Project Overview

The Cormorant Alpha platform is a fixed installation with a Concrete Gravity Base Structure (CGBS) located in the South Cormorant field in the East of Shetland basin of the Northern North Sea (NNS) Block 211/26a in approximately 150m water depth (Figure 2-1; Figure 2-2). The Cormorant Alpha CGBS was installed in May 1978 and the platform began production in December 1979. TAQA acquired the asset from Shell in 2008. The platform serves as a manned drilling, production and metering facility for the underwater manifold centre (UMC) and Pelican subsea tie-backs. Cormorant Alpha also serves as an entry point into the Brent System for TAQA and other third-party production. The Alwyn Riser has not been in use since the Cessation of Production (CoP) for the Cormorant Alpha platform, which took place on the 10th of September 2024.

The Alwyn Riser connects the oil export line from the North Alwyn platform to the Cormorant Alpha platform. The riser ties in at a flange at the base of the CGBS, runs vertically up the CGBS wall, then horizontally across the cell top before rising vertically to connect to the underside of the platform (Figure 2-3).

A de-oiling and flushing campaign was undertaken in 2023 to support CoP at North Alwyn and to prepare the export pipeline system for isolation and future decommissioning. The objectives of the campaign were to remove residual hydrocarbons from the pipeline and leave it in a stable, environmentally acceptable condition. Following completion of the campaign, the system was confirmed to be flushed and de-oiled, with inhibited seawater left *in situ* for corrosion protection. The pipeline was subsequently isolated and left in a de-oiled, ‘as-left’ condition.

The Conductor Guide Frames are comprised of three supporting frames to prevent lateral movement of the conductors from wave or current action (Figure 2-4).

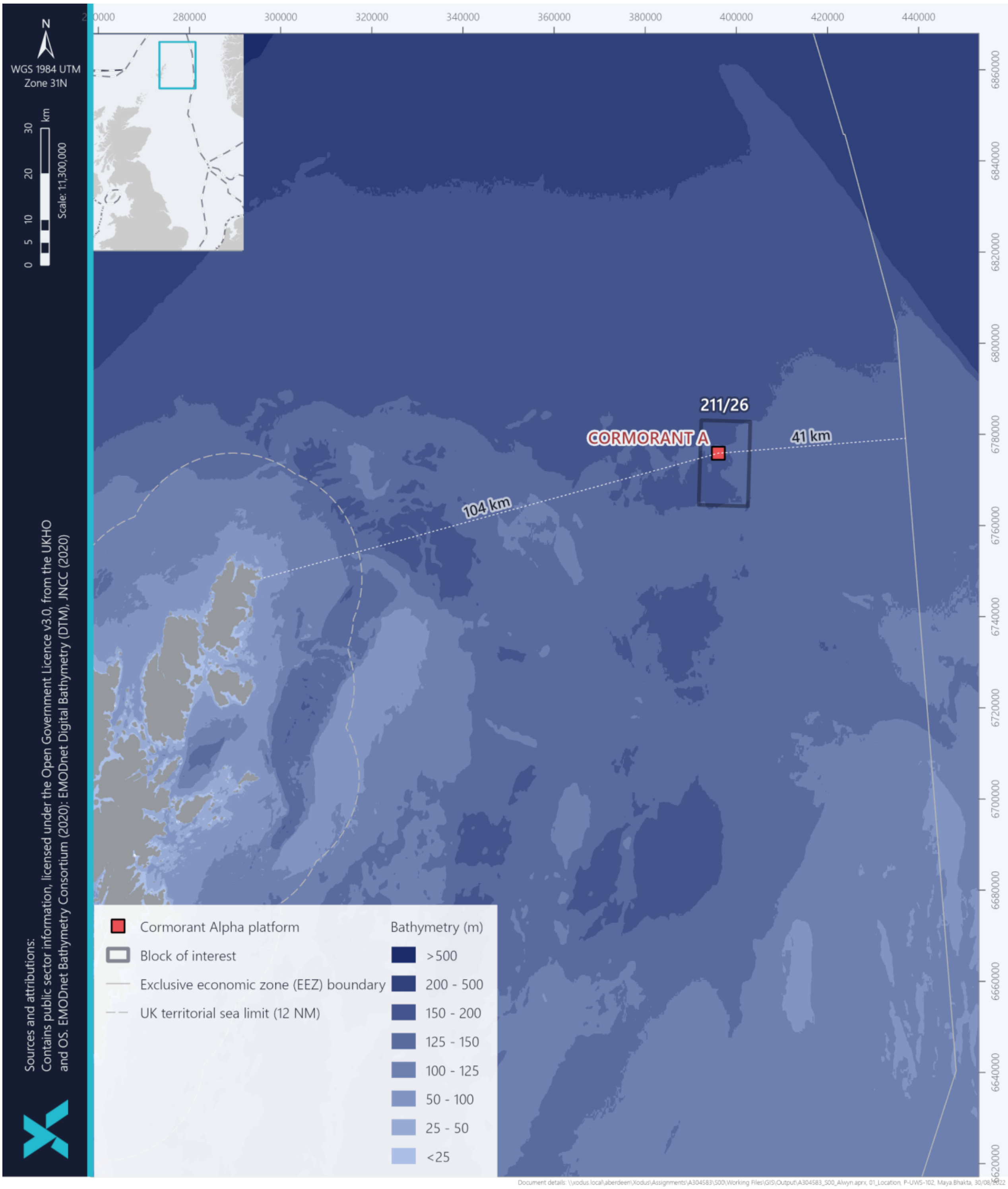


Figure 2-1 Location of the Cormorant Alpha Platform

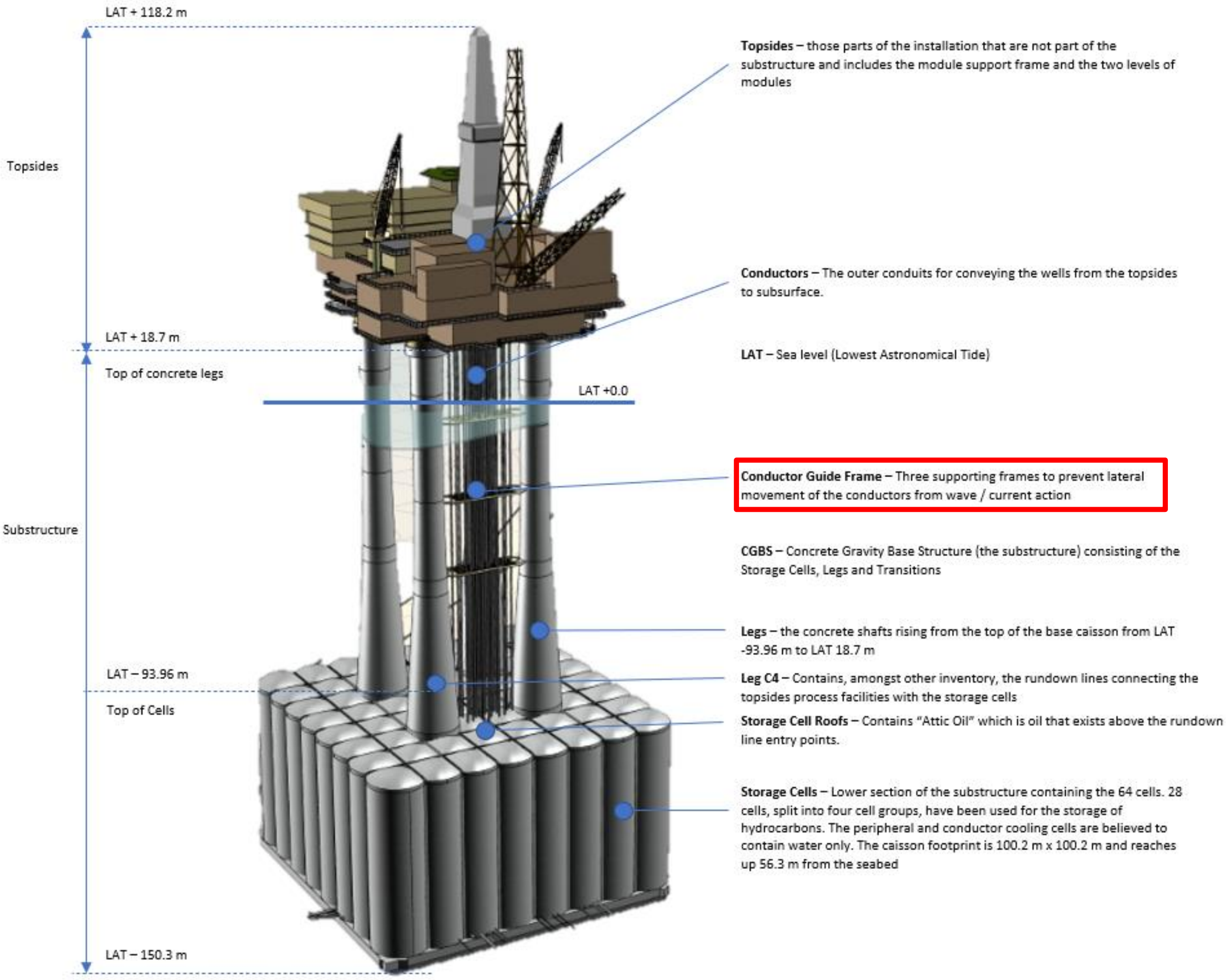


Figure 2-2 Overview of the Cormorant Alpha Platform

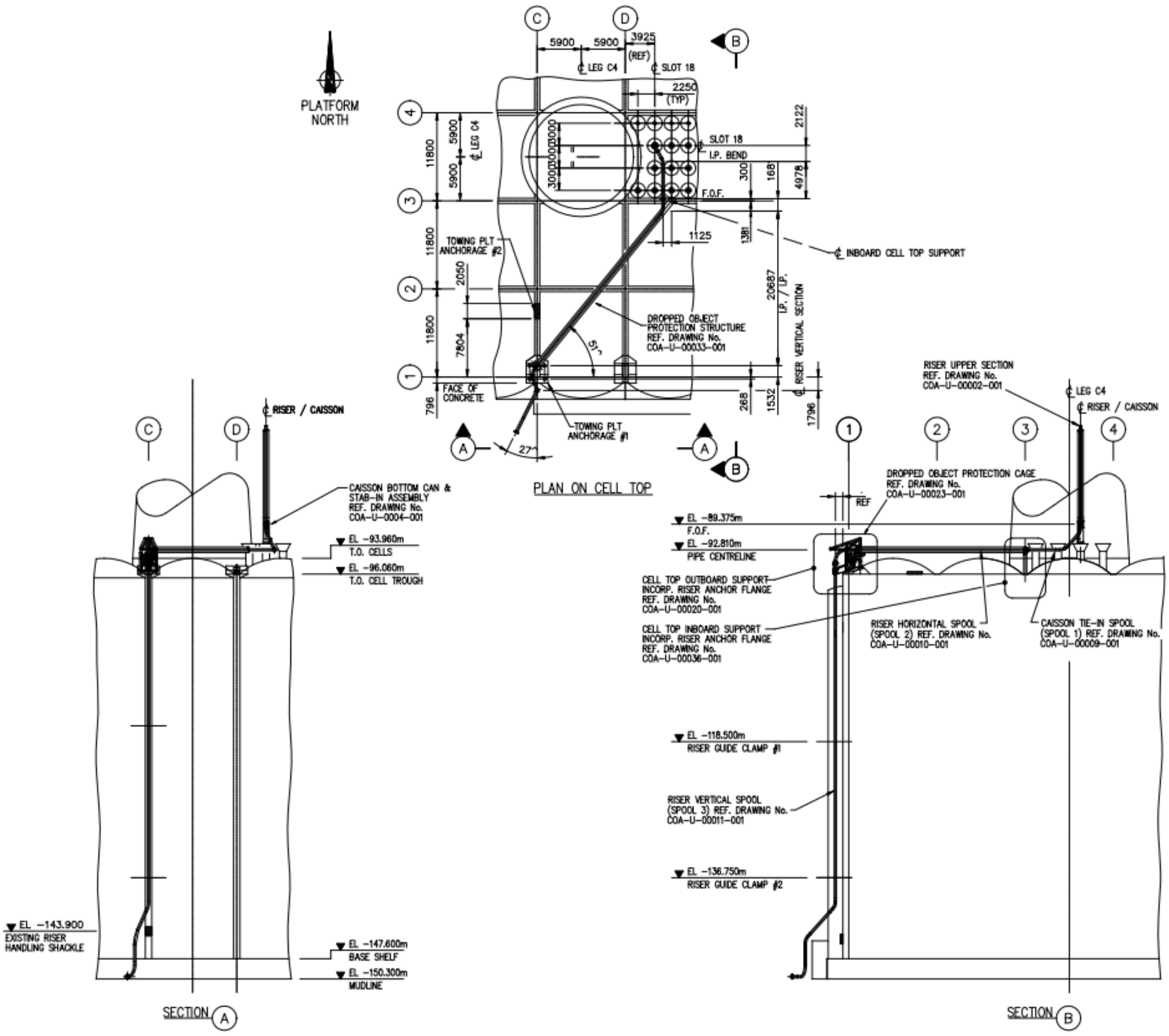


Figure 2-3 Alwyn Riser General Arrangement at Cormorant Alpha CGBS

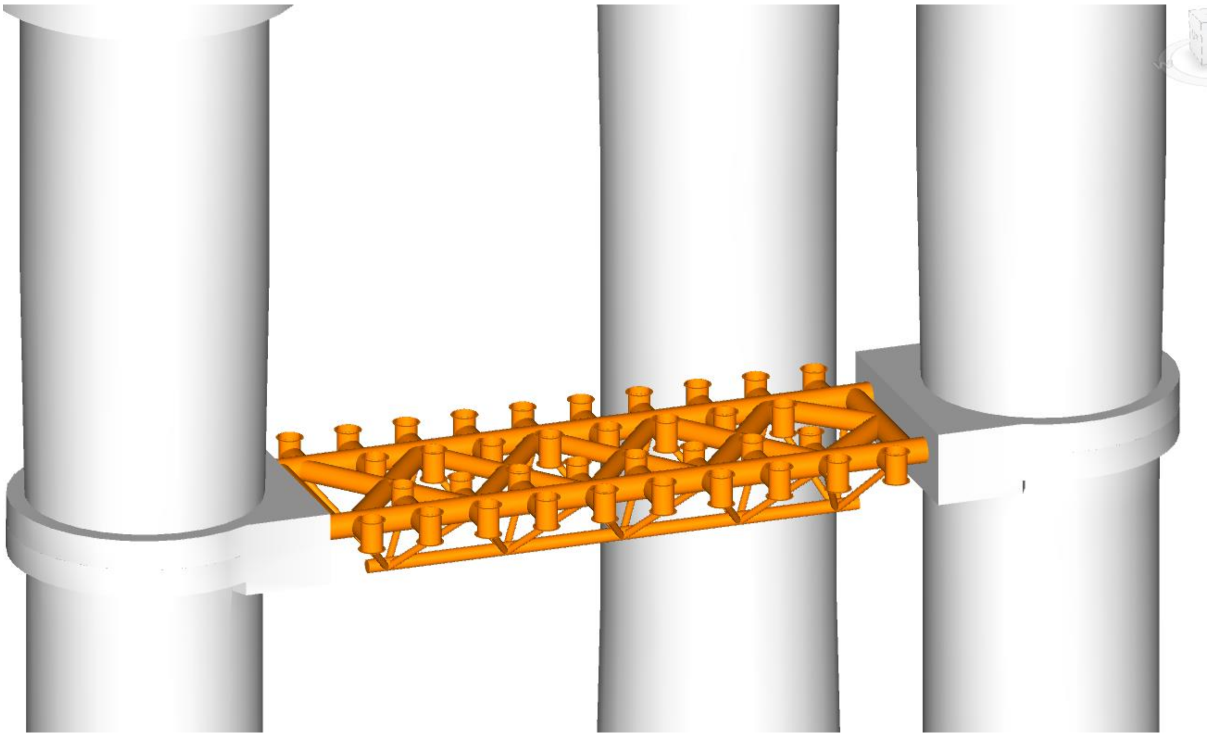


Figure 2-4 Example of Conductor Guide Frames

2.1.1 Purpose of the Environmental Appraisal

This EA assesses the potential environmental impacts associated with the proposed Conductor Guide Frames and Alwyn Riser decommissioning activities. The impact identification and assessment process encompasses stakeholder engagement, comparison of similar decommissioning projects undertaken in the UKCS, expert judgement, and the results of supporting studies. This EA documents this process and details, in proportionate terms, the extent of identified potential impacts and any necessary mitigation/control measures proposed.

2.2 Regulatory Context

2.2.1 Legislation and Guidance

The decommissioning of offshore oil and gas installations and pipelines on the UKCS is controlled through the Petroleum Act 1998 (as amended). Decommissioning is also regulated under the Marine and Coastal Access Act 2009 and, in Scotland, by the Marine (Scotland) Act 2010. The UK's international obligations on decommissioning are primarily governed by the 1992 Convention for the Protection of the Marine Environment of the Northeast Atlantic (the Oslo-Paris (OSPAR). The responsibility for ensuring compliance with the Petroleum Act 1998 rests with OPRED.

The Petroleum Act 1998 requires the operator of an offshore installation or pipeline to submit a draft Decommissioning Programme (DP) for statutory and public consultation, and to obtain approval of the DP from OPRED, before initiating decommissioning work. The DP must outline in detail the infrastructure being decommissioned and the method by which the decommissioning will take place.

The *Guidance Notes for the Decommissioning of Offshore Oil and Gas Installations and Pipelines* (BEIS, 2018) state that subsea installations must be completely removed for reuse, recycling or final disposal on land, unless there are exceptional or unforeseen circumstances that prevent complete removal. Should an operator wish to make an application to decommission a subsea installation *in situ* because of the difficulty of removing it, justification in terms of the environmental, technical or safety reasons would be required.

Any subsea installation foundation piles should be cut below natural seabed level at such a depth as to ensure that any remains are unlikely to become uncovered, typically 3m below the seabed.

With regards to pipelines (including risers), these should be considered on a case-by-case basis. The guidance does provide general advice regarding removal for two categories of pipelines:

- *For small diameter pipelines, the guidance states that they should normally be entirely removed; and*
- *For pipelines covered with rock protection, the guidance states that these are expected to remain in place unless there are special circumstances warranting removal.*

Finally, the guidance states that:

'Mattresses and grout bags installed to protect pipelines should be removed for disposal onshore if their condition allows. If the condition of the mattresses or grout bags is such that they cannot be removed safely or efficiently, any proposal to leave them in place must be supported by an appropriate Comparative Assessment of the options'.

The primary guidance for offshore decommissioning from the regulator (BEIS, 2018), details the need for an EA to be submitted in support of the DP(s). The guidance sets out a framework for the required environmental inputs and deliverables throughout the approval process. The Department for Business, Energy and Industrial Strategy (BEIS) guidance is supported by Decom North Sea's Environmental Appraisal Guidelines for Offshore Oil and Gas Decommissioning (Decom North Sea, 2017), which provide further definition on the requirements of the EA report.

In terms of activities in the NNS, the Scottish National Marine Plan (NMP) has been adopted by the Scottish Government to help ensure sustainable development of the marine area. The NMP is considered throughout this EA. The NMP was developed in line with UK, European Union (EU) and OSPAR legislation, directives and guidance. With regards to decommissioning, the NMP states that:

'*Where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. Re-use or removal of decommissioned assets from the seabed will be fully supported where practicable and adhering to relevant regulatory process'*.

TAQA has given due consideration throughout this EA to the NMP during the decision-making process and the interactions between the decommissioning activities and the NMP.

2.3 Scope and Structure of this Environmental Appraisal Report

This EA report sets out to describe, in a proportionate manner, the potential environmental impacts of the proposed activities associated with decommissioning of the Conductor Guide Frames and Alwyn Riser and to demonstrate the extent to which these can be mitigated and controlled to an acceptable level. This is achieved in the following sections, which cover:

- A description of the proposed decommissioning activities (Section 3);
- The process by which TAQA has arrived at the selected decommissioning strategy (Section 3.2);
- A summary of baseline sensitivities and receptors relevant to the assessment area that support this EA (Section 4);
- A review of all potential impacts from the proposed decommissioning activities, consideration of significance of the impacts and justification for the assessments (Section 6);
- Assessment of key issues (Section 6); and
- Conclusions (Section 7).

3 PROJECT SCOPE

3.1 Conductor Guide Frames and Alwyn Riser

3.1.1 Decommissioning Programme

The facilities included in the Cormorant Alpha Conductor Guide Frames and Alwyn Riser DP and therefore within the scope of this EA, include the infrastructure listed below. Information on the dimensions, weight and status of this infrastructure is included in Table 3-1 and Table 3-2:

- Cormorant Alpha Conductor Guide Frames; and
- Alwyn Riser.

Table 3-1 Subsea Installations

<table>
<tr><th>Item</th><th>Number</th><th>Size [LxWxH]</th><th>Weight (Te)</th><th colspan="2">Location</th><th>Comments / Status</th></tr>
<tr><td rowspan="2">Cormorant Alpha Conductor Guide Frames</td><td rowspan="2">3</td><td rowspan="2">(EL -5.3)
24.9 x 9.9 x 3.9
(EL -28.3)
24.9 x 9.9 x 3.9
(EL -58.3)
21.8 x 9.9 x 3.9</td><td rowspan="2">394</td><td>WGS84</td><td>61.102614
1.072853</td><td rowspan="2">The Conductor Guide Frames are located between Legs C3 and C4.</td></tr>
<tr><td>WGS84 Decimal Minute</td><td>61° 06.16'N
01° 04.37'E</td></tr>
</table>

Table 3-2 Pipelines

<table>
<tr><th>Description</th><th>Pipeline Number</th><th>Diameter</th><th>Length (km)</th><th>Description of Component Parts</th><th>Product Conveyed</th><th>From – To</th><th>Burial Status</th><th>Pipeline Status</th><th>Current Contents</th></tr>
<tr><td>Production Riser (The Alwyn Riser)*</td><td>PL1526</td><td>12”</td><td>0.312</td><td>Steel</td><td>Hydrocarbons</td><td>Cormorant Alpha Topsides Cut Point (EL-3.0m) to Riser Base Tie-in Flange (EL-150.3m)</td><td>N/A</td><td>Out of use</td><td>Treated sea water</td></tr>
<tr><td colspan="10">* The Alwyn Riser has a 12” diameter, that sits inside of a 30” nominal diameter caisson within conductor slot 18</td></tr>
</table>

3.2 Comparative Assessment

Under the Petroleum Act 1998 and as described in the Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines, (BEIS, 2018), a detailed Comparative Assessment (CA) is required to identify the recommended option for decommissioning of subsea infrastructure.

3.2.1 CA Overview

The Alwyn Riser was assessed as part of the NNS subsea infrastructure CA (Xodus, 2021). The overall methodology for the CA was as follows:

- Review the inventory of subsea facilities to identify characteristic equipment types (groups) into which the facilities may be classified.
- Carry out CA screening and evaluation for each group to determine the preferred decommissioning option for that group.
- Finalise selection of options, and
- Perform formal write-up detailing process and outcomes obtained.

A CA has not been carried out for the Conductor Guide Frames covered by this EA. The Conductor Guide Frames are being fully removed, recovered, and returned to shore for recycling and disposal, a CA is not required.

Removal does not prejudice or compromise the feasible decommissioning options for the remaining substructure.

The Alwyn Riser group identified during the CA is listed in Table 3-3 below.

Table 3-3 Subsea Infrastructure Groups Identified

Infrastructure	Group Number	Group Description	Recommended Decommissioning Option
Alwyn Riser	Group 11	Rigid Risers	Full removal

As outlined in Table 3-3, the Alwyn Riser was assigned to Group 11. This group was included among those for which full removal was selected as the decommissioning method during the scoping phase and therefore were not assessed further during the CA process.

3.3 Decommissioning Activities

3.3.1 Vessels

Specific vessel requirements for the decommissioning activities are not yet confirmed. It is anticipated that vessels may be shared across TAQA NNS decommissioning workstreams for efficiency. The decommissioning vessel type that is likely to be used is Construction Support Vessels (CSV). Currently it is envisaged that all vessels undertaking the decommissioning and removal works will be dynamically positioned vessels and there will be no requirement for anchoring activities.

3.3.2 Subsea Infrastructure Decommissioning

Subsea infrastructure decommissioning will include cutting activities to remove the items listed in Section 3.1. There are no piled structures within the scope of the Cormorant Alpha Conductor Guide Frames and Alwyn Riser DP.

The Alwyn Riser will be removed alongside the Cormorant Alpha topsides however, the Cormorant Alpha topsides will be removed under a separate DP, which was approved in 2022 and therefore does not fall within the scope of this EA. All other risers at Cormorant Alpha to be removed alongside the topsides are included in the approved Topsides DP. Once the Cormorant Alpha topsides have been removed, the Conductor Guide Frames will then be removed. Following their removal, they will be temporarily wet stored on the seabed before being transported to shore for dismantling and recycling. The Alwyn Riser will be cut into ~30 m lengths and will also be temporarily wet stored on the seabed, next to the Conductor Guide Frames. The potential wet storage locations will be located within the 500 m zone, out with the Cormorant Alpha drill cuttings pile boundary and will not overlap any environmental sensitivities in the area.

