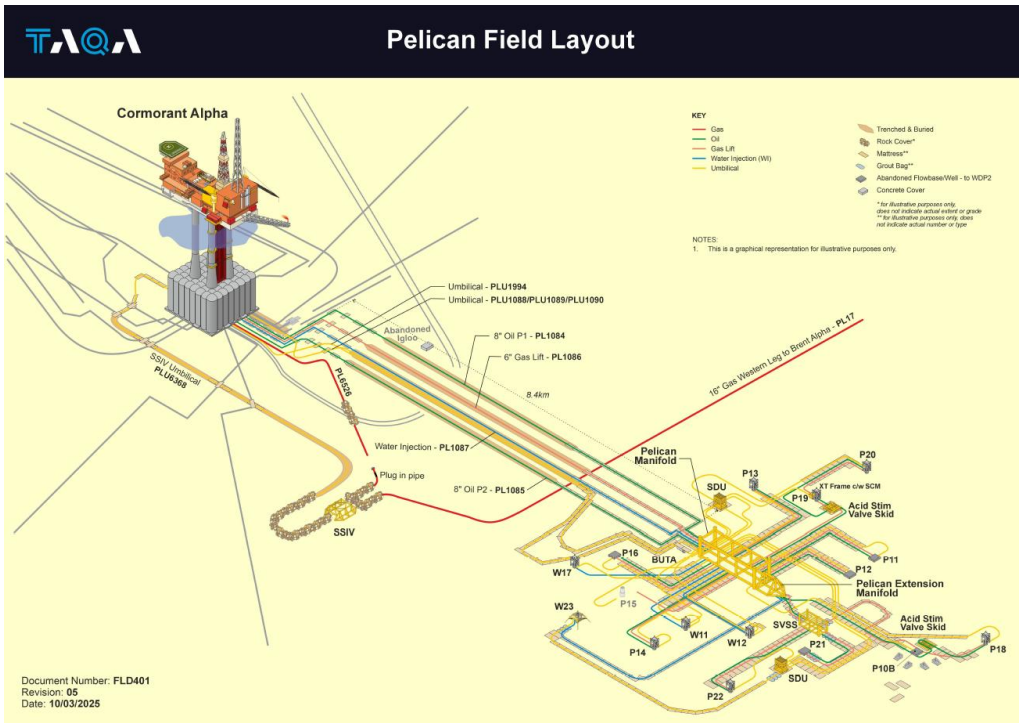
PELICAN DECOMMISSIONING

Pelican Subsea Facilities 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
BEIS	Department for Business, Energy and Industrial Strategy
BUTA	Bullhead Umbilical Termination Assembly
CA	Comparative Assessment
CAD	Computer-Aided Design
CCC	Committee on Climate Change
Cd	Cadmium
CFCs	Chlorofluorocarbons
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
CP	Cuttings Pile
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
DR MPA	Demonstration and Research Marine Protected Area
DSV	Dive Support Vessel
DTI	Department of Trade and Industry
EA	Environmental