Recovered infrastructure will be returned to shore for dismantling and sorting before being transferred to suitably licenced waste facilities. It is the intent that, where possible, materials and equipment will be re-used or recycled. Materials management options will take account of the waste hierarchy, with reduction in volume of waste being the preferred option. OPRED will be advised once waste contractors have been selected.

3.3.3 Post-Decommissioning Surveys

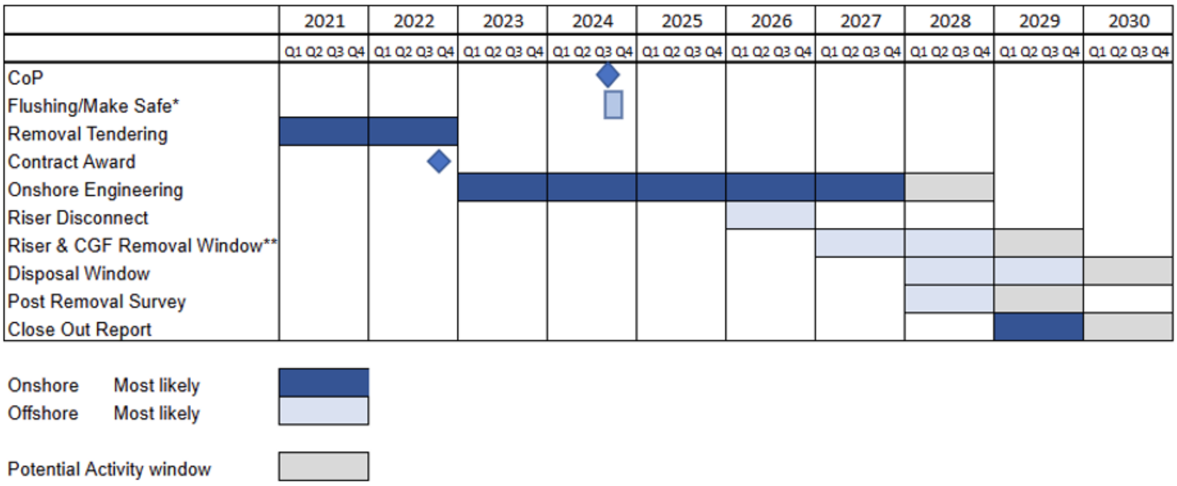
Post-decommissioning surveys will be carried out as part of the wider TAQA NNS decommissioning scope. Clear seabed verification will be carried out after decommissioning to ensure there is no residual risk to other sea users. Non-intrusive techniques will be considered in the first instance to identify any remaining debris or seabed obstructions. It is then TAQA's intention that, if present, these would be recovered/removed ensuring no oilfield-related debris that could interfere with future fishing operations remain (in line with Guidance; BEIS, 2018).

If the above cannot be achieved and potential debris or obstructions do remain then mitigations would be discussed with OPRED and fishing representative bodies.

3.3.4 Proposed Schedule

The precise timing of the decommissioning activities is not yet confirmed and will be subject to market availability, contractual agreements and alignment with other decommissioning projects. Although the wider subsea removals scope is not planned to commence until circa 2030, the upper section of the North Alwyn Riser will be removed in 2026 as part of the Cormorant Alpha topsides removal preparations. The remaining section of the Conductor Guide Frames and Alwyn Riser shall be removed in 2027 as part of the main Cormorant Alpha topsides removal campaign.

The riser sections and Conductor Guide Frames may be temporarily wet stored prior to their subsequent recovery to shore within a two-year window (maximum). This will either be performed as part of a dedicated recovery campaign or as part of the wider subsea installation and pipeline removal scope.



*Flushing and make safe completed as part of wider Topsides scope.
**Includes the potential Alwyn Riser and CGF wet storage window (2027 - 2029).

Figure 3-1 Project Schedule for the Conductor Guide Frames and Alwyn Riser Decommissioning Activities

3.4 Summary of Materials Inventory

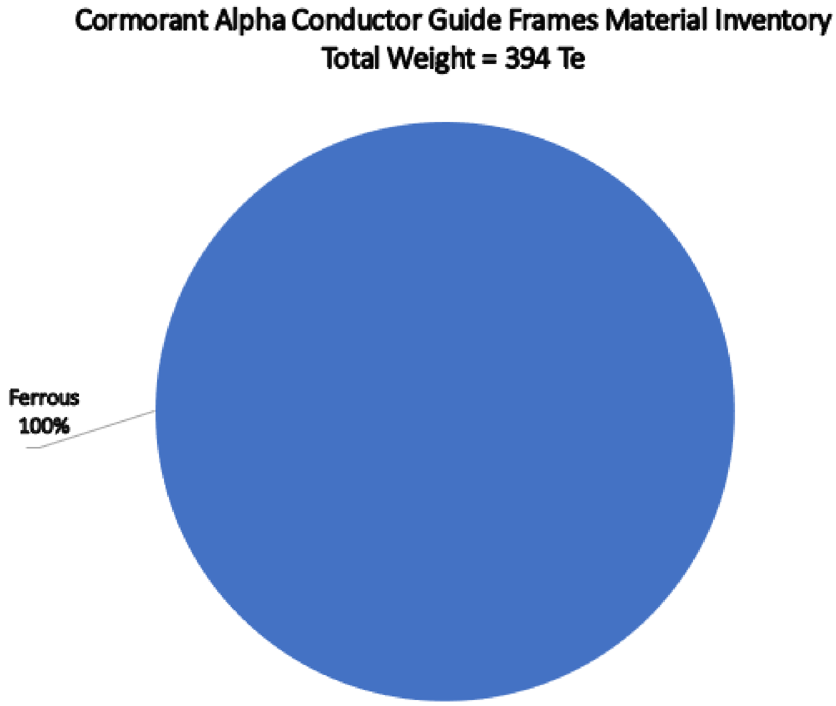
The approximate amounts of materials that make-up the Conductor Guide Frames and Alwyn Riser have been evaluated. A focused review of the inventories of materials will be conducted during the detailed engineering phase of decommissioning. A summary of the material inventory is presented in Table 3-4, Table 3-5 and Figure 3-2.

Table 3-4 Summary of Conductor Guide Frames Materials Inventory

Material	Weight (Te)	Planned Tonnage decommissioned in situ (Te)	Planned Tonnage to Shore (Te)
Ferrous metals (all grades)	394	-	394
Total	**394**	**-**	**394**

Table 3-5 Summary of Alwyn Riser Materials Inventory

Material	Weight (Te)	Planned Tonnage decommissioned in situ (Te)	Planned Tonnage to Shore (Te)
Ferrous metals (all grades)	98.8	-	98.8
Non-ferrous metals (copper, aluminium alloys)	2.0	-	2.0
Plastics	0.5	-	0.5
Total*	**101.3**	**-**	**101.3**
***This material inventory includes both the Alwyn Riser and Caisson 18**			



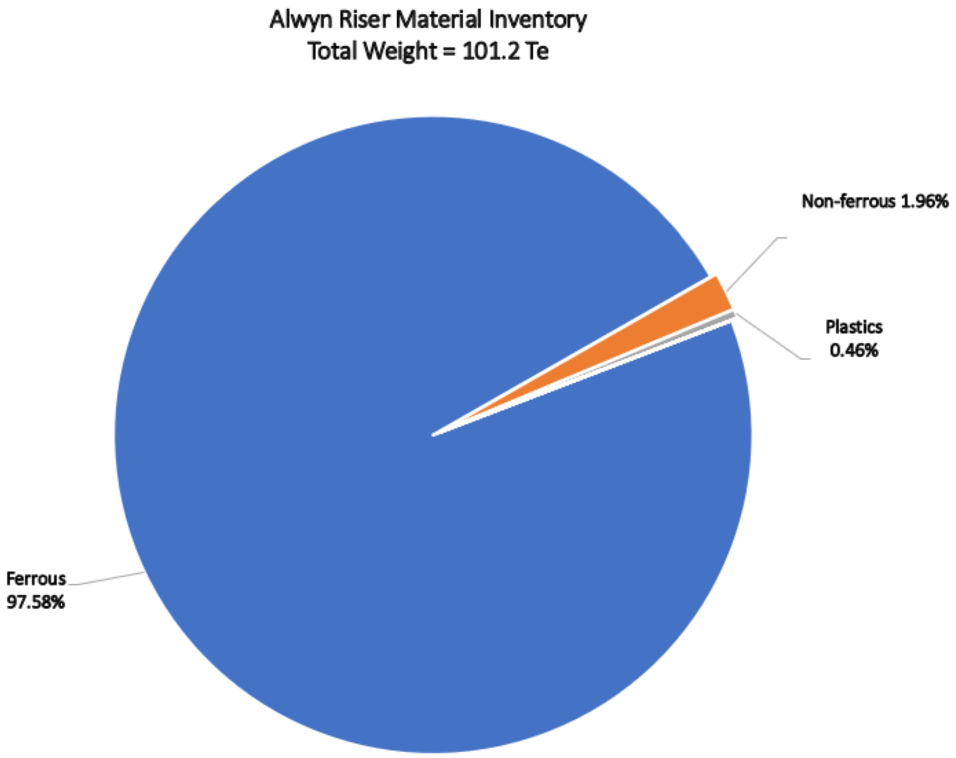


Figure 3-2 Cormorant Alpha Conductor Guide Frames and Alwyn Riser Materials Inventory

3.5 Waste Management

TAQA will comply with the Duty of Care requirements under the UK Waste Regulations and The Environmental Protection (Duty of Care) (Scotland) Regulations 2014. The Waste Hierarchy will also be followed at all stages of disposal (see Figure 3-3), along with the principles of the circular economy, prioritising reuse where possible. Industry best practice will be applied (Decom North Sea, 2018).

All waste will be managed in compliance with relevant waste legislation by a licenced and/or permitted waste management contractor. The selected contractor will be assessed for competence through due diligence and duty of care audits.

Most of the material recovered during the decommissioning activities will be non-hazardous, including ferrous metals, non-ferrous metals and plastic as outlined in Section 3.4.

Preventing waste is ultimately the best option, achieved through reducing consumption and using resources more efficiently. However, this is followed by re-use and recycling of goods. If all re-use opportunities have been taken by TAQA, the next preferable option is for recycling of materials.

Figure 3-3 The Waste Hierarchy

The Material Inventory has also classified each material according to the European Waste Catalogue (EWC) Codes as required for disposal of wastes within the EU and a further categorisation of hazardous/special or non-hazardous/non-special wastes. The EWC is a standardised way of describing waste and was established by the European Commission (EC). The use of EWC codes to describe waste is a requirement of the Duty of Care for waste which requires the holder of waste to take all reasonable steps to ensure that waste is described in a way that permits its safe handling and management.

Until a waste management contractor has been selected and disposal routes identified, the final disposal options for waste materials are unknown. The project aspiration is that all ferrous and non-ferrous metals and plastic will be recycled where possible and TAQA will work closely with the contractor(s) to ensure this is the case. There may be instances where infrastructure returned to shore is contaminated (marine growth, hydrocarbons, paints etc), in this situation TAQA will make every effort to clean such infrastructure to enable it to be recycled. In cases where this is not possible, and the infrastructure cannot be recycled, material will be disposed of in landfill.

As part of TAQA's standard processes, all sites and waste carriers will have appropriate environmental and operating licences and/or permits to carry out this work and will be closely managed within TAQA's contractor assurance processes.

Should Naturally Occurring Radioactive Material (NORM) be encountered associated with the materials brought to shore, TAQA will ensure the disposal site is suitably licenced to accept the waste arising from the decommissioning of the subsea infrastructure.

An Active Waste Management Plan (AWMP), including an inventory of hazardous waste, will be compiled to aid the segregation and recycling of waste.

TAQA is committed to working towards the government policy of Net Zero in line with the North Sea Transition Authority (NSTA) Stewardship Expectation 11 (NSTA, 2021). This commitment includes decommissioning activities and is intended to drive increased energy efficiencies and minimise emissions. TAQA seeks to influence our joint venture partners and suppliers to ensure that everyone is striving to reduce and manage associated emissions.

3.6 Environmental Management Strategy

TAQA has an established and independently verified Environmental Management System (EMS) which is certified in accordance with the requirements of ISO14001:2015. The scope of the TAQA EMS is defined to include all activities, onshore and offshore, in relation to the extraction, processing and export of oil & gas and abandonment and decommissioning activities in the UKCS. This includes TAQA operated platforms, subsea tie-backs and the Brent System Pipeline. This scope encompasses the Conductor Guide Frames and Alwyn Riser decommissioning. The EMS meets the requirements of OSPAR Recommendation 2003/5 which promotes the use and implementation of EMSs by the offshore industry.

TAQA is committed to managing all environmental impacts associated with its activities. Continuous improvement in environmental performance is sought through effective project planning and implementation, emissions reduction, waste minimisation and waste management. This mindset has fed into the development of the mitigation measures developed for the project. These measures include both industry-standard and project-specific mitigations. A copy of TAQA's Health, Safety, Security and Environment (HSSE) Policy is presented in Appendix A.

The project has limited activity associated with it beyond the main period of preparation for decommissioning of the Conductor Guide Frames and Alwyn Riser. The focus of environmental performance management for the project is therefore to ensure that the activities that will take place during the limited period of decommissioning happen in a safe, compliant and acceptable manner. The primary mechanism by which this will occur is through TAQA's accredited EMS and HSSE Policy.

To support this, a project Health, Safety and Environment (HSE) Plan will be developed which outlines how HSE issues will be managed and how the policies will be implemented effectively throughout the project. The plan will apply to all work carried out, whether onshore or offshore. Performance will be measured to satisfy both regulatory requirements including compliance with environmental consents, as well as to identify progress on fulfilment of project objectives and commitments.

TAQA also operates a Waste Management Strategy and will develop an AWMP for the project to identify and describe the types of materials identified as decommissioning waste and to outline the processes and procedures necessary to support the DP for the Conductor Guide Frames and Alwyn Riser. The AWMP will detail the measures in place to ensure that the principles of the waste management hierarchy are followed during decommissioning.

TAQA has developed a draft Emissions Reduction Strategy which supports its commitment to Net Zero and the NSTA Stewardship Expectation 11 (NSTA, 2021). This strategy catalogues TAQA's asset portfolio and future decommissioning activities and is intended to drive increased energy efficiencies and reduced emissions. TAQA plans several initiatives under the Emissions Reduction Strategy including working with the supply chain, collating emission/energy savings initiatives across the business and reviewing emissions sources.

The NMP has been adopted by the Scottish Government to help ensure sustainable development of the marine area. This Plan has been developed in line with UK, EU and OSPAR legislation, directives and guidance. With regards to decommissioning, the Plan states that 'where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as Carbon Capture and Storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. TAQA has given due consideration to the Scottish NMP during project planning and decision making.

4 ENVIRONMENTAL AND SOCIETAL BASELINE

As part of the EA process, it is important that the main physical, biological and societal sensitivities of the local environment are well understood. This environmental baseline describes the characteristics of the environment surrounding the Cormorant Alpha platform and highlights the key environmental sensitivities. This description draws on a number of data sources including published papers on scientific research in the area, industry wide surveys (e.g. the Offshore Energy Strategic Environmental Assessment (OESEA) 4 programme (BEIS, 2022)) and site-specific investigations commissioned as part of the exploration and development processes. The Cormorant Alpha survey reports (Benthic Solutions, 2020; Benthic Solutions, 2024) provide full coverage of the project area and have been used to inform this baseline section. The 2024 Benthic Solutions survey report is an updated version of the 2020 report and includes a revised drill cuttings assessment.

4.1 Seabed Environment

4.1.1 Bathymetry

In the Cormorant Alpha survey area, water depth ranges from 145 m Lowest Astronomical Tide (mLAT) to 153 mLAT and is considered generally flat throughout the area (Benthic Solutions, 2020). The wider environment surrounding the Cormorant Alpha platform is not located on any large-scale features of functional significance such as shelf deeps, shelf banks and mounds, seamounts, or continental slopes (NMPi, 2026).

4.1.2 Currents, Waves and Tides

The annual mean wave height in the NNS region follows a gradient increasing from the southern point in the Fladen/Witch Ground to the northern area of the East Shetland Basin. In the south, the mean wave height ranges from 2.11 - 2.40 m whilst in the north it ranges from 2.41 - 3.00 m (NMPi, 2026). McBreen *et al.,* (2011) shows wave energy at the seabed to range between 'low' (less than 0.21 N/m^2) and 'moderate' (0.21 - 1.2 N/m^2) for most of the NNS region, increasing to 'high' (more than 12 N/m^2) close to shore. The annual mean wave height in the wider area ranges from 2.713.00 m and the annual mean wave power ranges from 36.1 - 42.0 kW/m (NMPI, 2026).

The anti-clockwise movement of water through the NNS originates from the influx of Atlantic water, via the Fair Isle Channel and around the north of Shetland and the main outflow northwards along the Norwegian coast (BEIS, 2022). Against this background of tidal flow, the direction of residual water movement in the NNS is generally to the south-east (BEIS, 2022). The peak flow for mean spring tide ranges between low velocities of 0.01 m/s in open water to 2.5 m/s in the narrow sounds around Orkney (Pentland Firth) (BEIS, 2022). The mean residual current surrounding the proposed operations is approximately 0.05 to 0.1 m/s (Wolf *et al*., 2016).

The NNS is seasonally stratified, and the strength of the thermocline develops determined by solar energy, tidal and wave forces (BEIS, 2022). Distinct density stratification occurs in the NNS region in summer at a depth of around 50 m and the thermocline becomes increasingly distinct towards deeper water in the north of the region (BEIS, 2022). This stratification breaks down in September as the frequency and severity of storms increases causing mixing in the water column (DECC, 2009).

4.1.3 Meteorology

The prevailing winds in the NNS are from the southwest and north northeast. Wind strengths in winter are typically in the range of Beaufort scale force 4 - 6 (6 - 11 m/s) with higher winds of force 8-12 (17 - 32 m/s) being much less frequent. Winds of force 5 (8 m/s) and greater are recorded 60-65% of the time in winter and 22 - 27% of the time during the summer months. In April and July, winds in the open, central to NNS, are highly variable and there is a greater incidence of north-westerly winds (BEIS, 2022).

4.1.4 Wider Cormorant Alpha area Seabed Environment

4.1.4.1 Physical Characteristics

In the NNS, seabed sediments generally comprise a veneer of unconsolidated terrigenous and biogenic deposits, generally much less than 1 m thick. The survey conducted in the project area provides evidence of a relatively uniform nature of the seabed habitats and communities in the vicinity of the Cormorant Alpha platform.

Under the European Nature Information System (EUNIS) habitat classification, the most widespread seabed type around the wider Cormorant Alpha area is MD52: “Atlantic offshore circalittoral sand” which represents offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. This habitat type falls within the broad habitat Priority Marine Feature (PMF) “offshore sands and gravels” In addition, localised areas of EUNIS habitat complex MD32: “Atlantic offshore circalittoral coarse sediment” are predicted to occur.

The physical seabed characteristics recorded during the survey show the sediment around the Cormorant Alpha platform tend to be generally comprised of silty sand with varying levels of shell material, except for an area of high reflectivity associated with rock dump. Sediment closer to the Cormorant Alpha platform was mixed, with cohesive silt (cutting material) intermixed with small amounts of coarse *Mytilus* shell from the nearby infrastructure. The anthropogenic rock dumps present in the field displayed a similar habitat to some of the coarse glacial deposits found in the surrounding area (Benthic Solutions, 2020).

Sediment analysis across the Cormorant Alpha survey area indicated a heterogenous mixture of sediment across sampling stations, composed primarily of sand, with small contributions of fines and gravel. Sands dominated the stations within the survey area, ranging from 74.7% - 89.9% of the sediment composition. The fines and gravel components of the sediment was significantly lower, ranging from 7.9 - 16.9 % and 1.2 - 12.2 %, respectively (Benthic Solutions, 2020). These peak gravel concentrations were found close to the pile centre in the area surrounding the southeast leg of the Cormorant Alpha platform. The mean particle size in the Cormorant Alpha survey area ranged from 0.16 mm to 0.34 mm. When compared to the previous 2013 environmental monitoring survey (Fugro, 2013), the mean particle size was found to be consistent between the two surveys, with only a slight increase in particle size. This increase is not thought to be related to the drilling activity at the Cormorant Alpha platform, given the 500 m distance from the platform. Instead, it is considered to likely reflect the reworking of sediment by the local hydrodynamic regime resulting in a transition from fine sand to medium sand on the Wentworth scale in 2018 (Benthic Solutions, 2020).

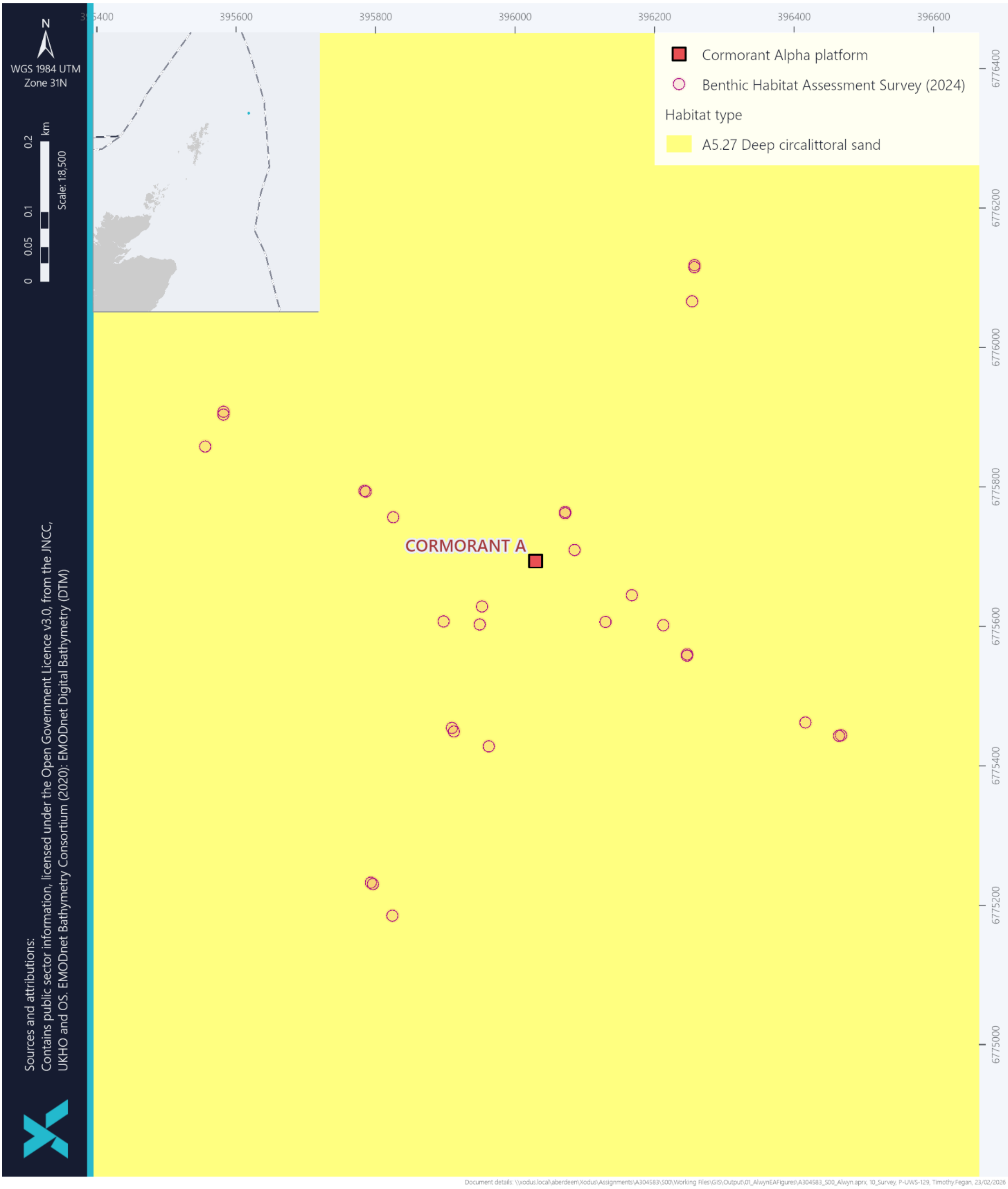


Figure 4-1 Coverage of Environmental Surveys Around the Cormorant Alpha Platform

4.1.4.2 Chemical Characteristics

Metals associated with drilling-related discharges are of particular relevance to offshore oil and gas operations. During drilling, cuttings and fluids are released to the seabed, where larger particles settle rapidly and finer clay-sized particles may be transported further by water currents. Although the use of oil-based muds (OBMs) was banned in the UK in the 1980s (PARCOM, 1984), their legacy remains in seabed sediments. OBMs were gradually replaced by low-toxicity OBMs, synthetic-based muds, and water-based muds (OSPAR, 2009b), which contain additives such as barium (Ba) sulphate and other compounds for viscosity, scale, and corrosion control.

Ba is commonly used as a tracer for drilling fluid deposition due to its presence in barite, a weighting agent in drilling muds. Barite can contain trace heavy metals including cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), and zinc (Zn) (NRC, 1983; McLeese *et al.*, 1987).

Natural Ba levels around the Cormorant Alpha platform ranged from 432 mg kg^{-1} to 2,960 mg kg^{-1} with a mean of 1.456 mg kg^{-1} and were found to exceed the UK Offshore Operators Association (UKOOA; 2001a) 95th percentile (577.6 mg kg^{-1}) for the 8 out of 10 stations sampled >125 m from platform centre (Benthic Solutions, 2020). When Ba was measured by fusion techniques, this recorded higher values ranging from 294 mg kg^{-1} to 23,600 mg kg^{-1} with peak concentrations recorded within the cutting pile (mean 10,884 mg kg^{-1}).

At three stations adjacent to the Cormorant Alpha platform, the concentration of several metals exceeded the UKOOA (2001a) 95th percentile including Cr, Cu, Pb and Zn. Metal levels in sediments around the Cormorant Alpha platform decreased with distance from the installation (Benthic Solutions, 2020).

Total hydrocarbon content (THC) concentrations in the surface sediments sampled around the Cormorant Alpha platform ranged from 26 mg kg^{-1} to 7,580 mg kg^{-1} with a mean of 561 mg kg^{-1}. THC levels were elevated above the UKOOA 95th percentile for the NNS (20.32 mg kg^{-1}) at 90% of the stations sampled. Higher levels were found close to the Cormorant Alpha platform where most of the stations within 190 m exceeded the OSPAR (2006) 50 mg kg^{-1} limit. Levels of THC were found to decrease with distance from the platform (Benthic Solutions, 2020).

4.1.5 Drill Cuttings Piles

An assessment was undertaken of the Cormorant Alpha (Benthic Solutions, 2024) cuttings pile to characterise its composition, including:

- The exact position of pile, pile area / topography;
- The pile volume inside a pile depth contour 0.1 m above seabed;
- The physical (sediment) characteristics;
- The chemical content; and
- The biological characteristics.

The survey strategy followed the Norsk Olje and Gass (NorOG) guidance document for characterization of offshore drill cuttings piles (NorOG, 2016) with regards to sampling design across the topography of the cuttings pile. Analysis was aligned as far as practicable with the OSPAR Guidelines for the Sampling and Analysis of Cuttings Piles (OSPAR, 2017) and Joint Article Management Promotion -consortium Guidelines for Monitoring Contaminants in Sediments (OSPAR, 2015).

The survey data was also utilised to delineate the extent of the cuttings pile and associated contamination, in particular locating the 50 mg kg^{-1} THC boundary which is deemed the limit for the presence of cuttings related pollution (UKOOA, 2001b).

Information is provided in Section 4.1.5.1 on the Cormorant Alpha platform cuttings pile. Due to the proximity of decommissioning activities with the Cormorant Alpha platform, this cutting pile is assessed in terms of the potential disturbance to the seabed (Section 6.4).

4.1.5.1 Physical Characteristics

Bathymetry data revealed a cuttings pile with a 10 m elevation above the CGBS cell top at the southeast corner of the CGBS (Benthic Solutions, 2024). The cuttings pile lies mainly on top of the CGBS cell top but also overspills onto the seabed. The physical cuttings pile boundary in relation to the CGBS is displayed in Figure 4-2. Following the investigation of the natural morphology of the seabed and the vertical profiles of the core samples retained from the survey, the approximate physical boundary and volume calculation of the cuttings pile was delineated. The Cormorant Alpha cuttings pile was estimated to cover an area of 12,210 m^2 with a pile volume of approximately 9,278 m^3 which would be categorised as a “medium cuttings pile” (5,000-20,000 m^3, NorOG, 2016) (Benthic Solutions, 2024).

The core sediments from the Cormorant Alpha cuttings pile were typically dominated by “cohesive silty sand” (80% of the cores analysed) throughout and were almost exclusively dominated by the fines fraction. The mean particle size was 0.04 mm and the cores closest to the pile centre exhibited distinctive layers of ‘dark greyish olive’ drilling material and ‘pale brown’ layers which are usually associated with chemical additives. Sample stations on the northern outer edge of the pile centre, located on top of the CGBS cell top, recorded a slightly higher sand content. The natural seabed sediments were only evident within the bottom layers of two core stations (sampled off the CGBS, towards the eastern boundary of the physical pile) where the sediment particle size was dominated by coarse gravelly sand; showing similarity to the sediment analysed throughout the baseline survey conducted around the Cormorant Alpha platform (Section 4.1.4.1). The other four stations located off of the CGBS showed no evidence of the natural seabed boundary, due to the deep depth of the of the pile and the relatively small recovery core sizes at most stations. Overall, there was no clear relationship between the core layer and the proportion of sands, fines or gravels, indicating the cuttings pile is a heterogenous mixture of different types of drilling muds and cuttings (Benthic Solutions 2024).

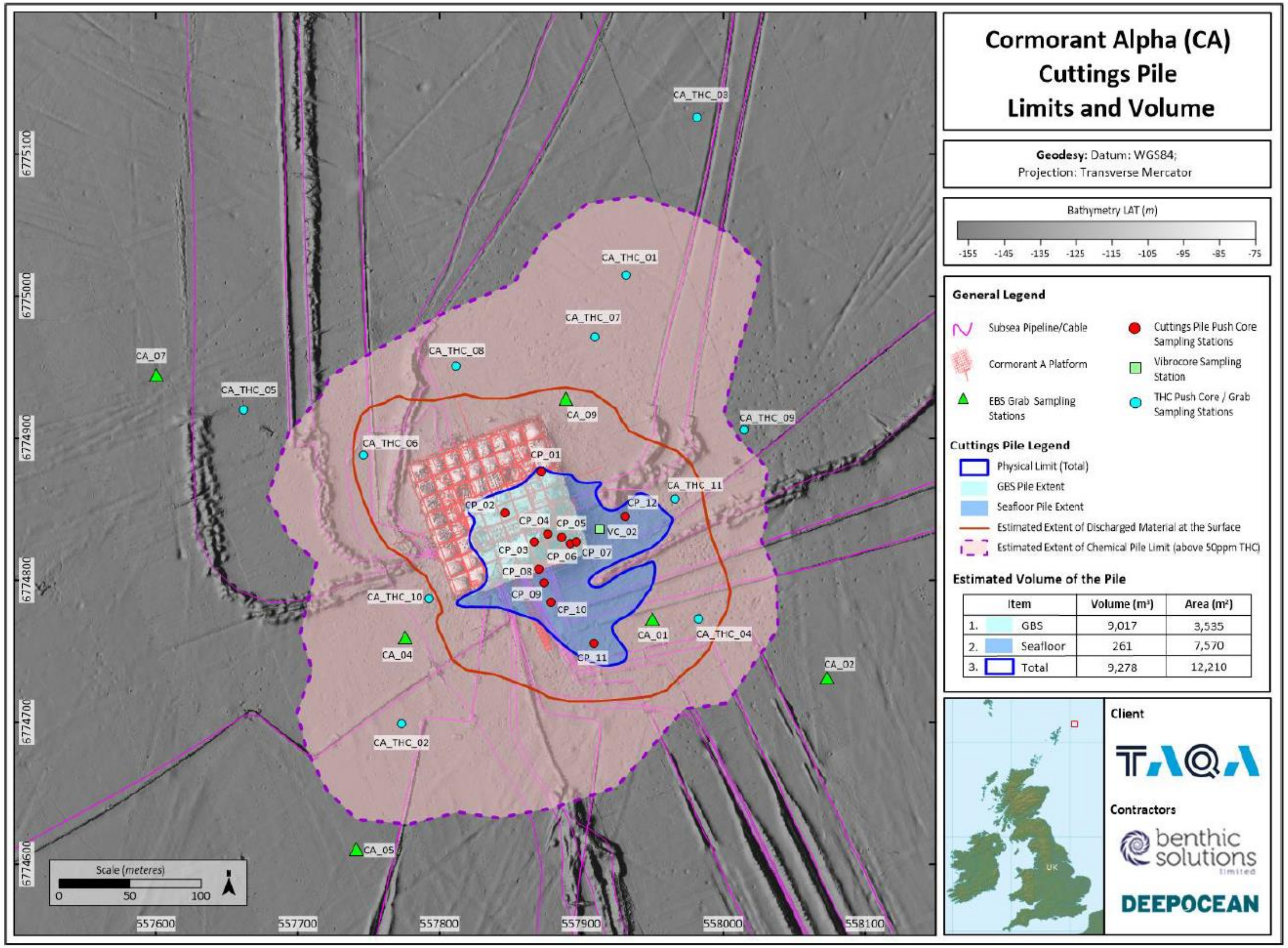


Figure 4-2 The Cormorant Alpha Cutting Pile Estimated Limits and Volume (Benthic Solutions, 2024)

4.1.5.2 Chemical Characteristics

Gas chromatogram profiles obtained from the Cormorant Alpha cuttings pile sediments shared a common hydrocarbon distribution typical of an input of a synthetic paraffin-based drilling fluid which had undergone varying degrees of weathering. Additionally, several core sections also exhibited evidence of drilling fluids (Benthic Solutions, 2024).

The approximate ‘ecological effect’ threshold of 50 mg kg^{-1} dry weight for sediment THCs was defined by OSPAR to estimate the environmental impacts of cuttings piles in the North Sea (OSPAR, 2017). As expected, stations on top of the CGBS, closest to the pile centre (<25 m), recorded higher levels of THC, where levels ranged between 63,800 mg kg^{-1} to 427,000 mg kg^{-1}. All core sections recorded over 1,000 times the OSPAR (2014) 50 mg kg^{-1} threshold. Two core samples on the seabed, on the eastern edge of the physical pile boundary, were the only samples that recorded THC levels below the 50 mg kg^{-1} limit. Stations on the seabed, beyond the physical pile boundary, continued to show elevated THC levels above the 50 mg kg^{-1}, on surface layers only.

Due to the large number of stations sampled on top, and in the vicinity of, the Cormorant Alpha CGBS, THC data was extrapolated to illustrate the dispersion of contaminants which extended southeast onto the seabed and the northern area of the CGBS, beyond the physical pile limit. Figure 4-2 represents the THC contamination, which was evident up to 200 m north and southeast, as well as covering a smaller range on the western side of the gravity base; extending out to the seabed surface by 150 m. The overall chemical footprint (where THC was above the OSPAR 50 mg kg^{-1} threshold) exceeds the physical pile boundary and covers a surface area approximately 0.1067 km^2, slightly elongated towards the northeast (Figure 4-2).

Higher levels of Ba were recorded close to the platform, reflecting the influence by drilling muds on the seabed with peak concentrations recorded within the cuttings pile. Despite this pattern, Ba concentrations fell well below the level described by Cefas for stations located within 500 m of active UK platforms (33,562.12 mg kg^{-1}; Cefas, 2001).

Normalisation of the heavy and trace metals, allowing comparison with OSPAR Background Assessment Concentrations (BAC), showed almost all core layers having most metal concentrations exceeding their corresponding BAC values. Concentrations of Cd were observed to exceed the OSPAR BAC level (0.31 mg kg^{-1}) for all 39 core samples.

Polychlorinated Biphenyls (PCB) and organotin (principally tributyltin) concentrations at most stations were found to be below laboratory limits of detection.

OSPAR Decision 2006/5 (OSPAR, 2006) requires operators to assess cuttings piles against:

- oil loss to the water column of 10 Te/yr; and
- persistence of the area of seabed contamination of 500 km^2/yr.

If either threshold is exceeded the operator is required to characterise the cuttings pile and review the impacts.

The sediment leachate analysis (the yearly oil loss) based on the chemical footprint of the cuttings pile ranged between 2.52 Te/yr (24-hour leachate rate) and 3.25 Te/yr (48-hour leachate rate). This indicates that the oil loss to the water column does not breach the OSPAR oil loss threshold (10 Te/yr). With a persistence of 7.54 km^2, the cuttings pile also falls well below the respective OSPAR leaching threshold (500 km^2/yr).

Both species richness and abundance were affected by the influence of drilling related activity. All stations located on top of, or in the vicinity of, the Cormoran Alpha CGBS and within the Cormorant Alpha cuttings pile, showed a reduced species diversity and increase in the abundance of opportunistic species. However, coarse material in the form of drill cuttings and relic *Mytilus edulis* shells was a common component of the sediments at stations within 125 m of the platform, providing a hard substrate for colonisation by sessile epifaunal species.

Species diversity rapidly increased with distance from the platform. This pattern is considered a classic response to point-source organic pollution, evidencing the contamination within the cutting pile had leached to the sediment within 125 m of the platform, but had not impacted the macrofaunal communities found at further distances (Davies *et al*.,1984). The stations atop of the CGBS noted low abundance of opportunistic deposit-feeding species which is thought to result from the higher levels of THC and Ba related metals at the stations close to the pile centre (Benthic Solutions, 2024).

4.2 Biological Environment

4.2.1 Plankton

Planktonic assemblages exist in large water bodies and are transported by tides and currents as they flow around the North Sea. Plankton forms the basis of marine ecosystem food webs and therefore directly influences the movement and distribution of other marine species. While there is no specific data available on plankton communities within the immediate vicinity of the Cormorant Alpha platform, plankton communities throughout the North Sea are well known.

Phytoplankton blooms occur at the time of year when large amounts of nutrients are present in the sea water, and there is strong sunlight. Despite its cold waters, the North Sea is an ideal basin for these blooms due to the combination of the presence of abundant nutrients and intense Arctic winds that favour the mixing of waters (Copernicus, 2021).

In both the northern and central areas of the North Sea, the phytoplankton community is dominated by a greater proportion of dinoflagellates of the genus *Tripos fusus, furca, lineatus* than diatoms such as *Thalassiosira* spp. and *Chaetoceros* spp. In recent years the dinoflagellate *Alexandrium tamarense* and the diatoms *Pseudo-nitzschia* (known to cause amnesic shellfish poisoning) have been observed in the area (BEIS, 2022). A general shift to the north-east of North Atlantic phytoplankton communities has been observed by Barton *et al*. (2016), studying Continuous Plankton Reader (CPR) data gathered between 1951-2000. The shift was driven by changes in various environmental conditions, including nutrient availability, light level and ocean circulation rather than being simply temperature driven (BEIS, 2022).

Zooplankton species richness is greater in the northern and central areas of the North Sea, than in the south and displays greater seasonality. Zooplankton communities in this area are dominated in terms of biomass and productivity by calanoid copepods, particularly *Calanus* species such as *C. finmarchicus* and *C. helgolandicus*. although other groups such as *Paracalanus* and *Pseudocalanus* are also plentiful. There is also a high biomass of *Calanus* larval stages present in the region. Other important taxa include *Acartia*, *Temora*, and *Oithona* spp. Larger zooplankton species such as euphausiids and decapod larvae are also important to the zooplankton community in this region (BEIS, 2022).

Calanus finmarchicus has historically dominated the zooplankton of the North Sea and is used as an indication of zooplankton abundance. Analysis of CPR surveys in the 10-year period between 1997 and 2007 shows that the biomass of *C. finmarchicus* in the NNS attains higher levels compared to more southerly areas. This peak in numbers is 70% greater than seen in the Central North Sea (CNS) and 88% greater than the Southern North Sea over the same period (SAHFOS, 2015). The increase is likely a reflection of the increased availability of nutrients and food (including phytoplankton) in spring. Evidence suggests that the increase of warmer water species at the expense of colder water species in the northeast Atlantic, as illustrated by the general trend in *C. finmarchicus* and *C. helgolandicus*, has accelerated (Edwards *et al.,* 2020). Since the 1960s, total *Calanus* spp. biomass in the North Sea has declined by approximately 70%. As plankton communities are so closely linked to the physical environment, they can be good indicators of changes in the climate (BEIS, 2022).

4.2.2 Benthos

The biota living near, on or in the seabed is collectively termed benthos. The diversity and biomass of the benthos is dependent on a number of factors including substrata (e.g. sediment, rock), water depth, salinity, the local hydrodynamics and degree of organic enrichment (BEIS, 2022). The species composition and diversity of the benthos or macrofauna found within sediments is commonly used as a biological indicator of sediment disturbance or contamination.

In broad terms, the infauna present is characterised by the most abundant species present, appears very similar in all surveys around TAQA assets. Species consistently appearing in the lists of most abundant taxa centre around the polychaetes (*Galathowenia oculata* and *Eclysippe vanelli*), bivalves (*Axinulus croulinensis* and *Adontorhina similis)* and echinoderms (*Asterias rubens* and *Amphiura filiformis*) (Benthic Solutions, 2020). Several species considered to be indicative of environmental disturbance and hydrocarbon contamination, both positive (e.g. *G. oculat*a and *E. vanelli*) and negative (e.g. *Capitella, C. cirratus*, and *T. sarsii*), were identified from the macrofaunal samples indicating contamination of seabed sediment within close proximity to the cuttings pile (Benthic Solutions, 2024). The epifauna present in all areas is generally noted as sparse (in direct contrast to the infauna) and taxon mostly belong to phyla Cnidaria and Bryozoa.

4.2.3 Potential Sensitive Habitats and Species

A review of data from the surveyed area within the wider Cormorant Alpha area indicated the presence of several potentially sensitive habitats and species, including:

- 'Submarine structures made by leaking gases' - Annex I Habitat
- 'Seapen and Burrowing megafauna communities - (OSPAR List of Threatened and/or Declining Species and Habitats and UK Biodiversity Action Plan (BAP) habitat
- Ocean quahog (*Arctica islandica*) - OSPAR list of threatened and/or declining species and habitats (Region II - Greater North Sea)

These habitats are listed by one or more International Conventions, European Directives or UK Legislation (including devolved UK administrations).

4.2.3.1 Submarine Structures Made by Leaking Gases

'Submarine structures made by leaking gases' encompass hard substrates which support a unique community of organisms that are able to survive on the methane and hydrogen sulphide gases associated with this habitat. There are two main types of submarine structures known to occur in the UK: bubbling reefs and submarine structures associated with pockmarks (JNCC, 2014). Pockmarks are generally connected to the release of methane, which reacts with the surrounding seawater forming carbonate blocks. Methane seeping from the seabed, which creates these structures, reacts with the surrounding seawater forming carbonate blocks. These blocks are termed as "Methane-Derived Authigenic Carbonate (MDAC)"

Numerous small seabed depressions (approximately 20-30 cm in depth and up to 1 m wide) were recorded within 250 m and in the northeast to southeast region of the Cormorant Alpha platform (Benthic Solutions, 2020). However, no features characteristic to large pockmarks were identified and ground-truthing did not identify MDAC within the depressions (Benthic Solutions, 2020).

4.2.3.2 Seapen and Burrowing Megafauna Communities

According to Joint Nature Conservation Committee (JNCC; 2015) guidance, the key determinant for classification of the habitat 'Seapen and burrowing megafauna communities' is the presence of burrowing species or burrows at a SACFOR (super-abundant, abundant, common, frequent, occasional, rare) density of at least 'frequent'. While the presence of burrowing macrofauna is an essential element of classification, seapens may, or may not, be present.

The Benthic Solutions (2024) survey estimated the density of burrow openings located between 250 m - 500 m northeast and northwest from the Cormorant Alpha platform and found that the density of small burrows (<3 cm) across the two transects were recorded as 'occasional' on the SACFOR scale, with no large burrows recorded. Seapens such as *Virgularia mirabilis* or *Pennatula phosphorea* were mostly observed at the stations CA_EBS_02, CA_EBS_03, CA_EBS_07, CA_EBS_10, which are located 250 m, 500 m, 250 m and 500 m from the Cormorant Alpha platform, respectively (Benthic Solutions, 2020).

4.2.3.3 Ocean Quahog

A. islandica is a bivalve species that is listed as a Priority Marine Feature (PMF) in Scottish waters (Tyler-Walters, 2016), is on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2008) and is also listed as a marine conservation zone (MCZ) feature of conservation importance. The ocean quahog is a species of conservation concern due to its exceptional longevity and slow growth rate. Considering this, the recoverability of ocean quahog to physical abrasion is very low. *A. islandica* is nevertheless commonly found in the NNS, with some individuals known to exceed 100 years of age (OSPAR, 2009a).

Two individuals of the environmentally sensitive species *A. islandica* were identified at two stations 200 m southeast and southwest of the Cormorant Alpha platform (Benthic Solutions, 2020). Previous surveys of marine protected areas (MPA) designated for the protection of *A. islandica* populations have shown only sparse populations reported by O'Connor (2016) (cited in Benthic Solutions, 2020). The distribution of *A. islandica* is relatively wide in the North Sea (OSPAR, 2009a). In summary, the presence of ocean quahog individuals over the whole area of interest must be assumed, however the presence of aggregations is unlikely.

4.2.4 Blue Carbon

Marine sediments are the primary store of biologically derived carbon (mostly inorganic carbon). Marine ecosystems that contribute to climate change mitigation by sequestering excess carbon from the atmosphere are known as Blue Carbon ecosystems. The Intergovernmental Panel on Climate Change (IPCC) defines Blue Carbon as "All biologically driven carbon fluxes and storage in marine systems that are amenable to management" (IPCC, 2019). Many natural processes and ecosystem components contribute to carbon sequestration and burial; when these are disrupted additional carbon previously stored can be released into the ocean or atmosphere.

As Blue Carbon increasingly becomes a focus for research and policymakers so does the ability to measure the rates and permanence of carbon sequestration (Macreadie *et al*., 2017). To date, focus has been placed on biogenic marine habitats (e.g., saltmarshes and seagrasses), which are highly productive places. Scotland's biogenic marine habitats have a very high rate of assimilation of carbon into plant material (662 gC/m^2/yr), mostly in coastal areas (Burrows *et al*., 2014; 2017). However, their overall contribution to the carbon budget is relatively small compared to offshore sediments (Hilmi *et al.,* 2021).

Carbon may be sequestered in marine sediments as precipitated carbonates or as particulate organic carbon. While it is known that sediment accumulation rates tend to be faster nearer to land (e.g. in sea lochs), it is unclear what processes maintain the accumulation basins on the shelf, or whether any of the rich supply of organic material from phytoplankton in productive shelf waters becomes refractory and remains there (Burrows *et al*., 2014). The principal threat to long term carbon burial in sediments is any process that stirs up the sediment, particularly the top few millimetres of sediment. Resuspension of sediment allows rapid consumption of buried carbon by organisms and its subsequent release as carbon dioxide (CO_2). This effectively reduces the carbon burial rate significantly and reduces the blue carbon inventory.

Total standing stock of organic carbon in Scotland's marine sediments is estimated as 18.1 MtC, and total sequestration capacity of Scottish seas as 7.2 MtC/yr. Patterns of standing stocks and sequestration capacity of organic carbon follow the distribution of mud and mud-sand-gravel combinations. Most organic carbon and the largest capacity for sequestration of organic carbon appears to be in deep mud off the continental shelf (Burrows *et al*., 2014).

4.2.5 Fish and Shellfish

A number of commercially important fish and shellfish species occur in the vicinity of the proposed decommissioning operations. Fish and shellfish populations may be vulnerable to impacts from offshore installations such as hydrocarbon pollution and exposure to aqueous effluents, especially during the egg and juvenile stages of their lifecycles (Bakke *et al*., 2013).

The Cormorant Alpha platform is located in International Council for the Exploration of the Sea (ICES) rectangle 51F1, in an area of spawning and nursery grounds for several commercially important species. Information on spawning and nursery periods for these different species, including peak spawning times is detailed in Table 4-1.

Table 4-1 Fisheries Sensitivities Within the ICES Rectangle 51F1

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Blue Whiting	N	N	N	N	N	N	N	N	N	N	N	N
Cod	S	S*	S*	S								
European hake	N	N	N	N	N	N	N	N	N	N	N	N
Haddock	N	S*N	S*N	S*N	SN	N	N	N	N	N	N	N
Herring	N	N	N	N	N	N	N	N	N	N	N	N
Ling	N	N	N	N	N	N	N	N	N	N	N	N
Mackerel	N	N	N	N	N	N	N	N	N	N	N	N
Norway Pout	SN	S*N	S*N	SN	N	N	N	N	N	N	N	N
Saithe	S*	S*	S	S								
Spurdog	N	N	N	N	N	N	N	N	N	N	N	N
Whiting	N	SN	SN	SN	SN	SN	N	N	N	N	N	N
S = Spawning, N = Nursery, SN = Spawning and Nursery; * = peak spawning; Species = High nursery intensity as per Ellis *et al*, 2012; Species = High intensity spawning as per Ellis *et al* (2012)												

Spawning areas for most species are not rigidly fixed and fish may spawn either earlier or later from year to year. In addition, the mapped spawning areas represent the widest known distribution given current knowledge and should not be seen as rigid unchanging descriptions of presence or absence (Coull *et al.*, 1998). Whilst most species spawn into the water column of moving water masses over extensive areas, benthic spawners (e.g., herring *Clupea harengus*) have very specific habitat requirements, and therefore their spawning grounds are relatively limited and potentially vulnerable to seabed disturbance and change.

ICES rectangle 51F1 represents a spawning ground for Norway pout *Trisopterus esmarkii,* whiting *Merlangius merlangus*, haddock *Melanogrammus aeglefinus,* saithe *Pollachius virens* and cod *Gadus morhua* (Ellis *et al*., 2012; Coull *et al*.,1998). Cod, is the only species with a high intensity spawning ground in ICES rectangle 51F1 while other species have a lower or undetermined spawning intensity (Coull *et al.*, 1998; Ellis *et al*., 2012). Figure 4-3 illustrates the general distribution of the particular spawning areas per species.

ICES rectangle 51F1 also represents a potential nursery ground for blue whiting *Micromesistius poutassou*, European hake *Merluccius merluccius*, haddock, herring *Clupea harengus,* ling, mackerel *Scomber scombrus*, Norway pout, spurdog *Squalus acanthias* and whiting. Blue whiting is the only species with a high intensity nursery ground in ICES rectangle 51F while other species have a lower nursery intensity (Coull *et al*, 1998; Ellis *et al*., 2012). Figure 4-4 illustrates the general distribution of the particular nursery habitats per species.

Haddock, saithe, Norway pout and cod are known to produce pelagic eggs. Herring are benthic spawners but are not reported to spawn within ICES rectangle 51F1, where the Cormorant Alpha platform is located (Coull *et al*., 1998; Ellis *et al*., 2012).

Fisheries sensitivity maps produced by Aires *et al*. (2014), for Marine Scotland Science detail the likelihood of aggregations of fish species in the first year of their life (i.e. 0 group) occurring around the UKCS. Maps from Aires *et al*. (2014), which show the probability of the presence of aggregations of 0 group anglerfish *Lophius piscatorius,* blue whiting, cod, European hake, haddock, dover sole *Solea vulgais*, herring, mackerel, horse mackerel *Trachurus trachurus*, Norway pout, plaice *Pleuronectes platessa*, sprat *Sprattus sprattus* and whiting are available on the National Marine Plan Interactive (NMPi; 2026) (note, for European hake and anglerfish the maps show probability of presence of 0 group fish as opposed to presence of aggregations). With this caveat in mind, the modelling indicates the presence, in medium densities, of juvenile fish (less than one years old) for six species within the ICES rectangle 51F1. This includes haddock, whiting, Norway pout, blue whiting and European Hake. All other species were low density (Aires *et al.,* 2014).

Of those listed above, the following species are also listed as Scottish PMFs and are considered of natural heritage importance; blue whiting, cod, herring, ling, mackerel, Norway pout, saithe, spurdog and whiting (NatureScot, 2020).

Blue whiting, herring, mackerel, Norway pout, saithe, spurdog and whiting are also on the International Union for Conservation of Nature (IUCN) Red List (although listed as species of 'least concern') (IUCN, 2018). Herring, cod, whiting, hake, blue whiting, ling, mackerel, Norway pout and spurdog are on the Scottish Biodiversity List which identifies species of most importance for biodiversity conservation in Scotland (NatureScot, 2020). Cod is reported as 'vulnerable' on the IUCN Red List and haddock is reported as ‘Vulnerable’ in a global perspective, but of ‘least concern’ at a European perspective (IUCN, 2018; NatureScot, 2020). Cod and spurdog are on the OSPAR (2008) List of Threatened and/or Declining Species and Habitats. Species of conservation interest which were identified during the survey are discussed in Section 4.2.3

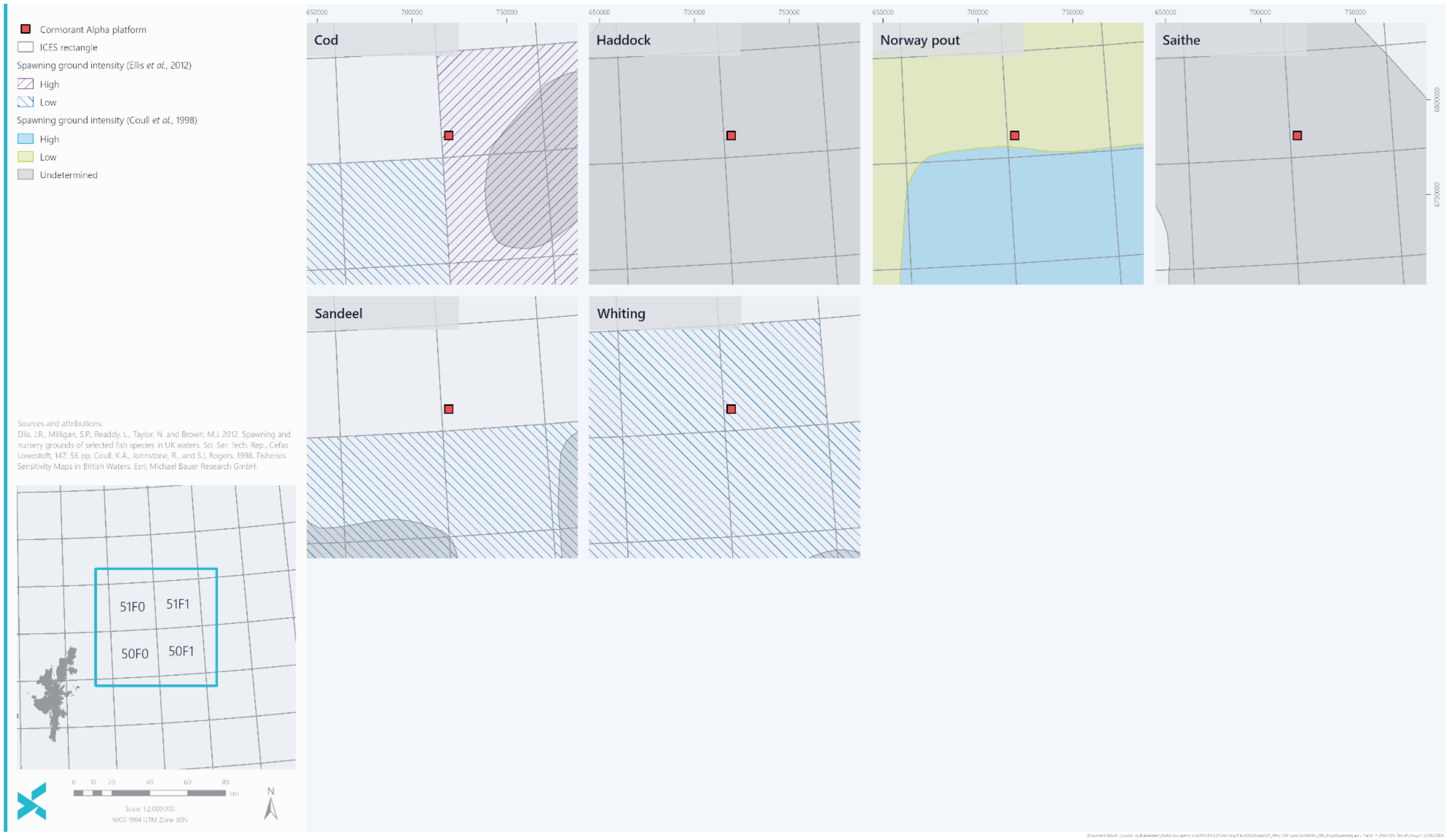


Figure 4-3 Potential Fish Spawning Grounds (Ellis *et al.*, 2012; Coull *et al.*, 1998)

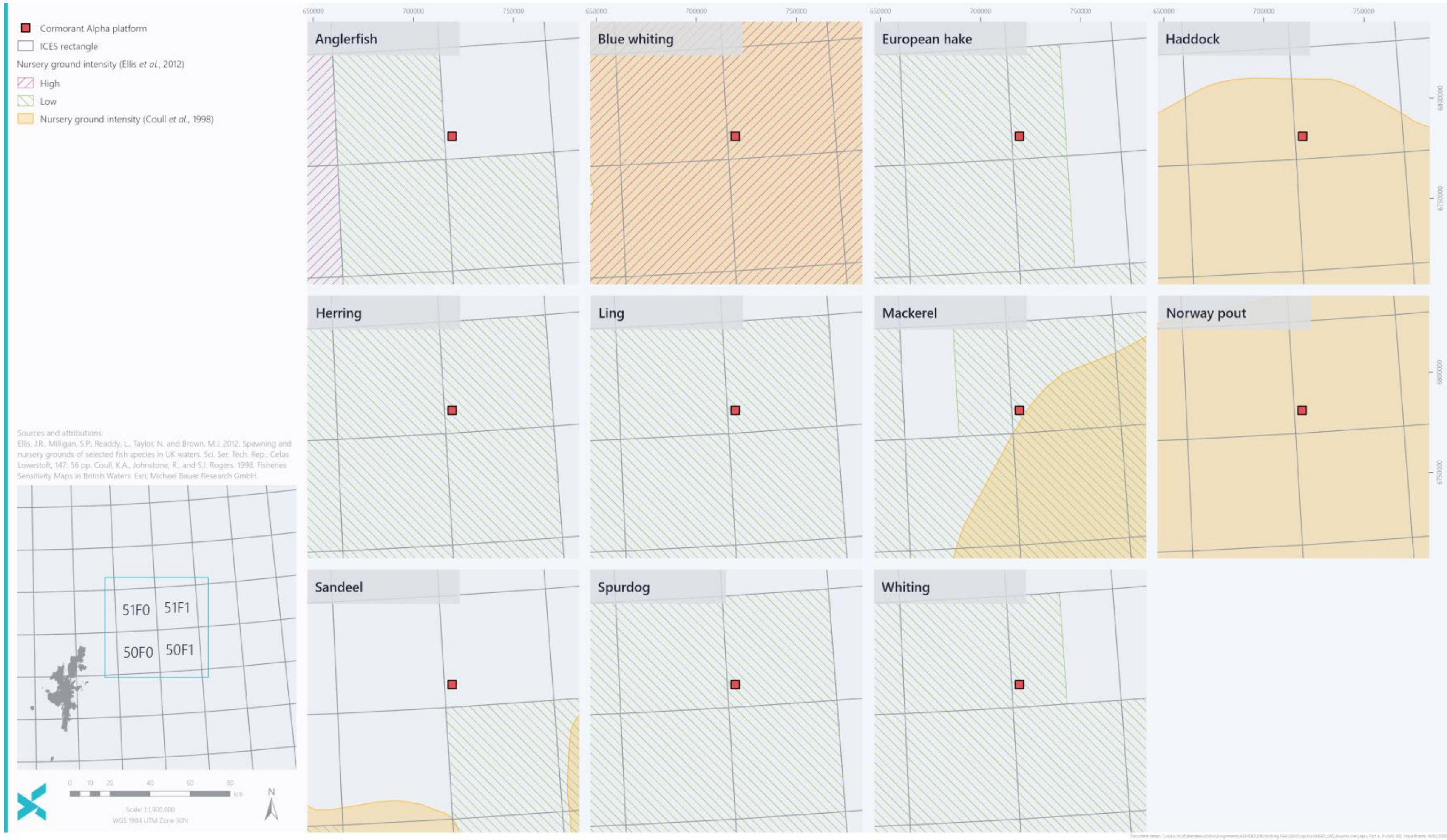


Figure 4-4 Potential Fish Nursery Habitats (Ellis *et al.*, 2012; Coull *et al.*, 1998)

4.2.6 Seabirds

Much of the North Sea and its surrounding coastline is an internationally important breeding and feeding habitat for seabirds. In the NNS, the most numerous species present are likely to be the northern fulmar *Fulmarus glacialis*, black-legged kittiwake *Rissa tridactyla* and common guillemot *Uria aalge* (BEIS, 2022). In the unlikely event of an oil release during decommissioning operations, birds would be vulnerable to oiling from surface pollution, which could cause direct toxicity through ingestion, and hypothermia as a result of the birds' inability to waterproof their feathers. Birds are most vulnerable in the moulting season when they become flightless and spend a large amount of time on the water surface.

After the breeding season ends in June, large numbers of moulting auks (common guillemot, razorbill *Alca torda* and Atlantic puffin *Fratercula arctica*) disperse from their Cormorant coastal colonies and into the offshore waters. At this time these high numbers of birds are particularly vulnerable to oil pollution. In addition to auks, black-legged kittiwake, northern gannet *Morus bassanus*, and northern fulmar, are present in sizable numbers during the post breeding season.

According to the density maps provided in Kober *et al.* (2010), the following species have been recorded within the Block 211/26: northern fulmar, sooty shearwater *Ardena grisea*, European storm petrel *Hydrobates pelagicus*, northern gannet, long-tail skua *Stercorarius longicaudus*, great skua *Stercorarius skua*, black-legged kittiwake, great black-backed gull *Larus marinus*, lesser black-backed gull *Larus fuscus*, herring gull *Larus argentatus*, glaucous gull *Larus hyperboreus*, common guillemot, razorbill, little auk *Alle alle* and Atlantic puffin.

The Seabird Oil Sensitivity Index (SOSI) (Webb *et al*., 2016) identifies sea areas where seabirds are likely to be most sensitive to oil pollution. The survey area covers the UKCS and beyond with data spanning the period between 1995 and 2015. Seabird data was collected using boat-based, visual aerial, and digital video aerial survey techniques. This data was combined with individual species sensitivity index values and summed at each location to create a single measure of seabird sensitivity to oil pollution (Webb *et al*., 2016). Block/month combinations that were not provided with data have been populated using the indirect assessment method provided by Webb *et al*. (2016).

Seabird oil sensitivity in Block 211/26 is considered low (score of 5) throughout the year. Oil sensitivity is considered medium (score of 4) across multiple adjacent blocks in September through to December (see Table 4-2).

Table 4-2 Seabird Oil Sensitivity in Block 211/26 and Adjacent Blocks (Webb *et al*., 2016)

Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
210/25	5	5	5	5*	N	5*	5	5	5	5*	5*	5
211/21	5	5	5	5*	N	5*	5	5	5	5*	5*	5
211/22	5	5	5	5*	N	5*	5	5	4	4*	4*	4
210/30	5	5	5	5*	5*	5	5	5	5	5*	5*	5
211/26	5	5	5	5*	5*	5	5	5	5	5*	5*	5
211/27	5	5	5	5*	5*	5	5	5	4	4*	5*	5
2/5	5	5	5	5*	5*	5	5	5	5	5*	5*	5
3/1	5	5	5	5*	5*	5	5	5	5	5*	5*	5
3/2	5	5	5	5*	5*	5	5	5	4	4*	5*	5

Key	1 = Extremely high	2 = Very high	3 = High	4 = Medium	5 = Low	N = No data

*in light of coverage gaps, an indirect assessment of SOSI has been made

4.2.7 Marine Mammals

4.2.7.1 Cetaceans

The NNS and CNS have a moderate to high diversity and density of cetaceans, with a general trend of increasing diversity and abundance with increasing latitude. Harbour porpoise *Phocoena phocoena* and white-beaked dolphin *Lagenorhynchus albirostris* are the most widespread and frequently encountered species, which are present throughout most of the year. Minke whales *Balaenoptera acutorostrata* are frequently recorded as seasonal visitors. coastal waters of the Moray Firth and the east coast of Scotland support an important population of bottlenose dolphins *Tursiops truncatus*, while killer whales *Orcinus orca* are sighted with increasing frequency towards the north of the Moray Firth. Atlantic white-sided dolphin *Lagenorhynchus acutus*, Risso's dolphin *Grampus griseus* and long-finned pilot whale *Globicephala melas* can be considered occasional visitors, particularly in the north of the area (BEIS, 2022).

White-sided dolphin, harbour porpoise, white beaked dolphin and minke whale have been recorded in ICES rectangle 51F1 (Reid *et al.*, 2003). Harbour porpoise is the most abundant cetacean species in this rectangle. The harbour porpoise has been recorded at high densities (approximately 10-100 individuals cited per hour) in February and August (Reid *et al.,* 2003). All cetacean species recorded in the area are listed as European Protected Species (EPS) under Annex IV of the Habitats Directive and are listed as PMFs (NatureScot, 2020). The harbour porpoise and the bottlenose dolphin are currently protected under Annex II of the EU Habitats Directive.

The fourth series of Small Cetaceans in European Atlantic waters and the North Sea (SCANS-IV) was conducted in 2022. This involved a large-scale ship and aerial survey to study the distribution and abundance of cetaceans. Harbour porpoise, white beaked dolphin and minke whale were the most abundant species recorded in the NS-F survey block covering the location of the Cormorant Alpha platform, with specific densities listed in Table 4-3 (Gilles *et al*., 2023).

Table 4-3 Densities of Cetaceans in the Cormorant Alpha Area

Species	Density of cetaceans in the survey block NS-F (animals per km^2)
Harbour porpoise	0.4393
White beaked dolphin	0.3056
Minke whale	0.0271

4.2.7.2 Seals

Two species of seals live and breed in the UK, namely the grey seal *Halichoerus grypus* and the harbour seal *Phoca vitulina* (Jones *et al*., 2015; BEIS, 2022). Both grey and harbour seals are listed under Annex II of the EU Habitats Directive and are PMFs (NatureScot, 2020; BEIS, 2022). Approximately 36% of the world's grey seals breed in the UK (of these, 84% breed at colonies in Scotland with the main concentrations in the Outer Hebrides and in Orkney). Approximately 30% of the world's harbour seals are found in the UK, however, this proportion has declined from approximately 40% in 2002. Harbour seals are widespread around the west coast of Scotland and throughout the Hebrides and Northern Isles (Special Committee on Seals, 2020; BEIS, 2022). On the east coast, the distribution is more restricted with concentrations in the major estuaries, including the Moray Firth.

Grey and harbour seals feed in inshore and offshore waters depending on the distribution of their prey, which changes seasonally and yearly. Both species tend to be concentrated close to shore, particularly during the pupping and moulting seasons. Grey seals typically pup in the autumn and moult in the winter whereas harbour seals pup in the early summer and moult from July - September. Seal tracking studies from the Moray Firth have indicated that the foraging movements of harbour seals are generally restricted to 40 - 50 km from haul-out sites (Special Committee on Seals, 2020). The movements of grey seals can involve larger distances than those of the harbour seal and tracking of individual seals has shown that most foraging probably occurs within 100 km of a haul-out site although they can feed up to several hundred kilometres offshore (Special Committee on Seals, 2020).

As the Cormorant Alpha platform is located approximately 104 km offshore, grey and harbour seals may be encountered from time to time, but it is not likely that they use the area with any regularity or in great numbers. This is confirmed by the grey and harbour seal density maps published by Carter *et al.,* (2025), which are provided in the NMPi (2026). The maps report the presence of grey and harbour seals in the wider Cormorant Alpha area as between 0 and 1 per 25 km^2 for both species (Carter *et al*., 2025; see Figure 4-5).

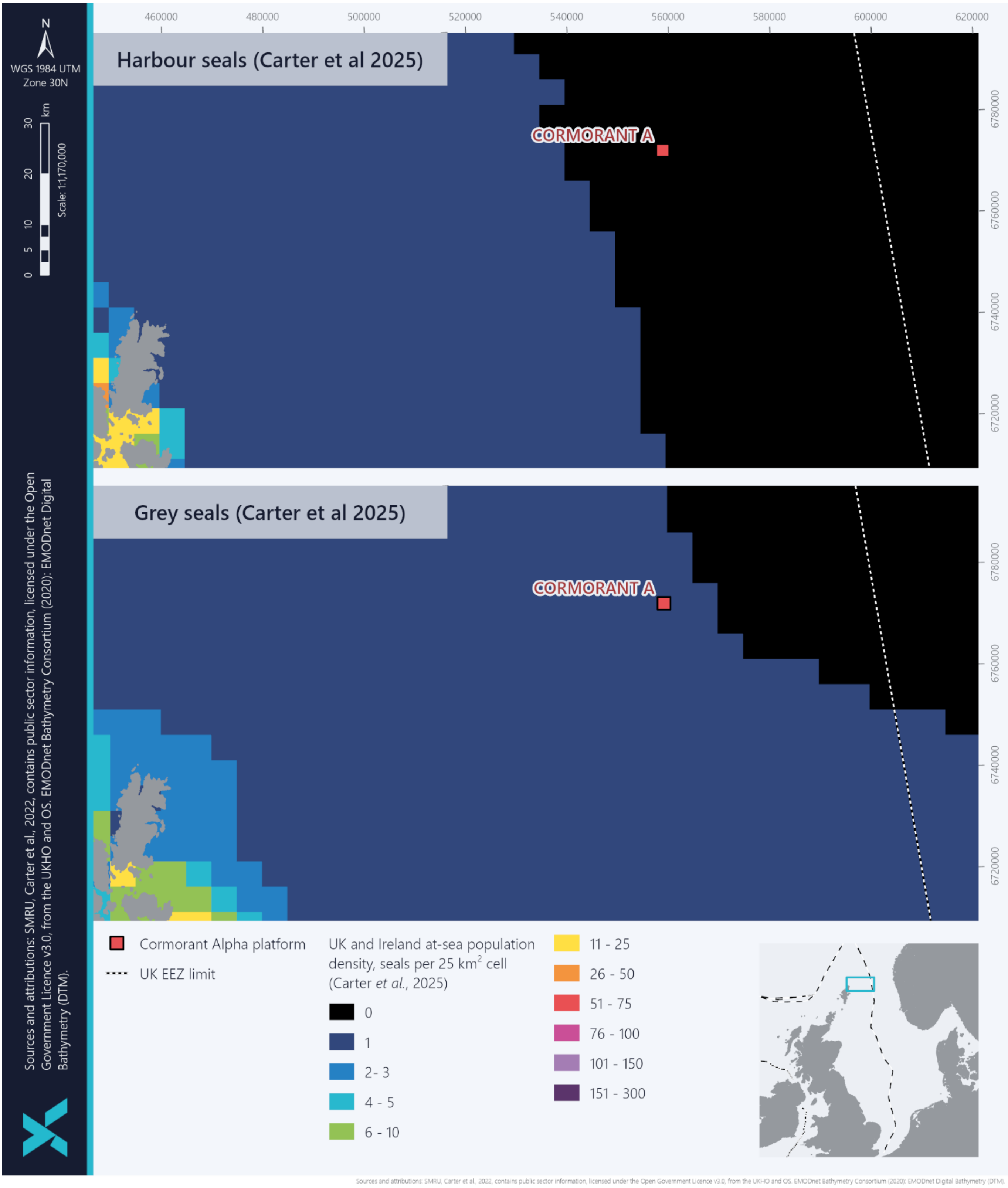


Figure 4-5 Seal Densities per km^2 (Carter *et al.*, 2025)

4.3 Conservation

4.3.1 Offshore Conservation

There are no Nature Conservation Marine Protected Areas (NCMPAs), Special Areas of Conservation (SACs) or Special Protection Area (SPAs), or Demonstration and Research MPAs within 40 km of the Cormorant Alpha platform. The closest protected site is the Pobie Bank Reef SAC, located approximately 63 km southwest of the Cormorant Alpha platform. The closest designated site is the Fetlar to Haroldswick NCMPA, located approximately 104 km to the southwest of the Cormorant Alpha platform. The closest SPA is Hermaness, Saxa Vord and Valla Field SPA, approximately 106 km west southwest of the Cormorant Alpha platform (Figure 4-6).

The Pobie Bank Reef SAC is designated due to the presence of the Annex I habitat of reefs. Due to the distance of the SAC from the Cormorant Alpha platform, the Pobie Bank Reef SAC will not be impacted from localised operations within close proximity to the Cormorant Alpha platform.

The seabed in UKCS Block 211/26 is within a wider area of 'Subtidal sand and gravels' (NMPi, 2026), a seabed type designated as a PMF in Scottish waters (Tyler-Walters *et al.*, 2016). Whilst this feature is present within the wider Cormorant Alpha area, it is expected as this subtidal habitat is common throughout the North Sea (NMPI, 2026). 'Subtidal sands and gravels' also support internationally important commercial fisheries e.g., scallops, flatfish, sandeels, and are important nursery grounds for juvenile commercial fish species such as sandeels, flatfish, bass, skates, rays and sharks (Tyler-Walters *et al.,* 2016).

4.3.2 Onshore Conservation

The Cormorant Alpha platform is located approximately 104 km from the northeast coast of Scotland. Due to this distance, no impacts to onshore conservation sites are expected from the Conductor Guide Frames and Alwyn Riser decommissioning activities.

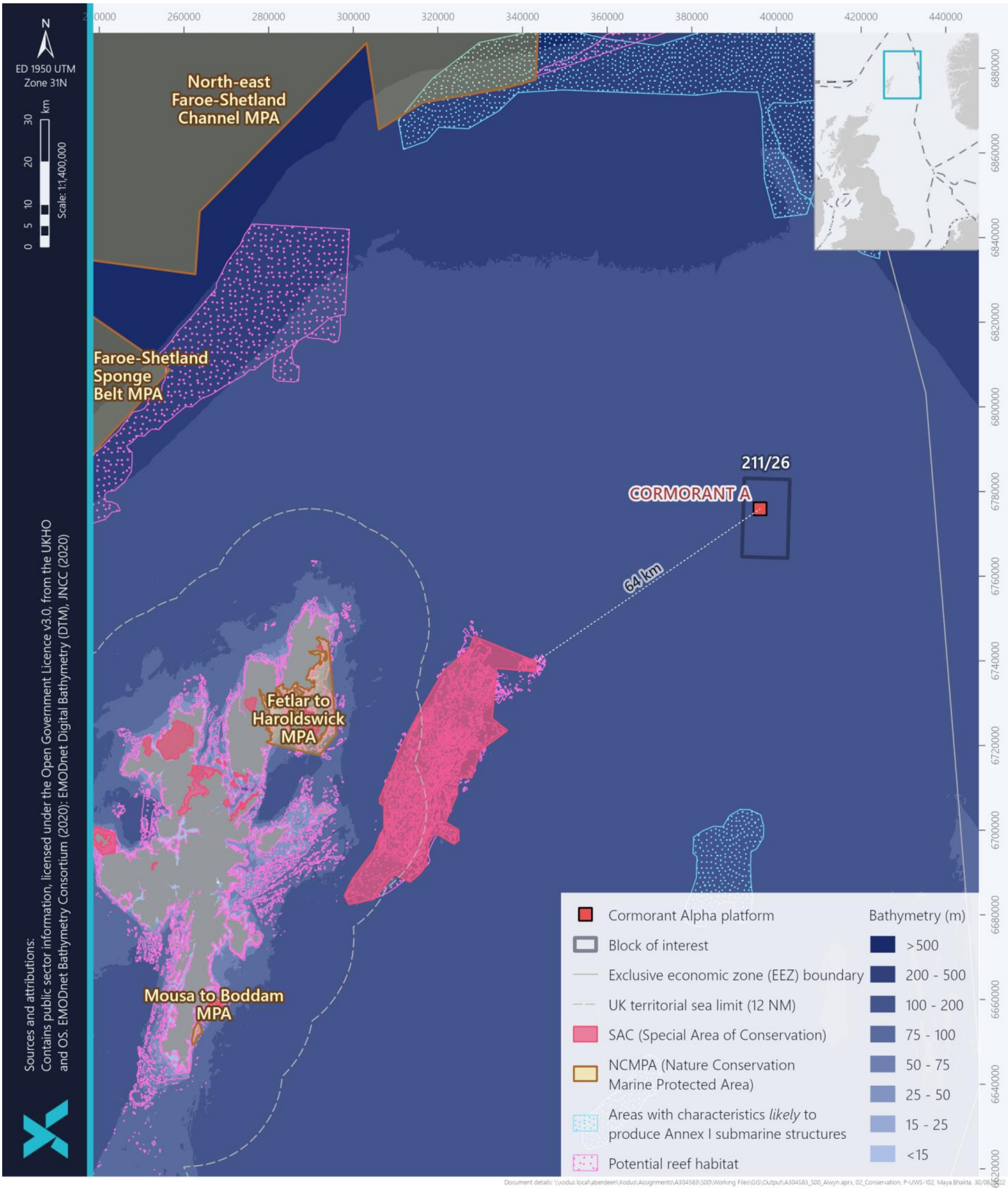


Figure 4-6 Location of the Cormorant Alpha Platform Relative to Protected Areas

4.3.3 Protected Species

Four species listed under Annex II of the EU Habitats Directive are found in UK waters; harbour porpoise, bottlenose dolphin, grey seal and harbour seal. Grey and harbour seals are unlikely to be observed near the Cormorant Alpha platform with any regularity as both species have very low densities in these area as shown by the seal density maps produced by the Sea Mammal Research Unit in NMPi (2026). There is a resident population of bottlenose dolphins in the Moray Firth (approximately 430 km from the Cormorant Alpha platform), but this population typically remains close to the coast. This species is however transient and therefore can occur in other areas around the North East of Scotland and into NNS waters, but they have not been recorded in the vicinity of the proposed operations. Therefore, harbour porpoise is the only Annex II species which is likely to be present in the vicinity of the Cormorant Alpha platform.

All species of cetacean recorded in the proximity of the Cormorant Alpha platform are listed as EPS and are also PMFs. These species are listed as Annex IV on the EU Habitats Directive, and bottlenose dolphin and harbour porpoise are also Annex II species. Other marine species listed as EPSs include turtles and sturgeon *Acipenser sturio*, which are not likely to be present within this area of the North Sea.

Ocean quahog *Arctica islandica* is listed as a PMF in Scottish waters (Tyler-Walters *et al.,* 2016) and is on the OSPAR List of Threatened and/or Declining Species (OSPAR, 2008). The distribution of *A. islandica* is relatively widespread in the North Sea (OSPAR, 2009a). As described in Section 4.2.3, two individuals of *A. islandica* were identified during site-specific surveys; however, the abundances do not constitute an aggregation (Benthic Solutions, 2020).

All species of conservation concern which were identified in the Cormorant Alpha survey area are described in Section 4.2.3.

4.3.4 National Marine Plan

The NMP covers the management of both Scottish inshore waters (out to 12 nautical miles) and offshore waters (12 to 200 nautical miles). The aim of the NMP is to help ensure the sustainable development of the marine area through informing and guiding regulation, management, use and protection of the NMP areas. The proposed operations described in this EA have been assessed against the Marine Plan General Planning Principles, specifically GEN 1, 4, 5, 9, 12, 13, 14 and 21 (Section 4.3.4.1 to Section 4.3.4.8) and OIL AND GAS 1, 2, 3 and 6 (Section 4.3.4.9 to Section 4.3.4.11).

Assessment of compliance against relevant policies has already been achieved through the impact assessment in Section 6 in support of this EA. The proposed operations do not compromise any of the NMP objectives and policies. TAQA will comply with all policies associated with the NMP, with particular attention being paid to the following policies:

4.3.4.1 GEN 1 – General planning principle

Development and use of the marine area should be consistent with the Marine Plan, ensuring activities are undertaken in a sustainable manner that protects and enhances Scotland's natural and historic marine environment.

All activities which may lead to seabed disturbance will be planned, managed and implemented in such a way that minimises that disturbance. Decommissioning of the Conductor Guide Frames and Alwyn Riser will result in the removal of around 495.2 Te of infrastructure from the marine environment.

4.3.4.2 GEN 4 – Co-existence

Where conflict over space or resource exists or arises, marine planning should encourage initiatives between sectors to resolve conflict and take account of agreements where this is applicable.

Potential impacts to other users of the sea during the decommissioning activities will be managed through existing safety zones, United Kingdom Hydrographic Office (UKHO) standard communication channels (including Kingfisher, Notice to Mariners and radio navigation warnings) and the use of Automatic Identification Systems (AIS) as well as other navigational controls. Upon completion of the decommissioning activities, the area of sea from which other users have been excluded throughout the decommissioning activities phase of the project area will be made available for them once again.

4.3.4.3 GEN 5 – Climate change

Marine planners and decision makers should seek to facilitate a transition to a low carbon economy. They should consider ways to reduce emissions of carbon and other greenhouse gasses.

TAQA has developed a draft Emissions Reduction Strategy which supports their commitment to Net Zero and the NSTA Stewardship Expectation 11. This strategy defines TAQA's asset portfolio, including decommissioning activities, and is intended to drive increased energy efficiencies and reduced emissions. TAQA plans several improvements under the Emissions Reduction Strategy including working with the supply chain, collating emission/energy savings initiatives across the business and reviewing emissions sources.

TAQA will ensure that the minimal number of vessels will be deployed to undertake the Alwyn Riser decommissioning activities that the activities are streamlined through planning to reduce the time required for vessels to undertake the activities and, in doing so, will support the drive to reduce emissions. Each vessel will have a Shipboard Energy Efficiency Management Plan (SEEMP) which contains information on minimising fuel consumptions.

4.3.4.4 GEN 9 – Natural heritage

Development and use of the marine environment must:

- *Comply with legal requirements for protected areas and protected species.*
- *Not result in significant impact on the national status of PMF.*
- *Protect and, where appropriate, enhance the health of the marine area.*

Legal requirements will be adhered to throughout the duration of the Conductor Guide Frames and Alwyn Riser decommissioning activities, including those relating to the protected species which may be present within the wider Cormorant Alpha area. There a number of PMFs (habitat and species) expected within the wider Cormorant Alpha area however the proposed decommissioning activities will not result in significant impact on their national status (see Section 6).

4.3.4.5 GEN 12 – Water quality and resource

Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives that apply.

The Alwyn Riser will be flushed prior to decommissioning. Therefore, any residual discharges during decommissioning activities will be negligible and managed/risk assessed under the existing permitting regime. Discharges from vessels are generally well-controlled activities, managed through robust vessel and machinery design, operational procedures, and onboard management systems to ensure full compliance with International Convention for the Prevention of Pollution from

Ships (MARPOL) requirements and other applicable environmental regulations. Controls will be in place, as required, through compliance with the Offshore Chemical Regulations 2002 (as amended) and the Oil Pollution Prevention and Control Regulations 2005 (as amended).

4.3.4.6 GEN 13 – Noise

Development and use in the marine environment should avoid significant adverse effects of anthropogenic noise and vibration, especially on species sensitive to such effects.

TAQA will ensure that any potential impacts via underwater noise associated with the decommissioning of the Alwyn Riser will be kept to a minimum. Vessel presence and cutting activities will be limited in duration. The cutting technique is likely to be diamond wire, or possibly abrasive water jet. Department for Energy Security and Net Zero (DESNZ; 2023) guidance states that, “Sound radiated from the diamond wire cutting of a conductor or abrasive water jets is not easily discernible above the background noise”.

4.3.4.7 GEN 14 – Air quality

Development and use of the marine environment should not result in the deterioration of air quality and should not breach any statutory air quality limits. Some development and use may result in increased emissions to air, including particulate matter and gasses. Impacts on relevant statutory air quality limits must be taken into account and mitigation measures adopted, if necessary, to allow an activity to proceed within these limits.

TAQA will ensure that the minimal number of vessels will be deployed to undertake the decommissioning activities and that these activities are streamlined through planning to reduce vessel time and, in doing so, will support the drive to reduce emissions. Each vessel will have a SEEMP which contains information on minimising fuel consumptions. As previously mentioned, TAQA has developed a draft Emissions Reduction Strategy which inclusive of decommissioning activities, and which is intended to drive increased energy efficiencies and reduced emissions. TAQA plans several improvements under the Emissions Reduction Strategy including working with the supply chain, collating emission/energy savings initiatives across the business and reviewing emissions sources.

4.3.4.8 GEN 21 – Cumulative impacts

Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation.

In terms of air and water quality, TAQA’s approach and project-specific mitigation measures will minimise the potential negative aspects contributing towards cumulative impacts as detailed in the responses to GEN 12 (Section 4.3.4.5) and GEN 14 (Section 4.3.4.7). In terms of seabed disturbance, it is reasonable to presume that the proposed operations are not of significant magnitude to have any discernible contribution to cumulative impacts in the broader context though this presumption is qualified in Section 6.3.

4.3.4.9 OIL AND GAS 2 – Decommissioning end-points

Where re-use of oil and gas infrastructure is not practicable, either as part of oil and gas activity or by other sectors such as carbon capture and storage, decommissioning must take place in line with standard practice, and as allowed by international obligations. Re-use or removal of decommissioned assets from the seabed will be fully supported where practicable and adhering to relevant regulatory process.

TAQA is committed to establishing and maintaining environmentally acceptable methods for managing wastes and is developing a project-specific WMP in line with the Waste Framework Directive and principles of the Waste Hierarchy. In line with the waste hierarchy and the principles of the circular economy, TAQA will continue to review reuse options for elements of the subsea infrastructure.

4.3.4.10 OIL AND GAS 3 – Minimising environmental and socio-economic impacts

Supporting marine and coastal infrastructure for oil and gas developments, including for storage, should utilise the minimum space needed for activity and should consider environmental and socio-economic constraints.

TAQA will identify appropriately authorised disposal contractors and fit for purpose facilities through a selection process that will ensure that the chosen facility(ies) demonstrate a proven track record of waste stream management throughout the deconstruction process, the ability to deliver innovative reuse/recycling options, and thus minimises the space required to process recovered items.

4.3.4.11 OIL AND GAS 6 – Risk reduction

Consenting and licensing authorities should be satisfied that adequate risk reduction measures are in place, and that operators should have sufficient emergency response and contingency strategies in place that are compatible with the National Contingency Plan and the Offshore Safety Directive.

TAQA has the relevant risk reduction measures in place for the proposed decommissioning activities and will demonstrate this appropriately through this DP/EA process, through stakeholder engagement and ultimately through the submission of notifications and applications for the authorisations, permits, licences, consents and emergency response processes required to execute the work.

4.4 Socio-Economic Environment

4.4.1 Commercial Fisheries

To provide the fullest picture of fisheries within the area, and the associated landings and effort trends, data from 2020 to 2024 are considered. The Cormorant Alpha platform is located in ICES rectangles 51F1, which is targeted primarily for demersal species in terms of both landed weights and value (see Table 4-4 and Table 4-5).

In ICES rectangle 51F1, demersal fish accounted for between 90% and 99% of the total value and 84% and 99% of the total landed weight between 2020 and 2024. In 2024, demersal fishing accounted for >99% of the total landed weight and value in ICES rectangle 51F1. Pelagic and shellfish fishing contributed <1% towards the total landed weight and value in ICES rectangle 51F1 in 2024 (MMO, 2025).

In 2024, ICES rectangle 51F1 saw 188 fishing days with effort most concentrated in May and July (32 days for both months) this compares to 273 days in 2023, 215 in 2022, 278 in 2021 and 128 in 2020. Overall, fishing effort remains relatively low for ICES rectangle 51F1 as there are <100 days of fishing in each month. Trawls were the most utilised gear in ICES rectangles 51F1 accounting for 84% of the total number of days fished in 2024. Other gear type utilised include demersal seine and pelagic trawls. Average value and effort for trawls used within ICES rectangle 51F1 and the wider NNS can be seen in Figure 4-7.

To put these figures into context, a total of 594,481 Te with a value of £882,253,660 was landed in the UK in 2024 (MMO, 2025). Therefore, fisheries in ICES rectangle 51F1 contributed approximately 0.16% of landings and 0.19% of value respectively when compared to overall UKCS values (MMO, 2025). The total average landed value and weight in ICES rectangle 51F1 in 2024 was broadly comparable to those observed in other high-performing rectangles in the UKCS.

In 2024, the three most valuable species in ICES rectangle 51F1 were haddock, whiting and cod. These three species made the largest contribution to landed value in 2024. With regards to landed weight, the largest contribution was attributed to haddock, whiting and saithe (MMO, 2025).

Table 4-4 Live Weight and Value from ICES 51F1 from 2020-2024 (MMO, 2025)

	Species type	2024		2023		2022		2021		2020	
		Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)
51F1	Demersal	1,693,624	976	2,796,679	1,577	2,398,088	1,327	2,923,354	1,701	1,321,277	887
	Pelagic	643	0	116,103	179	-	-	1	324	199	0
	Shellfish	6,263	2	16,363	3	9,137	2	10,631	3	5,734	2
	Total	**1,700,531**	**978**	**2,929,145**	**1,759**	**2,407,225**	**1,329**	**2,933,986**	**2,028**	**1,327,210**	**889**

Table 4-5 Fishing Days Per Month (all gear) in ICES 51F1 from 2020-2024 (MMO, 2025)

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
51F1	2024	4	19	28	31	32	19	32	7	10	3	3	-	188
	2023	D	8	47	47	62	14	17	16	13	21	14	12	273
	2022	10	12	37	23	25	14	4	9	21	24	20	14	215
	2021	9	9	13	46	68	31	35	10	18	17	15	7	278
	2020	5	9	11	16	4	11	24	14	7	12	11	D	128

Note: Monthly fishing effort by UK vessels landing into Scotland: Blank = no data, D = Disclosive data (indicating very low effort) [1], green = 0 – 100 days fished, yellow = 101 – 200, orange =201-300, red = ≥301

[1] The term 'disclosive' is used when fewer than five vessels have been recorded fishing in an area, meaning that detailed data cannot be shown in order to preserve data privacy. It therefore indicates very low levels of effort within the area.

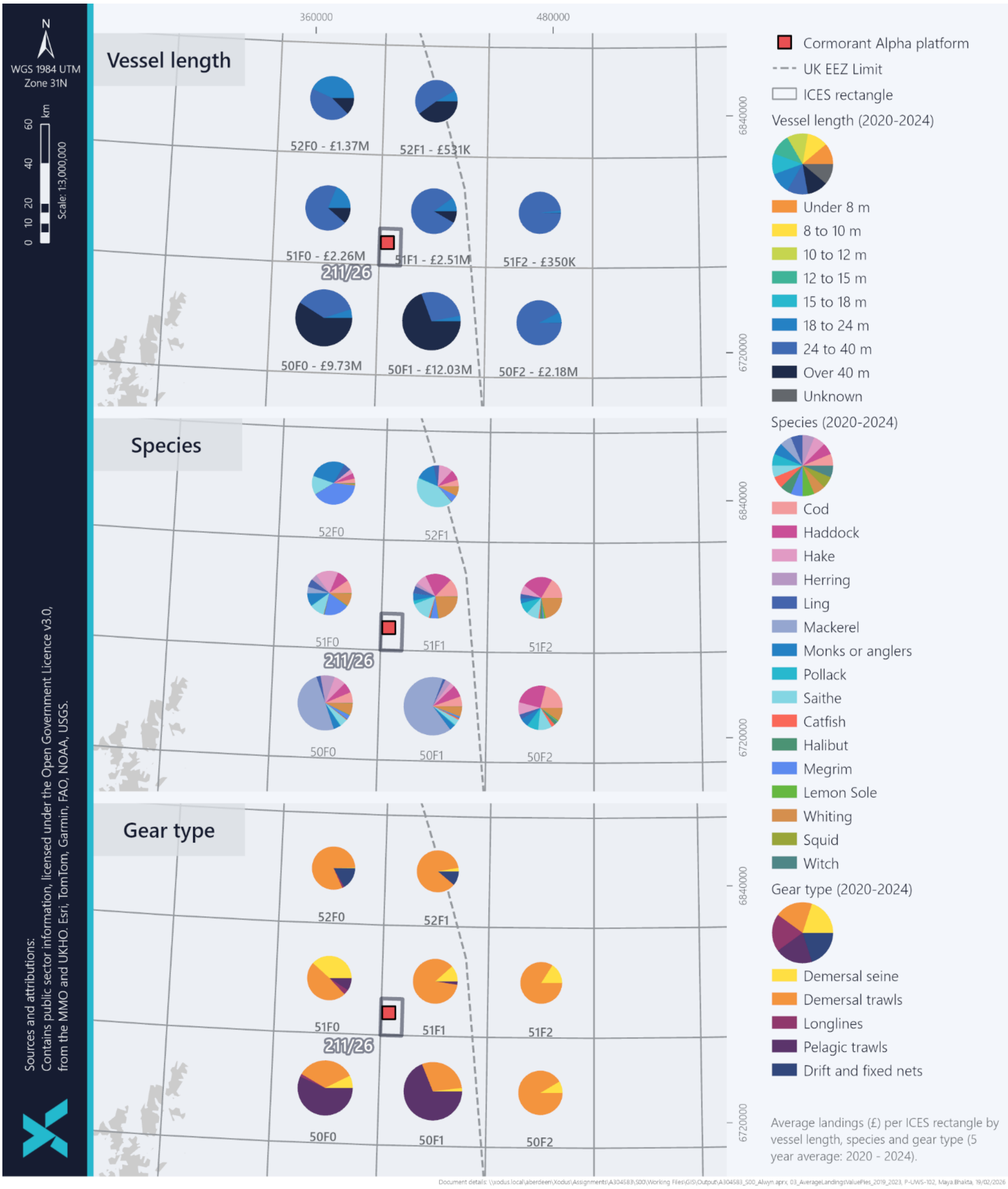


Figure 4-7 Fisheries Data for ICES Rectangle 51F1

4.4.2 Shipping

The North Sea contains some of the world's busiest shipping routes, with significant traffic generated by vessels trading between ports at either side of the North Sea and the Baltic Sea. North Sea oil and gas fields generate moderate vessel traffic in the form of support vessels, principally operating from Peterhead, Aberdeen, Montrose and Dundee in the north and Great Yarmouth and Lowestoft in the south (BEIS, 2022). However, the nature of shipping traffic in the North Sea is evolving. As oil and gas activities diminish, there is a rise in decommissioning operations and the installation of renewable energy infrastructure, leading to a dynamic shift in maritime activity in the North Sea.

The proposed operations are located in Block 211/26 and in ICES rectangle 51F1, an area of low vessel traffic (OGA, 2016). The average annual density of vessels (all combined) using EMODnet data from 2023 is low across Block 211/26 (Figure 4-12). A localised increase in vessel activity is observed around the surface installations. This increase in vessel activity can be attributed to the presence of operational and maintenance vessels around these surface installations, as these areas are highly concentrated in comparison to the wider area.

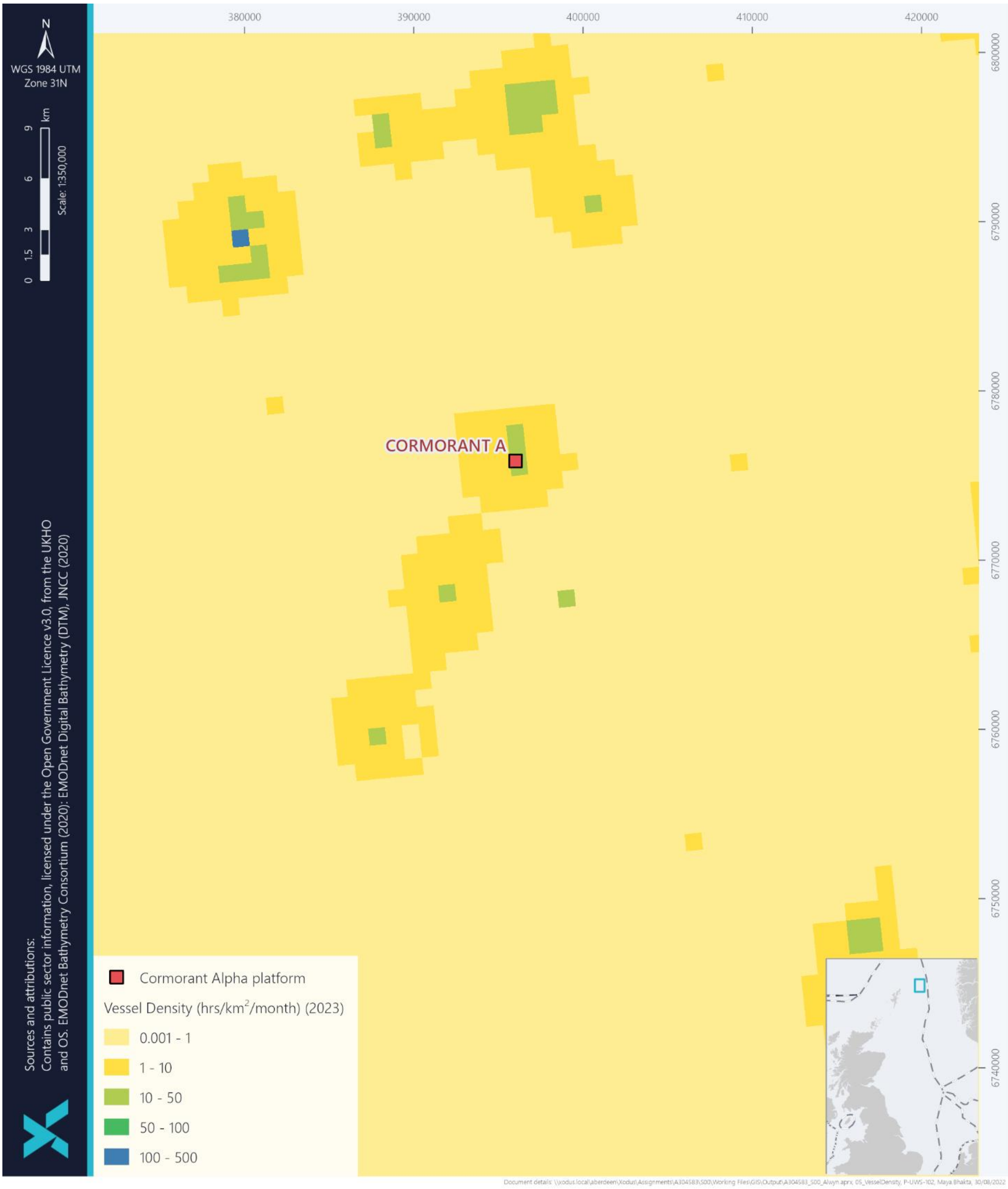


Figure 4-8 Annual Density of Vessel Transits Around the Cormorant Alpha Platform in 2023 (EMODnet, 2023)

4.4.3 Oil and Gas Activity

There are several oil and gas installations in the vicinity of the Cormorant Alpha platform, as outlined in Figure 4-13. Table 4-6 provides the distances to surface installations within 40 km of the Cormorant Alpha platform. The eventual decommissioning of nearby oil and gas installations, some of which may coincide with decommissioning of the Conductor Guide Frames and Alwyn Riser, will alter the profile of ongoing oil and gas activities in the region.

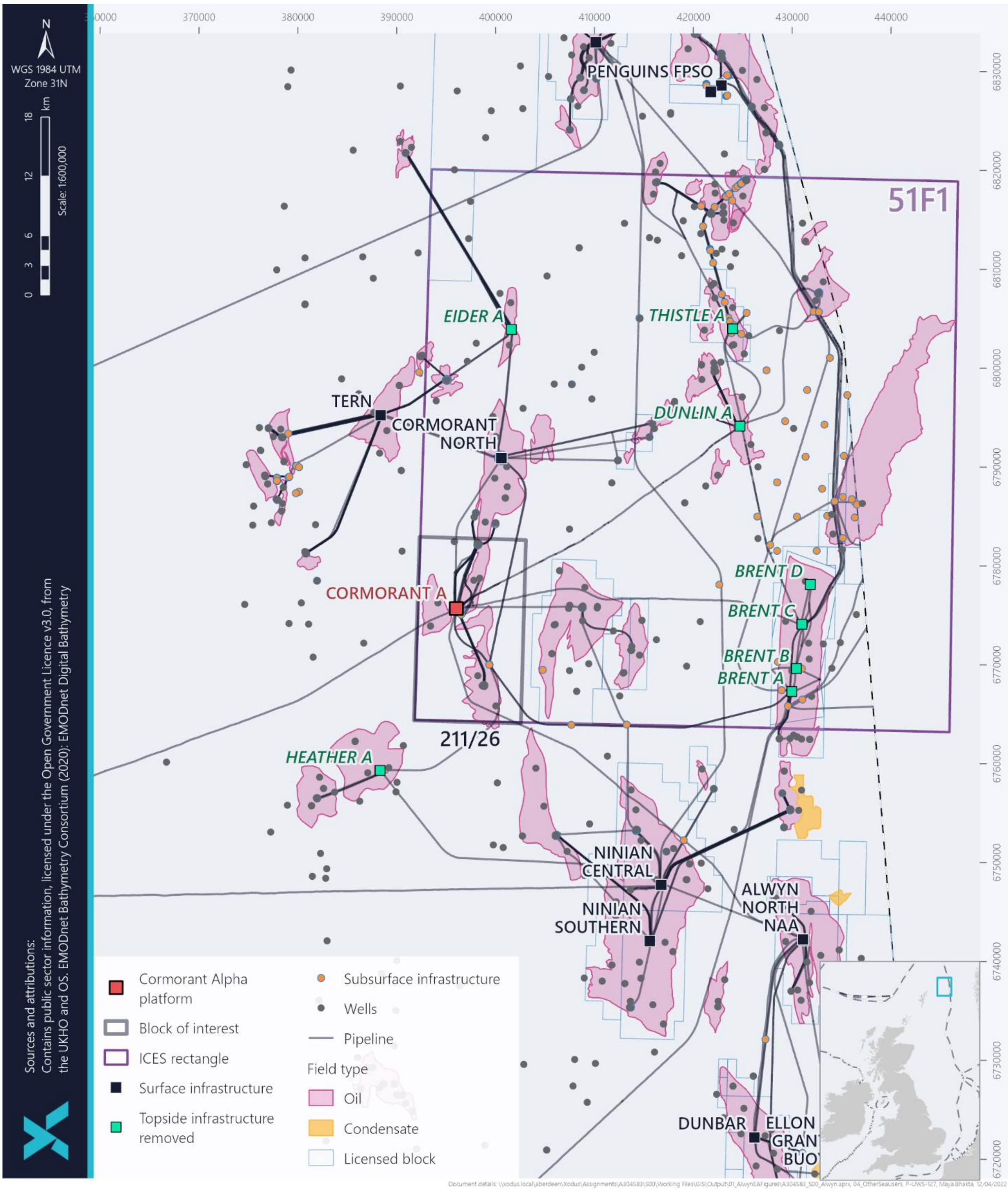


Figure 4-9 Installations in the Vicinity of the Cormorant Alpha Platform

Table 4-6 Surface Installations Located within 40 km of the Cormorant Alpha Platform

Installation	Type / Status	Operator	Distance from Cormorant Alpha platform (km)	Direction from North Cormorant
North Cormorant	Platform/Operational	TAQA	15	North northeast
Heather A	Platform/Topsides removed	EnQuest	17	South southwest
Ninian Central	Platform/Non-operational	CNRI	34	South southeast
Tern	Platform/Non-operational	TAQA	20	North northwest
Ninian Southern	Platform/Operational	CNRI	38	South southeast
Brent A	Platform/Topsides removed	Shell	34	East southeast
Brent B	Platform/Topsides removed	Shell	34	East southeast
Brent C	Platform/Topsides removed	Shell	34	East southeast
Brent D	Platform/Topsides removed	Shell	35	East southeast
Eider A	Platform/Topsides removed	TAQA	28	North northeast
Dunlin A	Platform/Topsides removed	Dunlin Management Limited	33	East northeast
Thistle A	Platform/ Under preparation for decommissioning (CoP)	EnQuest	39	East northeast

Note: “Operational” means that the installation is either still producing, undertaking well plug and abandonment, and/or not yet hydrocarbon free.

4.4.4 Military Activities

Aircraft, surface craft and submarines from many countries use the North Sea as a training ground and for routine operations but the distribution and frequency of these activities is unknown.

Block 211/26 is not located within a Ministry of Defence area or within any Military Practice and Exercise Areas (NMPi, 2026).

4.4.5 Renewable Energy

There are no planned or operating renewable activities in close vicinity (<40 km) to the Cormorant Alpha platform (NMPi, 2026). The closest Sectoral Marine Plan for wind is the NE1 plan, located approximately 85 km southwest of the Cormorant Alpha platform (NMPi, 2026).

The Innovation for Targeted Oil and Gas (INTOG) areas are located within close proximity to the Pelican Area. INTOG area NE-b is located approximately 7 km east of the Cormorant Alpha Platform and INTOG area NE-a is located 47 km northwest (NMPi, 2026).

4.4.6 Telecommunication Cables

There are no planned or operating telecommunication cables within 40 km of the Cormorant Alpha platform. The nearest telecom cable is the Cantat 3 SEG.F3C telecoms cable, located 96 km east northeast of the Cormorant Alpha platform (KIS-ORCA, 2025).

4.4.7 Wrecks

According to the UKHO (UKHO, 2023), there are 23 wrecks within 40 km of the Cormorant Alpha platform, with the closest wreck is located approximately 8 km west southwest of the Cormorant Alpha platform. However, due to the nature of the decommissioning activities, no impact to any wrecks is envisaged. There are no Historic MPAs within Block 211/26 (NMPi, 2026).

5 IMPACT ASSESSMENT APPROACH

This EA is designed to:

- Identify potential impacts to environmental and societal receptors from the proposed decommissioning activities;
- Evaluate the potential significance of any identified impacts in terms of the threat that they pose to these receptors; and
- Assign measures to manage the risks in line with industry Best Available Technique (BAT) and Best Environmental Practice (BEP); and address concerns or issues raised by stakeholders through consultation.

The impact assessment was undertaken using the following approach:

- The potential environmental issues arising from subsea decommissioning activities were identified through a combination of the expert judgement of project engineers and marine environmental specialists, and from previous consultation on the wider area with OPRED, Marine Directorate, JNCC and the Scottish Fisherman's Federation (SFF). The potential environmental issues were grouped under the following key receptor risk groups:
    - Emissions to air;
    - Disturbance to the seabed;
    - Disturbance to drill cutting piles;
    - Planned discharges to sea;
    - Physical presence of vessels in relation to other sea users;
    - Underwater noise emissions;
    - Resource use;
    - Onshore impacts/waste; and
    - Unplanned events.
- An initial scoping based on a high-level consideration of these aspects against the evaluation criteria was then undertaken which screened aspects in or out of further detailed assessment. Justification statements were compiled detailing the rationale for scoping out any aspects from further assessment (Section 6.1).

- For aspects which were considered potentially significant, their significance of potential impacts against impact criteria definitions was evaluated (Sections 6.2, 6.3 and 6.4); and
- For any potentially significant impact, any potential mitigation and/or control measures to be used to further reduce any impact to 'As Low As Reasonably Practicable' (ALARP) were captured.

5.1 Stakeholder Engagement

Consultation of key stakeholders has been covered under the Cormorant Alpha Topsides decommissioning scope. For more information, please refer to the Cormorant Alpha Topsides DP (TAQA, 2022). TAQA have and will continue to consult with a wide range of interested parties during the decommissioning planning stages, which include but are not limited to: Scottish Fishermen's Federation (SFF), National Federation of Fisherman's Organisations (NFFO), Northern Irish Fish Producers Organisation (NIFPO), Global Marine Services (GMS) and the NSTA.

5.2 EA Methodology

5.2.1 Overview

The Conductor Guide Frames and Alwyn Riser EA methodology was developed by reference to the Institute of Ecology and Environmental Management (IEEM) guidelines for marine impact assessment (IEEM, 2010), the Marine Life Information Network (MarLIN) species and ecosystem sensitivities guidelines (Tyler-Walters *et al*., 2004) and guidance provided by Scottish Natural Heritage (SNH), now NatureScot, in the handbook on environmental impact assessment (SNH, 2013) and by The Institute of Environmental Management and Assessment (IEMA), now the Institute of Sustainability and Environment in the guidelines for environmental impact assessment (IEMA, 2015; 2016).

Environmental impact assessment provides an assessment of the environmental and societal effects that may result from a project's impact on the receiving environment. The terms impact and effect have different definitions in environmental impact assessment and one drives the other. Impacts are defined as the changes resulting from an action, and effects are defined as the consequences of those impacts.

In general, impacts are specific, measurable changes in the receiving environment (volume, time and/or area); for example, were a number of marine mammals to be disturbed following exposure to vessel noise emissions. Effects (the consequences of those impacts) consider the response of a receptor to an impact; for example, the effect of the marine mammal/noise impact example given above might be exclusion from an area caused by disturbance, leading to a population decline. The relationship between impacts and effects is not always so straightforward; for example, a secondary effect may result in both a direct and indirect impact on a single receptor. There may also be circumstances where a receptor is not sensitive to a particular impact and thus there will be no significant effects/consequences.

For each impact, the assessment identifies a receptor's sensitivity and vulnerability to that effect and implements a systematic approach to understand the scale of the effect. The process considers the following:

- Identification of receptor and impact (including duration, timing and nature of impact);
- Definition of sensitivity, vulnerability and value of receptor;
- Definition of magnitude and likelihood of impact; and

- Assessment of consequence of the impact on the receptor, considering the probability that it will occur, the spatial and temporal extent and the importance of the impact. If the assessment of consequence of impact is determined as moderate or major, it is considered a significant impact.

Once the consequence of a potential impact has been assessed it is possible to identify measures that can be taken to mitigate impacts through engineering decisions or execution of the project. This process also identifies aspects of the project that may require monitoring, such as a post-decommissioning survey at the completion of the works to inform inspection reports.

For some impacts, significance criteria are standard or numerically based. For others, for which no applicable limits, standards or guideline values exist, a more qualitative approach is required. This involves assessing significance using professional judgement.

Despite the assessment of impact significance being a subjective process, a defined methodology has been used to make the assessment as objective as possible and consistent across different topics. The assessment process is summarised below. The terms and criteria associated with the impact assessment process are described and defined; details on how these are combined to assess consequence and impact significance are then provided.

5.2.2 Baseline Characterisation and Receptor

To assess potential impacts on the environment it was necessary to firstly characterise the different aspects of the environment that could potentially be affected (the baseline environment). The baseline environment is described in Section 4 and is based on desk studies combined with additional site-specific studies such as surveys and modelling where required.

The EA process requires identification of the potential receptors that could be affected by the Conductor Guide Frames and Alwyn Riser decommissioning activities (e.g. other users of the sea, water quality). High level receptors are identified and described in Section 4.

5.2.3 Impact Definition

5.2.3.1 Impact Magnitude

Determination of impact magnitude requires consideration of a range of key impact criteria including:

- Nature of impact, whether it be beneficial or adverse;
- Type of impact, be it direct or indirect;
- Size and scale of impact, e.g. the geographical area;
- Duration over which the impact is likely to occur e.g. less than a year, a few years, etc.;
- Seasonality of impact, i.e. expected to occur all year or at specific times; and
- Frequency of impact, i.e. how often the impact is expected to occur.

Each of these variables is expanded upon in Table 5-1 to Table 5-2 to provide consistent definitions across all EA topics. In each impact assessment, these terms are used in the assessment summary table to summarise the impact and are expanded upon as necessary in any supporting text. With respect to the nature of the impact (Table 5-1), it should be noted that all impacts discussed in this EA report are adverse unless explicitly stated otherwise.

Table 5-1 Nature of Impact

Nature of impact	Definition
Beneficial	Advantageous or positive effect to a receptor (i.e. an improvement).
Adverse	Detrimental or negative effect to a receptor.

Table 5-2 Type of Impact

Type of impact	Definition
Direct	Impacts that result from a direct interaction between the Conductor Guide Frames and Alwyn Riser decommissioning activities and the receptor. Impacts that are caused by the activities.
Indirect	Reasonably foreseeable impacts that are caused by the interactions with the Conductor Guide Frames and Alwyn Riser decommissioning activities but which occur later in time than the original, or at a further distance. Indirect impacts include impacts that may be referred to as 'secondary', 'related' or 'induced'.
Cumulative	Impacts that act together with other impacts (including those from any concurrent or planned future third-party activities) to affect the same receptors as the Conductor Guide Frames and Alwyn Riser decommissioning activities. Definition encompasses "in-combination" impacts.

Table 5-3 Duration of Impact

Duration	Definition
Short-term	Impacts that are predicted to last for a short duration (e.g. less than one year).
Temporary	Impacts that are predicted to last a limited period (e.g. a few years). For example, impacts that occur during the decommissioning activities and which do not extend beyond the main activity period for the works or which, due to the timescale for mitigation, reinstatement or natural recovery, continue for only a limited time beyond completion of the anticipated activity.
Prolonged	Impacts that may, although not necessarily, commence during the main phase of the decommissioning activity and which continue through the monitoring and maintenance, but which will eventually cease.
Permanent	Impacts that are predicted to cause a permanent, irreversible change.

Table 5-4 Geographical Extent of Impact

Geographical extent	Description
Local	Impacts that are limited to the local area surrounding the Conductor Guide Frames and Alwyn Riser decommissioning activities footprint and associated working areas. Alternatively, where appropriate, impacts that are restricted to a single habitat or biotope or community.
Regional	Impacts that are experienced beyond the local area to the wider region, as determined by habitat/ecosystem extent.
National	Impacts that affect nationally important receptors or protected areas, or which have consequences at a national level. This extent may refer to either Scotland or the UK depending on the context.
Transboundary	Impacts that could be experienced by neighbouring national administrative areas.

International	Impacts that affect areas protected by international conventions, European and internationally designated areas or internationally important populations of key receptors (e.g. birds, marine mammals).

Table 5-5 Frequency of Impact

Frequency	Description
Continuous	Impacts that occur continuously or frequently.
Intermittent	Impacts that are occasional or occur only under a specific set of circumstances that occurs several times during the course of the Conductor Guide Frames and Alwyn Riser decommissioning activities. This definition also covers such impacts that occur on a planned or unplanned basis and those that may be described as 'periodic' impacts.

5.2.3.2 Impact Magnitude Criteria

Overall impact magnitude requires consideration of all the impact parameters described above. Based on these parameters, magnitude can be assigned following the criteria outlined in Table 5-6. The resulting effect on the receptor is considered under vulnerability and is an evaluation based on scientific judgement.

Table 5-6 Impact Magnitude Criteria

Magnitude	Criteria
Major	Extent of change: Impact occurs over a large scale or spatial geographical extent and/or is long term or permanent in nature. Frequency/intensity of impact: high frequency (occurring repeatedly or continuously for a long period of time) and/or at high intensity.
Moderate	Extent of change: Impact occurs over a local to medium scale/spatial extent and/or has a prolonged duration. Frequency/intensity of impact: medium to high frequency (occurring repeatedly or continuously for a moderate length of time) and/or at moderate intensity or occurring occasionally/intermittently for short periods of time but at a moderate to high intensity.
Minor	Extent of change: Impact occurs on-site or is localised in scale/spatial extent and is of a temporary or short-term duration. Frequency/intensity of impact: low frequency (occurring occasionally/intermittently for short periods of time) and/or at low intensity.
Negligible	Extent of change: Impact is highly localised and very short term in nature (e.g. days/few weeks only).
Positive	An enhancement of some ecosystem or population parameter.
Notes: Magnitude of an impact is based on a variety of parameters. Definitions provided above are for guidance only and may not be appropriate for all impacts. For example, an impact may occur in a very localised area (minor to moderate) but at very high frequency/intensity for a long period of time (major). In such cases informed judgement is used to determine the most appropriate magnitude ranking and this is explained through the narrative of the assessment.	

5.2.3.3 Impact Likelihood for Unplanned and Accidental Events

The likelihood of an impact occurring for unplanned/accidental events is another factor that is considered in this impact assessment. This captures the probability that the impact will occur and also the probability that the receptor will be present and is based on knowledge of the receptor and professional judgement.

5.2.3.4 Receptor Definition

As part of the assessment of impact significance it is necessary to define a receptor's sensitivity, vulnerability and value. The sensitivity of a receptor is defined as 'the degree to which a receptor is affected by an impact' and is a generic assessment based on factual information whereas an assessment of vulnerability, which is defined as 'the degree to which a receptor can or cannot cope with an adverse impact' is based on professional judgement taking into account a number of factors, including the previously assigned receptor sensitivity and impact magnitude, as well as other factors such as known population status or condition, distribution and abundance. The value of a receptor can be defined as the benefits from use of the natural environment. These benefits may be direct or indirect and they may be from present use and/or future use.

5.2.3.4.1 Receptor sensitivity

These range from negligible to very high and definitions for assessing the sensitivity of a receptor are provided in Table 5-7.

Table 5-7 Sensitivity of Receptor

Receptor Sensitivity	Definition
Very high	Receptor with no capacity to accommodate a particular effect and no ability to recover or adapt.
High	Receptor with very low capacity to accommodate a particular effect with low ability to recover or adapt.
Medium	Receptor with low capacity to accommodate a particular effect with low ability to recover or adapt.
Low	Receptor has some tolerance to accommodate a particular effect or will be able to recover or adapt.
Negligible	Receptor is generally tolerant and can accommodate a particular effect without the need to recover or adapt.

5.2.3.4.2 Receptor vulnerability

Information on both receptor sensitivity and impact magnitude is required to determine receptor vulnerability. These criteria, described in Table 5-6 and Table 5-7 are used to define receptor vulnerability as per Table 5-8.

Table 5-8 Vulnerability of receptor

Receptor Vulnerability	Definition
Very high	The impact will have a permanent effect on the behaviour or condition on a receptor such that the character, composition or attributes of the baseline, receptor population or functioning of a system will be permanently changed.
High	The impact will have a prolonged or extensive temporary effect on the behaviour or condition on a receptor resulting in long term or prolonged alteration in the character, composition or attributes of the baseline, receptor population or functioning of a system.
Medium	The impact will have a short-term effect on the behaviour or condition on a receptor such that the character, composition, or attributes of the baseline, receptor population or functioning of a system will either be partially changed post development or experience extensive temporary change.

Low	Impact is not likely to affect long term function of system or status of population. There will be no noticeable long-term effects above the level of natural variation experience in the area.
Negligible	Changes to baseline conditions, receptor population of functioning of a system will be imperceptible.

It is important to note that the above approach to assessing sensitivity and vulnerability is not appropriate in all circumstances and in some instances professional judgement has been used in determining sensitivity. In some instances, it has also been necessary to take a precautionary approach where stakeholder concern exists with regard to a particular receptor. Where this is the case, this is detailed in the relevant impact assessment in Section 6.

5.2.4 Receptor value

The value or importance of a receptor is based on a pre-defined judgement based on legislative requirements, guidance or policy. Where these are absent, it is necessary to make an informed judgement on receptor value based on perceived views of key stakeholders and specialists. Examples of receptor value definitions are provided in Table 5-9.

Table 5-9 Value of receptor

Receptor Value	Definition
Very high	Receptor of international importance (e.g. United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site). Receptor of very high importance or rarity, such as those designated under international legislation (e.g. EU Habitats Directive) or those that are internationally recognised as globally threatened (e.g. IUCN red list). Receptor has little flexibility or capability to utilise alternative area, receptor obtains all its income from the Conductor Guide Frames and Alwyn Riser decommissioning area. Best known or only example and/or significant potential to contribute to knowledge and understanding and/or outreach.
High	Receptor of national importance (e.g., MCZ). Receptor of high importance or rarity, designated under national legislation, and/or ecological receptors such as United Kingdom Biodiversity Action Plan (UKBAP) priority species with nationally important populations in the study area, and species that are near-threatened or vulnerable on the IUCN red list. Receptor obtains the majority of income from the Conductor Guide Frames and Alwyn Riser decommissioning area. Above average example and/or high potential to contribute to knowledge and understanding and/or outreach.
Medium	Receptor of regional importance. Receptor of moderate value or regional importance, and/or ecological receptors listed as of least concern on the IUCN red list, but which form qualifying interests on internationally designated sites, or which are present in internationally important numbers. Receptor which is active in the Conductor Guide Frames and Alwyn Riser decommissioning area and utilises it for up to half of its annual income/activities. Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach.
Low	Receptor of local importance. Receptor of low local importance and/or ecological receptors, such as species which contribute to a national site, is present regionally.

	Receptor which is active in the Conductor Guide Frames and Alwyn Riser decommissioning area and reliant upon it for some income/activities. Below average example and/or low potential to contribute to knowledge and understanding and/or outreach.
Negligible	Receptor of very low importance, no specific value or concern. Receptor of very low importance, such as those which are generally abundant around the UK with no specific value or conservation concern. Receptor of very low importance and activity generally abundant in other areas/not typically present in the Conductor Guide Frames and Alwyn Riser decommissioning area. Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach.

5.2.5 Consequence and Significance of Potential Impact

Having determined impact magnitude and the sensitivity, vulnerability and value of the receptor, it is then necessary to evaluate impact significance. This involves:

- Determination of impact consequence based on a consideration of sensitivity, vulnerability and value of the receptor and impact magnitude;
- Assessment of impact significance based on assessment consequence;
- Mitigation; and
- Residual impacts.

5.2.5.1 Assessment of Consequences and Impact Significance

The sensitivity, vulnerability and value of receptors are combined with magnitude (and likelihood, where appropriate) of impact using informed judgement to arrive at a consequence for each impact, as shown in Table 5-10. The significance of impact is derived directly from the assigned consequence ranking. The assessment of consequence considers mitigation measures that are embedded within the proposed activities.

Table 5-10 Assessment of consequence

Assessment consequence	Description (consideration of receptor sensitivity and value and impact magnitude)	Impact significance
Major consequence	Impacts are likely to be highly noticeable and have long term effects or permanently alter the character of the baseline and are likely to disrupt the function and status/value of the receptor population. They may have broader systemic consequences (e.g. to the wider ecosystem or industry). These impacts are a priority for mitigation in order to avoid or reduce the anticipated effects of the impact.	Significant
Moderate consequence	Impacts are likely to be noticeable and result in prolonged changes to the character of the baseline and may cause hardship to, or degradation of, the receptor population, although the overall function and value of the baseline/receptor population is not disrupted. Such impacts are a priority for mitigation in order to avoid or reduce the anticipated effects of the impact.	Significant
Low consequence	Impacts are expected to comprise noticeable changes to baseline conditions, beyond natural variation, but are not expected to cause long term degradation, hardship, or impair the function and value of the receptor. However, such impacts may be of interest to	Not significant

	stakeholders and/or represent a contentious issue during the decision-making process and should therefore be avoided or mitigated as far as reasonably practicable.	
Negligible	Impacts are expected to be either indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not anticipated to be a stakeholder concern and/or a potentially contentious issue in the decision-making process.	Not significant
Positive	Impacts are expected to have a positive benefit or enhancement. These impacts do not require mitigation and are not anticipated to be a stakeholder concern and/or a potentially contentious issue in the decision-making process.	Not significant

5.2.6 Cumulative Impact Assessment

While the scope of this impact assessment is restricted to the decommissioning of the Conductor Guide Frames and Alwyn Riser as outlined in Section 3, there will be other marine activities which have the potential to interact with the activities completed under the decommissioning work scope. The impact assessments presented in the following sections consider the potential for significant cumulative impacts to occur as a result of overlapping activities.

5.2.7 Transboundary Impact Assessment

For most potential impacts from decommissioning, the likelihood of transboundary impact is low. However, where impacts on mobile receptors are of concern, the likelihood of a transboundary impact is higher. The impact assessments presented in the following sections have identified the potential for transboundary impacts and the potential for transboundary impact is considered within the definition of significance.

5.2.8 Mitigation

Where potentially significant impacts (i.e., those ranked as being of moderate impact level or higher in Table 5-10) are identified, additional mitigation measures must be considered. The intention is that such measures should remove, reduce or manage the impacts to a point where the resulting residual significance is at an acceptable or insignificant level. Mitigation is also proposed in some instances to ensure impacts that are predicted to be not significant remain so.

6 IMPACT ASSESSMENT AND JUSTIFICATION

An impact assessment scoping discussion was undertaken to discuss the proposed decommissioning activities and any potential impacts these may pose. This discussion identified nine potential impact areas based on the proposed removal methods. Of these nine potential impact areas, six were scoped out of further assessment based on the low level of severity, or likelihood of significant impact occurring. The potential impacts are tabulated in Section 6.1, together with justification statements for the scoping decisions and proposed mitigation. The remaining three areas: emissions to air, disturbance to the seabed and disturbance to drill cuttings pile were scoped in for further assessment and are discussed in Sections 6.2, 6.3 and 0 respectively.

6.1 Assessment of Potential Impacts

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Emissions to air	Yes	Scoping discussions centred around the inevitability of the activities which lead to the production of emissions and the potential magnitude of these emissions. Anticipated emissions were placed in context with cumulative emissions on the UKCS whilst also considering the bigger Net Zero picture. Emissions during decommissioning activities (largely comprising fuel combustion gases) will occur following CoP. Emissions generated by infrastructure, equipment and vessels associated with operation of the assets will be replaced by those from vessel use as well as the recycling of decommissioned materials. TAQA acknowledges the contribution of all greenhouse gas (GHG) emissions to global climate change, and in line with the NSTA's (2021) expectations (in particular, Stewardship Expectation 11 relating to Net Zero), TAQA is dedicated to minimising GHG emissions from decommissioning operations, as far as is reasonable for each project. TAQA is committed to working with the supply chain and joint ventures as part of meeting these commitments. Direct project emissions are considered to be of low consequence (not significant), however, due to stakeholder, scientific and public concern around the cumulative impact of GHGs, atmospheric emissions resulting from project activities are assessed further in Section 6.2.	See Section 6.2.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Disturbance to the seabed	Yes	Disturbance to the seabed focusses on the moderate magnitude of the potential activities and the uncertainty around the temporary and permanent impacts of these on sensitive and protected receptors, including: • Ocean quahog; • 'Seapens and burrowing megafauna communities'; and • Blue Carbon sequestration Decommissioning the removal of subsea infrastructure. Seabed impacts may range in duration from temporary sediment suspension or smothering to permanent impacts, such as the introduction of new substrate or any consequential habitat or community level changes which may transpire. Impacts to the seabed from project activities are considered to be of a moderate consequence (significant) and are therefore assessed further in Section 6.3.	See Section 6.3.
Disturbance to the drill cuttings pile	Yes	There is potential for decommissioning activities to generate disturbance to the seabed and cuttings pile located at the Cormorant Alpha platform; which has elevated levels of THCs and heavy metals relative to the baseline of the wider area. It is therefore deemed necessary to understand how the removal activities will impact the lower water column and benthic communities. Decommissioning activities which could disturb the cuttings pile include the removal of the Alwyn Riser. Associated impacts are considered to be of a moderate consequence (significant) and are therefore assessed further in Section 6.4.	See Section 6.4
Planned discharges to sea	No	The Alwyn Riser has been flushed to an appropriate standard and now contains treated seawater. A de-oiling and flushing campaign was undertaken in 2023 to support cessation of production at North Alwyn and to prepare the export pipeline system for isolation and future decommissioning. As such, no further flushing of hydrocarbon liquids is anticipated. Any minor volumes of residual fluids associated with decommissioning activities will be managed under the relevant Oil Discharge Permit, which will define the applicable control measures and monitoring requirements.	• MARPOL compliance. • Treatment and maceration to International Maritime Organization (IMO) standards. • Bilge management procedures.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
		Discharges from vessels are generally well-controlled activities, managed through robust vessel and machinery design, operational procedures, and onboard management systems to ensure full compliance with MARPOL requirements and other applicable environmental regulations. Discharges to sea are considered to be of a negligible consequence (not significant) and are therefore not assessed further.	• Vessel equipment maintained according to manufacturer's recommendations. • Vessel assurance procedures. • Contractor management procedures. • Compliance with the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended). • Compliance with the Offshore Chemical Regulations 2002 (as amended). • Regulator engagement on potential residual pipeline and subsea system discharges.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Physical presence of vessels in relation to other sea users	No	The presence of a small number of vessels for topsides and subsea infrastructure removal decommissioning activities will be relatively short-term in the context of the life of the assets involved. Activity will occur using similar vessels to those currently deployed for oil and gas installation, operation and decommissioning activities. The small number of vessels required will also generally be in use within the existing 500 m safety zones at the individual field sites and will not occupy any new areas. Other sea users will be notified in advance of activities occurring meaning those stakeholders will have time to make any necessary alternative arrangements for the very limited period of operations. The decommissioning of the Conductor Guide Frames and Alwyn Riser is estimated to require only CSVs. The physical presence of vessels in relation to other sea users is considered to be of a negligible consequence (not significant) and is therefore not assessed further.	• Safety zones (where/when applicable and being mindful that arrangements will change at certain stages of the project). • UKHO standard communication channels including Kingfisher, Notice to Mariners and radio navigation warnings. • Use of AIS and other navigational controls.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Underwater noise emissions	No	Scoping discussions for underwater noise focussed on the high likelihood potential noise-producing activities, the concurrent (cumulative) nature of these activities and the potential for disturbance to sensitive species, in particular marine mammals. Aside from vessel noise and cutting activities, there will be no other noise-generating activities. Cutting techniques will either be diamond wire or abrasive water jet. DESNZ (2023) guidance on The Use and Environmental Impact of Explosives in the Decommissioning of Offshore Wells and Facilities states that "*Sound radiated from the diamond wire cutting of a conductor or abrasive water jets is not easily discernible above the background noise*." Vessel presence will be limited in duration. Diamond wire and hydraulic shear cutting operations are not readily discernible above background noise levels. Thus, vessel presence during the cutting process will mask the cutting noise generated (Pangerc *et al.*, 2016). As a result, noise generated during the decommissioning activities will be largely undetectable. Furthermore, the Cormorant Alpha platform is not located within an area protected for marine mammals. With industry-standard mitigation measures and JNCC guidance, EAs for offshore oil and gas decommissioning projects typically show no injury, or significant disturbance associated with these projects (Shell, 2017; CNRI, 2013; CNRI, 2017; and Marathon, 2017). Underwater noise emissions are considered to be of minor consequence (not significant) and are therefore not assessed further.	• Vessel management. • Minimal vessel use/movement. • Vessel sharing where possible. • Cutting activities will be minimised and carried out in isolation where possible. • Adherence to Marine and Cormorant Alphastal Access Act 2009 for Marine Licence.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Resource use	No	Scoping discussions highlighted that resource use from the proposed activities will require limited raw materials and be largely restricted to fuel use. The estimated total energy usage for the decommissioning activities is 27,627 GJ. Most of this energy use is related to vessel operations (22,317 GJ). A large amount (4,458 GJ) of this total is associated with the onshore recycling of materials. Material will be returned to shore as a result of project activities. The project aspiration is that all ferrous and non-ferrous metals, concrete and plastics will be recycled where possible, in line with the waste hierarchy and a circular economy approach, and TAQA will work closely with waste contractors to ensure that this is the case to minimise landfill requirements. Resource use is considered to be of a negligible consequence (not significant) and is therefore not assessed further.	• Minimal number of vessels deployed. • Use of low sulphur diesel. • Vessel equipment maintained according to manufacturer's recommendations. • Each vessel will have a Shipboard Energy Efficiency Management Plan (SEEMP) which contains information on minimising fuel consumptions.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Onshore impacts/waste	No	Waste management is often cited as a stakeholder concern across DPs. The waste to be brought to shore will be managed in line with TAQA's Waste Management Strategy and the Waste Hierarchy, as part of the project AWMP, using approved waste contractors and in liaison with the relevant Regulators. Waste management activities associated with the proposed operations are subject to comprehensive regulatory oversight under applicable environmental legislation and established industry standards. All waste streams will be managed, stored, transported, and disposed of in full compliance with statutory requirements and approved company procedures. Given the robust regulatory framework governing waste management, together with the well-defined and controlled nature of the processes involved, the potential for significant environmental effects is considered to be low. The measures in place ensure that any risks are effectively mitigated, and therefore waste management does not represent a pathway for likely significant adverse impacts. On this basis, waste management is assessed as being of minor consequence (not significant) and is not considered further within this assessment.	• 'Duty of Care' obligations. • Adherence to Waste Management Strategy. • Active waste tracking including close-out reporting. • Adherence to the Waste Hierarchy. • Selection of suitably authorised contractor(s) and facilities. • Communication with relevant Regulator(s) - e.g., Scottish Environment Protection Agency (SEPA). • Project Waste Management Targets focusses on maximising reuse and recycling. • Supply Chain Action Plan.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Unplanned events	No	Scoping discussions centred around the potential damage to sensitive receptors from an oil or diesel spill and the very low likelihood of an unplanned event, given the established mitigation measures in place. The flushing of the Alwyn Riser has already taken place and the riser now contains treated seawater. Although the risk of oil spill is remote, the Cormorant South Field System Oil Pollution Emergency Plan (OPEP) (TAQA, 2025) will be updated to cover the Conductor Guide Frames and Alwyn Riser decommissioning activities. Any spills from vessels in transit and outside the 500 m zones are covered by separate SOPEPs. Any potential from dropped objects whilst in transit, onto active subsea facilities, would be covered within 'Dropped object procedures', which are industry-standard. There is only a very remote probability of any interaction with any live infrastructure. Considering the above, the potential impacts from accidental chemical/hydrocarbon releases or dropped objects during decommissioning activities are not anticipated to be significant and are not assessed further.	• Safety zones (where/when applicable and being cognisant that arrangements will change at certain stages of the project). • UKHO standard communication channels including Kingfisher, Notice to Mariners and radio navigation warnings. • Use of AIS and other navigational controls. • OPEP in place for operations. • SOPEP on all vessels. • Navigational warnings in place. • Spill response procedures. • Contractor management and communication. • Lifting operations management of risk. • PON1/PON2 submissions. • Careful planning, management, and

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
			implementation of activities. • The location of any dropped or dislodged material will be accurately recorded and reported via Hydrographic Office and Kingfisher notification system.

6.2 Emissions to Air

6.2.1 Approach

On a global scale, concern regarding atmospheric emission of GHGs (including water vapour, CO_2, methane (CH_4), nitrous oxides (NO_x), ozone (O_3), chlorofluorocarbons and volatile organic compounds (VOCs) is focused on the impact they have on global climate change. The IPCC in its sixth assessment report (AR6) states that it is unequivocal that the increase of CO_2, CH_4 and NO_x in the atmosphere over the industrial era is the result of human activities. Human influence is the principal driver of many changes observed across the atmosphere, ocean, cryosphere and biosphere (IPCC, 2021). Climate change estimates in the AR6 report state that each of the last four decades have been successively warmer than any decade that preceded it since 1850. IPCC (2021) reports a 47% increase in CO_2 concentrations since 1750 which far exceeds the natural multi-millennial changes between glacial and interglacial periods over at least the past 800,000 years, and states that fossil fuel combustion is the primary contributor to the observed climate change.

The information on the quantification and impact assessment of the emissions is presented in this chapter of the EA representing atmospheric emissions associated with:

- Offshore vessel use for decommissioning activities; and
- Lifecycle emissions (onshore transport, recycling)

6.2.2 Sources of Potential Impacts

Emissions associated with decommissioning activities (largely comprising fuel combustion gases) will occur following CoP. Emissions associated with the routine operation of infrastructure, equipment, and vessels will cease, and will instead be replaced by emissions arising from decommissioning vessel activities and the processing and recycling of recovered materials. Reviewing historical data and comparison with the likely emissions from the proposed workscope suggests that emissions relating to decommissioning will be small relative to those during production.

Where available, carbon dioxide equivalent (CO_2e) values are presented. CO_2e is a unit of measurement that compares the global warming potential of different GHGs to the amount of CO_2 that would have the same effect. Estimated CO_2e emissions have been calculated using data from various sources (DESNZ, 2016; IoP, 2000). The estimated CO_2e emissions to be generated by the proposed decommissioning activities are 2,213 Te CO_2e, equating to approximately 0.018% of total UKCS oil and gas emissions in 2024 (12.4 million Te CO2e; OEUK, 2025). Most of these emissions are related to operation of vessels offshore (1,699 Te CO_2e) (Table 6-1), equating to 0.014% of the total UKCS oil and gas emissions in 2024 (OEUK, 2025). Vessel emissions have been calculated assuming a worst case of 24.3 (24h) vessel days across the duration of the decommissioning project (Table 6-2).

Table 6-1 Energy Use and Atmospheric Emissions by Project Activity for Decommissioning

Planned Activity	Energy (GJ)	Emissions CO_2e (Te)
Onshore transportation of materials	283	20
Onshore dismantling of materials	570	18
Onshore recycling of materials	4,458	476
Operation of vessels offshore (Table 6-2)	22,317	1,699
Total	**27,627**	**2,213**

Table 6-2 Offshore Vessel Activities Energy Use and Atmospheric Emissions for Decommissioning

Vessel type	Duration (days)					Energy	Emissions
	Mob/ Demob	Transit	Working	WOW	TOTAL	(GJ)	CO_2e (Te)
Large CSV	4.5	5	11.8	3	24.3	22,317.00	1,699.20
Total					**24.3**	**22,317.00**	**1,699.20**

6.2.3 Effects on Sensitive Receptors

To determine the significance level of impacts resulting from atmospheric emissions, there is a requirement to understand the sensitive receptors. Gaseous emissions from the proposed decommissioning activities include CO_2, carbon monoxide (CO), NO_x, nitrous oxide (N_2O), sulphur oxide (SO_x), CH_4 and VOCs. These have the potential to impact sensitive receptors in the area. The direct effect of t emittting CO_2, CH_4, N_2O and VOCs is the implication for climate change and the contribution to localised air quality deterioration due to low-level O_3 (IPCC, 2021). The direct effect of NO_X, SO_X and VOC emissions is the formation of photochemical pollution in the presence of sunlight. Low level O_3 is the main chemical pollutant formed, with by-products that include nitric and sulphuric acid and nitrate particulates, contributing to acid rain formation. The indirect effects of low-level O_3 include deleterious health effects, as well as damage to ecosystems.

The exposed offshore conditions will promote the rapid dispersion and dilution of these emissions. Review of available decommissioning EAs suggests that atmospheric emissions in highly dispersive offshore environments are not considered to present significant impacts in the context of UKCS and global emissions. Most submissions also note that emissions from short-term decommissioning activities are small compared to those previously arising from the asset over its operational life.

Outside the immediate vicinity of the decommissioning activities, all released gases would only be present in low concentrations. No impact is expected on ecosystem components (benthos, fish and shellfish, marine mammals, seabirds) including habitats and species of conservation significance. In the open conditions that prevail offshore, the atmospheric emissions generated during the decommissioning activities would be quickly dispersed. The atmospheric emissions from the proposed activities are therefore considered unlikely to have any significant effect on ecosystem components. Potential impacts from onshore emissions are likely to be relatively minor and within local and regional air quality criteria.

6.2.4 Cumulative and Transboundary Impacts

The potential cumulative effects associated with the atmospheric emissions produced by the vessels includes global warming (greenhouse gases), acidification (acid rain) and local air pollution. Localised impacts may include elevated levels of atmospheric emissions in the immediate area of the vessels. Atmospheric emissions from fuel supply (of which production of oil and gas is a part) was 28.4 million Te CO_2e in 2024, which represents 7% of the UK total territorial emissions for that year, according to the Committee on Climate Change (CCC) latest Progress Report to Parliament (CCC, 2025). The emissions for 2024 show that emissions from refineries and oil and gas production decreased by 6% compared to 2023, continuing the long-term trend of falling domestic fossil fuel production (CCC, 2025). The total UKCS oil and gas emissions in 2024 were 12.4 million Te CO_2e (OEUK, 2025). This means that the emissions associated with the Conductor Guide Frames and Alwyn Riser decommissioning activities (2,213 CO_2e Te) will amount to approximately 0.018% of the total emissions generated in the UK in 2024 from oil and gas activities. Any emissions will be limited to the duration of the decommissioning activities in contrast to the continuous emissions associated with live production operations and will be minimised as far as possible following the mitigation approaches outlined in Section 6.2.5. It can therefore be concluded that the projected emissions do not represent a significant proportion of the UK offshore emissions and therefore are not considered significant in cumulative terms.

In addition, the temporary nature of the emissions along with the remote geographic location and winds within the offshore environment means that the atmospheric emissions would be rapidly dispersed and are not likely to be detectable within a short distance from the source. Given the distance from the UK/Norway median line (41 km), transboundary impacts are also deemed negligible.

6.2.5 Mitigation Measures

Most emissions in these phases will be the result of combustion of hydrocarbons for power generation related to vessel activities. Vessels will be owned by a 3rd party and the activities are therefore subject to supply chain processes of contract selection and management. Minimisation of emissions from vessels will form part of the selection criteria for the installation vessels through the tendering and selection process.

- Each vessel will have a SEEMP which contains information of minimising fuel consumptions e.g., economical speeds when operationally appropriate.
- Green dynamic positioning or economical speeds when operationally appropriate.
- Developing the decommissioning plan, which includes the possibility of combining Conductor Guide Frames and Alwyn Riser decommissioning activities with other decommissioning projects, to minimise the number of vessel deployments, mobilisations and demobilisations.
- Streamlining of activities through planning to reduce the time required for vessels will be required for these activities and will support the drive to reduce emissions.

6.2.6 Emissions to Air Residual Impact

Receptor	Magnitude	Sensitivity	Vulnerability	Value
Global climate change	Minor	Low	Medium	Low
TAQA acknowledge the contribution of these emissions (however small) to global climate change, and have assigned a Minor magnitude, low sensitivity, high vulnerability and low value score based on this premise. Overall consequence is anticipated to be low for global climate change. In line with the NSTA's (2021) expectations (in particular, Stewardship Expectation 11) TAQA is dedicated to minimising greenhouse gas emissions from decommissioning operations, as far as is reasonable for each project. TAQA is committed to working with the supply chain and joint ventures as part of meeting these commitments.				
Consequence		**Significance**		
Global Climate Change: Low		Not significant		

6.3 Disturbance to the Seabed

6.3.1 Approach

The two seabed impact pathways associated with the proposed activities are direct and indirect disturbance.

Direct disturbance refers to the physical disturbance of seabed sediments and benthic habitats and may result in either temporary or permanent changes to the marine environment, depending upon the nature of the associated activity. Where appropriate, permanent impacts are considered as a conservative, worst-case scenario. Activities which contribute to the direct disturbance impact pathway include the removal of infrastructure and remediation of snagging hazards, either from re-burial or placement of material (rock cover) on the seabed. The total area of seabed subject to direct physical disturbance has been calculated by aggregating the individual disturbance footprints associated with each activity.

Indirect disturbance occurs beyond the direct disturbance footprint. It may be caused by the suspension and re-settlement of natural seabed sediments and drill cuttings materials disturbed during activities. This secondary impact pathway is considered temporary in all instances. The scale of indirect disturbance resulting from re-suspension and re-settlement of natural and potentially contaminated sediment has been estimated based on the expected area of direct disturbance from any activity. For assessment purposes, the indirect disturbance area is assumed to be double the direct disturbance area for all installations and activities taking place.

The seabed impacts resulting from the activities associated with the decommissioning of the Conductor Guide Frames and Alwyn Riser are categorised here as temporary. Temporary impacts are defined as those resulting in effects lasting a few days to a few years. Permanent impacts are those expected to persist for decades to centuries following decommissioning. As the Conductor Guide Frames and Alwyn Riser will be completely removed during decommissioning, there will be no permanent impacts associated with the decommissioning activities.

6.3.2 Sources of Potential Impacts

The following activities have been identified as potential sources of direct or indirect seabed disturbance for the decommissioning of the infrastructure:

- Disconnection/removal of Alwyn Riser vertical cell wall section adjacent to Riser Base Tie-in Flange (EL-150.3m) (Section 6.3.2.1);
- Potential temporary wet storage of the Alwyn Riser (approximately six ~30 m sections) and Conductor Guide Frames (three of).

6.3.2.1 Removal of Infrastructure

All elements of the Conductor Guide Frames and Alwyn Riser will be subject to full removal during decommissioning. Following removal, these structures may be temporarily wet stored on the seabed before being transported to shore for dismantling and recycling.

The worst-case temporary seabed disturbance footprint for wet storage was determined by accounting for the dimensions of both the Conductor Guide Frames and Alwyn Riser and then combining the individual footprints. An additional 5 m buffer was applied to this combined area to represent a conservative, worst-case extent of direct, temporary disturbance during removal activities.

As outlined in Section 3.3.2, the Alwyn Riser will be cut into ~30 m long sections prior to wet storage on the seabed. The riser itself has a diameter of 12”, and the caisson has a diameter 30”. For assessment purposes, it has been assumed that the riser and caisson will be removed and stored together. To ensure the seabed disturbance area reflects a worst-case scenario, the width of the caisson plus an additional 5 m buffer to all sides has been used in the calculations.

An estimate of the potential extent of indirect seabed disturbance arising from sediment re-suspension and subsequent settlement has been undertaken using established in-house Xodus methodology. Most re-suspended sediment will settle within the initial disturbance area, but it has been assumed that some may be deposited beyond that area. Accordingly, and to provide a conservative assessment, the extend of indirect disturbance has been assumed to be equivalent to twice the area of direct disturbance.

This disturbance will be temporary, and with sediment resettlement occurring during active operations and in the period immediately following the completion of activities. The direct and indirect disturbance areas associated with these proposed operations are summarised in Table 6-3.

6.3.2.2 Summary of Disturbance to the Seabed

The seabed disturbance from all decommissioning activities is summarised in Table 6-3. These are considered conservative estimations of the likely impact of the proposed decommissioning activities, as the buffers added to the structures are likely to overestimate the range of impact generated by various removal methods.

Table 6-3 Seabed Disturbance Associated with the Decommissioning Activities

Activity	Location	Expected duration of disturbance	Temporary direct disturbance area (km^2)	Temporary Indirect disturbance area (km^2)
Alwyn Riser Removal	Cormorant Alpha Platform	Temporary	0.00005	0.00010
Wet storage of Alwyn Riser	Cormorant Alpha Platform	Temporary	0.0035	0.0069
Wet storage of Conductor Guide Frames	Cormorant Alpha Platform	Temporary	0.0021	0.0042
Total (km^2)			**0.0056**	**0.011**

*Please note, any apparent discrepancy in the totals is due to rounding within the table.

6.3.3 Effects on Sensitive Receptors

6.3.3.1 Direct Disturbance

Temporary direct disturbance will result from the removal of infrastructure from the seabed. Sediment will be disturbed during the retrieval of equipment from the seabed, but once decommissioning is complete, this disturbance will cease.

Temporary direct disturbance should allow recovery in line with natural processes such as sediment re-suspension and deposition, movement of animals into the disturbed area from the surrounding habitat, and recruitment of new planktonic individuals.

6.3.3.1.1 Temporary Direct Disturbance (wider area)

Decommissioning disturbance will cause mortality, due to injuries arising from the crushing of benthic and epibenthic fauna which are sedentary or unable to move quickly. Mobile fauna will likely also be disturbed. The sediment structure, including the burrows of any animals present, will be affected. The 2020 survey report identified the presence of burrowing species (seapens) and infauna were consistently reported to be prolific and consist of polychaetes and bivalve molluscs (Benthic Solutions, 2020). The epifauna present in all areas is generally noted as sparse and typically features mobile species that have wide distributions throughout the North Sea. These include, for example, sea urchins and brittle stars.

The primary features of conservation and environmental concern in the wider Cormorant Alpha area include:

- Ocean quahog *A. islandica* – OSPAR list of threatened and/or declining species and habitats (Region II – Greater North Sea);
- ‘Seapens and burrowing megafauna communities’ – OSPAR list of threatened and/or declining species and habitats (Region II – Greater North Sea), a component of which is the Scottish PMF habitat ‘Burrowed mud’; and
- Blue Carbon sequestration.

Ocean Quahog

Ocean quahog live at the surface of sediments while feeding but can burrow to depths of 14 cm and are vulnerable to physical abrasion and smothering. They are long-lived bivalves which take 5 - 15 years to reach sexual maturity and spawn over a short period in the year. Recruitment is sporadic and variable (Tyler-Walters & Sabatini, 2017). Considering this, the recoverability of ocean quahog to physical abrasion is very low. While two ocean quahog individuals were identified in the Cormorant Alpha survey area, there was no evidence of aggregations. While scattered individuals of ocean quahog may occur, they would not be expected to occur either in significant densities or communities of specific conservation value.

Seapens and Burrowing Megafauna

The 'Seapen and burrowing megafauna communities' habitat also has been previously recorded within the Cormorant Alpha survey area. The Benthic Solutions (2024) survey estimated the density of burrow openings located between 250 m - 500 m northeast and northwest from the Cormorant Alpha platform and found that the density of small burrows (<3 cm) across the two transects were recorded as ‘occasional’ on the SACFOR scale, with no large burrows recorded. Seapens such as *V. mirabilis* or *P. phosphorea* were mostly observed at the stations CA_EBS_02, CA_EBS_03, CA_EBS_07, CA_EBS_10, which are located 250 m, 500 m, 250 m and 500 m from the Cormorant Alpha platform, respectively (Benthic Solutions, 2020).

Seapens have some resistance to being disturbed and can reinsert themselves into the sediment if removed, as long as they remained undamaged. Damaged individuals show poor recovery and resilience is considered low, giving an overall sensitivity of medium (Hill, Tyler-Walters and Garrard, 2020). As such, temporary disturbance is expected to cause some mortality to damaged seapens, but this is expected to be localised, with no impact on the viability of the local population. Replacement of damaged individuals would be expected to occur either from plankton or from "adult" seapens moving in from the surrounding area. Where there has been a disturbance but the seapens remain undamaged, recovery may be rapid (<2 years; Hill, Tyler-Walters and Garrard, 2020). Given the extent of their habitat across the North Sea the recovery of seapens and burrowing megafauna would be swift.

Blue Carbon

The percentage carbonate in the top 10 cm of superficial sediments in UKCS Blocks 211/26 ranges from 0 to 20%, which is above average compared to the UKCS more generally (UKCS average value is 10.1%; Burrows *et al.,* 2014; NMPi, 2026). The variation in carbonate sequestration can be attributed to the sediment composition across the fields, with sandy and muddy (fine) sediment generally exhibiting a higher percentage uptake of carbonate (Burrows *et al*., 2014). Under the EUNIS habitat classification, the most widespread seabed type around the Cormorant Alpha platform is predicted to be MD52: "Atlantic offshore circalittoral sand" which represents offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. In addition, localised areas of EUNIS habitat complex MD32: Atlantic offshore circalittoral coarse sediment are predicted to occur which could explain this variation.

As noted in Table 6-3, approximately 0.0053 km^2 of seabed could be affected by temporary direct disturbance. The scale of the disturbance is minimal when compared to other forms of disturbance that occur in the area. For example, a commercial trawler with a 12 m wide beam trawl trawling at its slowest rate of approximately 4.7 km h^{-1} would cover an area of roughly 0.06 km^2 per hour so would therefore take approximately 1 hour to cover the anticipated direct disturbance area (FAO, 2019).

6.3.3.2 Temporary Indirect Disturbance

Indirect disturbance (assumed to be twice the area of direct disturbance) is projected to have an area of temporary impact of 0.011 km^2 with no permanent impacts anticipated. The temporary indirect disturbance area of increased sediment in the water column is expected to dissipate rapidly as generally it is the coarser, upper layers of sediment that would be disturbed. Given the muddy nature of the sediments, the overall level of re-suspended sediment will be low.

Increased suspended sediment may reduce feeding efficiency of filter feeders due to clogging of feeding structures. However, though not well studied, the bioturbation associated with burrows will generate sediment resuspension, thus implying that species typical of the 'Seapen and burrowing megafauna communities' habitat may have some natural tolerance to sedimentation (Hill, Tyler-Walters and Garrard, 2020). Experimental evidence suggests that seapens are not sensitive to increased suspended sediment. Both species observed in the area (*P. phosphorea* and *V. mirabilis*) are tolerant to heavy smothering and siltation. *V. mirabilis* in particular are capable of retracting into their burrows thereby cleaning themselves of excess sediment by the production of mucous within the burrow (Hill, Tyler-Walters and Garrard, 2020). As such, effects due to increased suspended sediment are not expected to impact the benthos surrounding the Cormorant Alpha platform.

6.3.4 Cumulative and Transboundary Impacts

Most of the 12 surrounding oil and gas assets within 40 km of the Cormorant Alpha platform (Table 4-6) will be subject to decommissioning in the coming years. The anticipated seabed footprint of these activities cannot be known at present. However, given that the total area of seabed disturbance (0.011 km^2, Table 6-3) of the Conductor Guide Frames and Alwyn Riser decommissioning operations amounts to less than 0.00022% of the 5,027 km^2 of seabed available within that 40 km radius, it is reasonable to presume that the impact is not of significant magnitude to have any discernible contribution to cumulative impacts in the broader context. Therefore, cumulative impacts to the seabed caused by these decommissioning activities are considered to be negligible.

Mitigation measures will be in place to protect the primary features of conservation concern:

- Ocean quahog *A. islandica* – OSPAR list of threatened and/or declining species and habitats (Region II – Greater North Sea); and
- ‘Seapens and burrowing megafauna in circalittoral mud’ – OSPAR list of threatened and/or declining species and habitats (Region II – Greater North Sea), a component of which is the Scottish PMF habitat ‘Burrowed mud’.

Temporary disturbance would be expected to cause some mortality to any seapens and ocean quahog individuals that are physically damaged during operations, but this is expected to be localised and not have any significant effect on the viability of the local populations. As far as practicable, vessels will use dynamic positioning instead of anchors.

The Cormorant Alpha platform is located approximately 41 km from the UK/Norway median line (closest point). Given this distance, and the area of indirect temporary disturbance being 0.011 km^2, there is limited potential for sediment to travel beyond the immediate vicinity of the decommissioning area and into neighbouring territorial waters. Transboundary impacts are therefore highly unlikely.

6.3.5 Mitigation Measures

The following measures will be adopted to ensure that seabed disturbance and its impacts are minimised to a level that is ALARP:

- Pre-decommissioning status surveys will be carried out to enable planning for the decommissioning activities;
- All activities which may lead to seabed disturbance will be planned, managed and implemented in such a way that disturbance is minimised;
- Careful planning, selection of equipment, management and implementation of activities;
- If wet storage is required, the storage location will be positioned outside of the cuttings pile contamination threshold boundary, within the Cormorant Alpha 500 m zone and avoiding existing infrastructure. The wet storage area has been positioned to lie outside the footprint of any potential future drill cuttings deposition following completion of the Cormorant Alpha CGBS cuttings clearance works. This includes consideration of a worst-case cuttings pile relocation scenario;
- A debris survey will be undertaken at the completion of the decommissioning activities. Any debris identified as resulting from oil and gas activities will be recovered from the seabed where possible;
- Clear seabed verification will ensure there is no residual risk to other sea users and will be agreed with OPRED. Non-intrusive verification techniques will be considered in the first instance and in agreement with fishing bodies. Post-decommissioning survey specifications will be agreed in advance with OPRED to ensure that any protected species or areas of conservational importance are not inadvertently compromised in any way by any clear seabed trawling activities or other obtrusive methods.

6.3.6 Seabed Disturbance Residual Impact

Receptor	Magnitude	Sensitivity	Vulnerability	Value
Seabed habitats and fauna	Moderate	Low	Medium	Low

The Conductor Guide Frames and Alwyn Riser decommissioning activities will result in temporary direct and indirect disturbance to the seabed. Temporary direct disturbance has the potential to impact approximately 0.0056 km^2 of seabed. Temporary indirect disturbance has the potential to impact approximately 0.011 km^2.

These are considered highly conservative estimations of the likely impact of the proposed decommissioning activities, as the buffers added to the structures are likely to overestimate the range of impact generated by various removal methods.

Overall, given the localised nature of the seabed disturbance, and the area of seabed impact that will be permanent (yet recoverable), the magnitude of the impacts on seabed habitats and fauna is considered to be moderate.

The 2024 survey of the Cormorant Alpha area indicated the presence of several potentially sensitive habitats and species, including the OSPAR and UKBAP protected habitat 'Seapen and burrowing megafauna communities' and the OSPAR protected species, ocean quahog.

The presence of OSPAR 'Seapen and burrowing megafauna communities' habitat was recorded as 'occasional' on the SACFOR scale with no large burrows recorded. The general benthos and the species associated with the 'Seapen and burrowing megafauna communities' habitat specifically are likely to have some natural resilience to increased sedimentation, if not to abrasion associated with direct disturbance.

Two ocean quahog individuals were observed in the survey area and the presence of aggregations is unlikely. The species could be affected by the proposed decommissioning activities via physical abrasion and smothering, and recoverability to these pressures is very low due to the low level of recruitment. However, the decommissioning activities have a highly localised impact as demonstrated in this chapter, it is therefore expected that a very low number of individuals would be impacted by the proposed decommissioning activities.

Overall, based on the anticipated localised and temporary nature of the disturbance, the proposed decommissioning of the Conductor Guide Frames and Alwyn Riser will have an impact of low consequence (i.e. not significant) for seabed receptors.

Consequence	Significance
Low	Not significant

6.4 Disturbance to the Drill Cuttings Pile

6.4.1 Approach

As previously detailed in Section 4.1.5, a cuttings pile is located on top of the Cormorant Alpha CGBS cell top which overspills onto the seabed next to the Cormorant Alpha CGBS.

6.4.2 Sources of Potential Impacts

The following activities have been identified as potential sources of direct or indirect drill cuttings disturbance for the decommissioning of the Conductor Guide Frames and Alwyn Riser:

- Removal of the Alwyn Riser on top of the CGBS storage cells, including upper vertical section within caisson 18, horizontal cell top section and vertical cell wall section; and
- Removal of the Alwyn Riser at the Riser Base Tie-in Flange.

6.4.3 Effects on Sensitive Receptors

The Cormorant Alpha cuttings pile is estimated to cover an area of 12,210 m^2 with a pile volume of approximately 9,278 m^3 which would be categorised as a “medium cuttings pile” (5,000-20,000 m^3, NorOG, 2016; Benthic Solutions, 2024). The cuttings pile lies mainly on top of the CGBS cell top but also overspills onto the seabed (Figure 4-2). The overall chemical footprint (where THC was above the OSPAR 50 mg kg^{-1} threshold) exceeds the physical pile boundary and covers a surface area approximately 0.1067 km^2, slightly elongated towards the northeast (Figure 4-2).

The Cormorant Alpha cuttings pile was typically dominated by “cohesive silty sand” (80% of the cores analysed) throughout and were almost exclusively dominated by the fines fraction. The cores taken from on top of the cell top, closest to the pile centre, exhibited distinctive layers of ‘dark greyish olive’ drilling material and ‘pale brown’ layers which are usually associated with chemical additives. The natural seabed sediments were only evident within the bottom layers of two core stations (sampled off the CGBS, towards the eastern boundary of the physical pile) where the sediment particle size was dominated by Cormorant Alphas gravelly sand; showing similarity to the sediment analysed throughout the baseline survey conducted around the Cormorant Alpha platform (Section 4.1.5.1). All other eleven stations showed no evidence of the natural seabed boundary, due to the deep depth of the pile and the relatively small recovery core sizes at most stations. Overall, there was no clear relationship between the core layer and the proportion of sands, fines or gravels, indicating the cuttings pile is a heterogenous mixture of different types of drilling muds and cuttings (Benthic Solutions, 2024).

Stations on top of the CGBS cell top, closest to the pile centre (<25 m), recorded higher levels of THC when compared to the OSPAR ‘ecological effect’ threshold of 50 mg kg^{-1}, with levels ranging between 63,800 mg kg^{-1} to 427,000 mg kg^{-1}. THC contamination was evident up to 200 m north and southeast, as well as covering a smaller range on the western side of the gravity base; extending out to the seabed surface by 150 m. Sediment leachate analysis based on the chemical footprint of the cuttings pile ranged between 2.52 Te/yr (24-hour leachate rate) and 3.25 Te/yr (48-hour leachate rate). These values are well below the OSPAR oil loss threshold of 10 Te/yr, demonstrating that oil release to the water column is negligible and well within regulatory limits. With a persistence of 7.54 km^2, the cuttings pile also falls well below the respective OSPAR leaching threshold (500 km^2 /yr). The proposed removal activities are likely to disturb the drill cuttings pile and lead to the subsequent release of contaminants into the lower water column. However, given the very low hydrodynamic forcing at the depth of the Cormorant Alpha drill cuttings pile, it is likely that most of the disturbed cuttings would resettle over the already contaminated sediments of the existing drill cuttings pile.

6.4.3.1 Plankton

International Association of Oil and Gas Producers (IOGP, 2016) cites a number of sources indicating the impacts of drill cuttings discharge on plankton are negligible. Recorded deleterious effects on phytoplankton are generally attributed to light attenuation due to suspended solids. The majority of the disturbed material is expected to re-settle almost immediately, and material disturbed at the seabed (at 153 m depth) is unlikely to interact with the photic zone. Therefore, no impacts on plankton are expected.

6.4.3.2 Benthic Fauna

The macrofaunal community within the Cormorant Alpha survey area is typical of the wider NNS, but the macrofaunal community shows indications of being modified. Several species considered to be indicative of environmental disturbance and hydrocarbon contamination, both positive (e.g. *G. oculata* and *E. vanelli*) and negative (e.g. *Capitella, C. cirratus*, and *T. sarsii*), were identified from the macrofaunal samples indicating contamination of seabed sediment within close proximity to the cuttings pile (Benthic Solutions, 2024). Studies have shown that recolonisation of cuttings pile sediments may commence one to two years after the cessation of cuttings discharges (UKOOA, 2001b).

Toxicity of synthetic-based mud to benthic organisms is, as summarised by Neff *et al.* (2000), generally low. Neff *et al*. (2000) conclude that a proportion of observed harmful effects are likely due to nutrient enrichment and subsequent anoxia in affected sediments. The Cormorant Alpha cuttings pile showed THC levels which ranged between 63,800 mg kg^{-1} to 427,000 mg kg^{-1}. Leachate analysis for the cutting pile indicated that the yearly oil loss based on the physical extent of the cuttings pile would be below the OSPAR oil loss threshold (10 Te/yr).

PCB concentrations recorded across the majority of the Cormorant Alpha survey stations are below the OSPAR Effect Range Low (ERL) threshold (11.50 µg kg^{-1}) and are therefore unlikely to have had a detrimental impact on the benthic community (Benthic Solutions, 2024).

Recolonisation of the contaminated sediments increases with the biodegradation of contaminants within the surface layer of the disturbed sediments and, therefore, the gradual reduction in the overall contaminated area will occur more quickly in areas where a thin veneer of sediments is present, including the furthest extents of the drill cuttings pile. The areas of highest contamination would be expected to fall out of suspension wholly within the footprint of the drill cuttings pile, with some minor impacts closer to the edge of the cuttings pile. As such, whilst disturbance of the accumulation will cause spreading of contaminated material over a small additional area, it is deemed unlikely to result in significant toxic effects, especially when considering that much larger scale disturbance events (such as the Hutton Tension Leg Platform operations) have been found to have no major effect on the spatial distribution of cuttings contamination, or on biological communities located more than 100 m from the disturbance location (OSPAR, 2009c).

In conclusion, the small amount of material which could potentially be redistributed outside the existing cuttings accumulation area, the tolerance of the fauna to low levels of toxicity, and the limited potential for smothering and anoxia indicate that there will be no significant impacts on the benthos from disturbance of the cuttings pile.

6.4.3.3 Water Quality and Fish

The re-suspension of drill cuttings will result in the release of contaminants and an increase in turbidity, resulting in the localised reduction in water quality. The phytoplankton and zooplankton communities in the project area are typical of the NNS, with a phytoplankton community dominated by the dinoflagellate genus *Ceratium* and a zooplankton community dominated by *Calanus* species (Section 4.2.1).

Impacts to the water column due to the removal of the Conductor Guide Frames and Alwyn Riser are considered to be of low risk as the associated impacts are predicted to be localised (and of a limited duration). Therefore, it is possible that a small number of demersal and pelagic fish might be temporarily disturbed.

The removal of the Conductor Guide Frames and Alwyn Riser could coincide with spawning periods for cod, haddock, Norway pout, saithe and whiting (Section 4.2.5; Coull *et al.,* 1998 and Ellis *et al.,* 2010). Haddock, saithe, Norway pout and cod are known to produce pelagic eggs which are dispersed within the water column and are transported by prevailing currents, rather than being associated with the seabed. As such, they are spatially separated from the primary zone of drill cuttings disturbance, which is predicted to be localised, short-term, and largely confined to the seabed and near-bed environment. As previously stated, any re-suspended drill cuttings material is expected to settle rapidly due to particle size and density, resulting in limited vertical dispersion into the upper water column where pelagic eggs and larvae typically occur. On this basis, and considering the limited magnitude, extent and duration of the predicted re-suspension, it is considered unlikely that pelagic eggs or larvae would be adversely affected by drill cuttings disturbance associated with the proposed activity. Herring are benthic spawners but are not reported to spawn within Block 211/26 where the Cormorant Alpha platform is located and would be unlikely to spawn in a contaminated area of seabed (Coull *et al*., 1998; Ellis *et al*., 2012).

In addition to impacts associated with spawning and nursery areas, other potential direct impacts of the hydrocarbons in the drill cuttings on fish include tainting of fish for human consumption, diseases in adult fish such as abnormal tissue growths and other lesions, and physiological impacts such as repression of the immune system in adult fish (CEFAS, 1999). Taint contamination of benthic species could be due to the ingestion of contaminated sediment. Hydrocarbons have been associated with teratogenicity, mutagenicity and carcinogenicity in fish (CEFAS, 1999) through chronic effects on tissues. The release of contaminants from the sediments may affect the early life stages of some fish species but would be localised and not likely to have an impact on that species' population or its long-term survival.

The Cormorant Alpha drill cuttings pile does exhibit some high levels of contamination, particularly in the sub-layers. The removal of infrastructure (where this is embedded within the pile) is expected to cause a localised and short-lived displacement of sediment. Most of this sediment is expected to settle within the existing chemical footprint of the cuttings pile. Neff *et al*., (2000) reports that synthetic-based fluids have very low toxicity to fish, and do not bioaccumulate meaning there is no risk of SBMs being concentrated in the food chain. The material may be toxic since many of the toxic components (such as aromatics) remain present at levels exceeding Effect Range Low (ERL) concentrations. However, OSPAR (2009) indicates that hydrocarbons are likely to remain bound to sediments rather than become free in the water column and therefore pathways for toxic components into fish are likely to be limited. The most significant effect on fish is interference with feeding behaviour due to increased sediment load in the water column. As discussed above, increased sediment load as a result of the proposed activities is expected to be short-term and is insignificant when compared to the commercial trawling activity in the area, therefore the impact on benthic fauna, water quality and fish is expected to be minimal for the same reason.

6.4.3.4 Marine Mammals

There is limited published data on the impacts of synthetic based fluids on marine mammals. The available data on other fauna suggests that synthetic-based fluids are low in toxicity and non-bioaccumulating. Notwithstanding this, the majority of drilling fluid disturbed by the proposed activities is expected to remain bound to drill cuttings particles, which modelling and survey evidence indicate will re-settle rapidly and predominantly within the vicinity of the existing cuttings accumulation. As a result, potential exposure pathways for marine mammals - principally via the water column - are limited, and any exposure is expected to be localised and short-lived. On this basis, the potential for adverse effects on marine mammals is considered to be low.

6.4.4 Cumulative and Transboundary Impacts

Disturbance of drill cuttings during the proposed decommissioning operations is expected to occur during the removal of infrastructure, but also from future commercial fishing activity. Commercial fishing may begin immediately after decommissioning activities have finished and could therefore qualify as a sequential transient event. Thus, it is reasonable to expect that the Conductor Guide Frames and Alwyn Riser decommissioning operations and commercial fishing could produce cumulative impacts.

However, the impacts on drill cuttings resulting from the proposed operations will be transient and limited both spatially and temporally. Although demersal fishing activity in ICES rectangle 51F1 is comparable to activity in other high-performing rectangles, this activity is broadly distributed across the rectangle. The decommissioning area represents a small proportion of the overall area of ICES rectangle 51F1.

In UKCS waters there are approximately 174 “potentially significant” cuttings piles (OSPAR, 2009c), all of which fall below the OSPAR threshold values for persistence and rate of loss of oil to the water column. As UKCS oil and gas infrastructure is decommissioned over the coming years, these cuttings piles will be subject to disturbance either during decommissioning operations or by future commercial fishing activity. Given the highly localised nature of any disturbance associated with the proposed activities, and the existing evidence that UKCS cuttings piles are below significance thresholds, it is considered unlikely that cumulative impacts arising from cuttings pile disturbance would be significant.

6.4.5 Mitigation Measures

The following measures will be adopted to ensure that drill cuttings disturbance and its impacts are minimised to a level that is as low as reasonably practicable:

- Disturbance of the cuttings pile during decommissioning operations is expected to occur during the removal of infrastructure but also from future fishing activity. The presence of vessels during decommissioning operations will be communicated through the appropriate channels - submission of Kingfisher notice(s) and notification to UKHO of commencement/termination of operations. Upon completion, TAQA will ensure that data is made available to enable the cuttings pile to be marked on UKHO Admiralty charts and FishSAFE plotter files. This will highlight the presence of the cuttings pile to fishermen and assist in reducing the frequency of trawling occurrences (over which time the cuttings pile efficacy will continue to naturally degrade).

6.4.6 Drill Cuttings Pile Disturbance Residual Impact

Receptor	Magnitude	Sensitivity	Vulnerability	Value
Seabed habitats and fauna	Moderate	Low	Medium	Low
The decommissioning of the Conductor Guide Frames and Alwyn Riser will result in direct and indirect temporary disturbance to the seabed which in turn could also disturb the associated drill cutting pile. Temporary direct disturbance has the potential to impact approximately 0.0056 km^2 of seabed. Temporary indirect disturbance has the potential to impact approximately 0.011 km^2.				

THC concentrations in the cuttings pile were high when compared with the OSPAR ‘ecological effect’ threshold, however, the THC concentrations recorded are not atypical for drill cuttings piles of similar volumes found throughout the UKCS. As far as possible, care will be taken to avoid unnecessary disturbance to the Cormorant Alpha drill cuttings pile during removal activities. The Alwyn Riser is located within the drill cuttings pile atop the Cormorant Alpha CGBS storage cells. Furthermore, the cuttings pile spills onto the seabed where the Alwyn Riser will be disconnected at the base of the CGBS, at the Riser Tie-in Flange. Consequently, there is limited interaction between the riser and the cuttings pile. Therefore the spread of drill cuttings will be limited to the lower water column and within the current limit of the chemical footprint of the pile, where no protected species or habitats are found.

Overall, given the localised nature of the potential drill cuttings pile disturbance and the short-term nature of the decommissioning activities, the magnitude of the impacts on seabed habitats and fauna is considered to be minor from the Cormorant Alpha cuttings pile disturbance. While THC concentrations are high in the Cormorant Alpha drilling cuttings pile, larger scale drill cuttings disturbance events have been recorded in which there was no major effect on the spatial distribution of cuttings contamination, or on biological communities located more than 100 m from the disturbance location. In addition, when compared to trawling activities the potential impacts from the proposed decommissioning activities are short term and therefore the impact on benthic fauna, water quality and fish is expected to be minimal.

In conclusion, the small amount of material which could potentially be redistributed outside the existing cuttings accumulation area, the tolerance of the fauna to low levels of toxicity, and the limited potential for smothering and anoxia indicate that there will be no significant impacts on the benthos from disturbance of the cuttings accumulation.

Consequence	Significance
Low	Not significant

7 CONCLUSIONS

Following detailed review of the proposed decommissioning activities, the environmental sensitivities characteristic of the area surrounding the Conductor Guide Frames and Alwyn Riser, industry experience and consideration of stakeholder concerns, it was determined that potential project-related impacts to the seabed, and commercial fisheries required further consideration.

The Cormorant Alpha platform is located approximately 104 km offshore in the NNS, remote from coastal sensitivities. There are no NCMPAs or SPAs within 40 km of the Cormorant Alpha platform.

The proposed decommissioning activities could result in temporary direct and indirect disturbance to the seabed (Section 6.3). Temporary direct disturbance has the potential to impact approximately 0.0056 km^2 of seabed. Temporary indirect disturbance has the potential to impact approximately 0.011 km^2 of seabed. Considering the temporary and/or localised nature of the activities and the mitigation measures outlined, the habitat, though sensitive, is not likely to be affected significantly by the decommissioning. Based on the anticipated localised and temporary nature of the disturbance, the proposed decommissioning of the Conductor Guide Frames and Alwyn Riser will have a low impact on seabed receptors.

This EA has considered the objectives and marine planning policies of the NMP across the range of policy topics including biodiversity, natural heritage, cumulative impacts and the oil and gas sector. TAQA considers that the proposed decommissioning activities are in alignment with these objectives and policies.

Based on the findings of this EA including the identification and subsequent application of appropriate mitigation measures, and project management according to TAQA's HSSE Policy and EMS, it is considered that the proposed Conductor Guide Frames and Alwyn Riser decommissioning activities do not pose any significant threat of impact to environmental or societal receptors within the UKCS.

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APPENDIX A - TAQA HSSE POLICY

TAQA UK Health, Safety, Security and Environment Policy

The health, safety and security of our employees, contractors and the public is our highest priority; it is more important than any operational priority.

We must also:

- Ensure that our assets are operated safely
- Assure the integrity of our assets
- Respect, protect and understand the natural environment

HSSE = Health, Personal Safety, Major Accident Prevention, Security and Environment

We strongly believe that excellent business performance requires excellent HSSE performance – we recognise this as a core value.

Employees and contractors are required to focus on the four areas below:

Leadership

- Everyone within TAQA demonstrates commitment and accountability to implement this policy and to work in accordance with the TAQA Management System Elements and Expectations
- Everyone within TAQA understands their accountabilities for the management of HSSE
- The structure and resources necessary to achieve and measure HSSE accountabilities are provided
- Requirements of applicable legislation and standards are identified, understood and complied with
- Personnel have the required competencies and are fit for work
- Our workforce is aligned, involved and empowered in the identification and management of HSSE hazards and the achievement of our HSSE goals
- Key stakeholder groups are identified and a good working relationship is maintained with them (understanding and addressing their issues and concerns)

Operational Risk Identification and Assessment

- Risks are identified, assessed and appropriately managed
- Information required to support safe operation is identified, accurate, available and up to date

Operational Risk Management

- The standards, procedures and operating manuals required to support project, maintenance and operational activities are identified, developed, understood and consistently applied
- Process and operational status monitoring and handover requirements are defined, understood and carried out
- Operational interfaces with third parties are identified, assessed and appropriately managed

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TAQA UK Health, Safety, Security and Environment Policy

- Risks arising from any form of change are systematically identified, assessed and managed
- A systematic process is in place to verify the safe condition of plant and equipment and to ensure that personnel are appropriately prepared (before start-up or return to normal operations)
- We are appropriately prepared for all necessary actions which may be required for the protection of the public, personnel (including contractors), the environment, plant equipment and reputation in the event of an incident
- We aim to prevent pollution and protect the environment from the impact of our operations

Review and Improvement

- We routinely monitor our activities through internal/external audits and produce key performance indicators – we review these indicators and intervene as necessary
- Compliance with our expectations is routinely reviewed and audited to determine whether this policy remains appropriate and is being implemented effectively
- The management system is routinely reviewed for continual improvement and to enhance HSSE performance
- All incidents, near misses and opportunities for improvement are consistently reported and investigated, and that identified actions and learnings are implemented on a timely basis

We all have a personal responsibility to work safely and protect the environment. We are all safety leaders, irrespective of our role or location. Everyone is empowered to challenge and stop work if they are in any doubt regarding a job they are involved in or observing.

Sandy Hutchison, Managing Director

Brad Youngson,
HSSEQ & Assurance Director

Calum Riddell,
Operations Director

David Wilson,
Decommissioning, Projects & Engineering Director

Jeremy Kibble,
Finance Director

Rachel Lucken,
Human Resources Manager

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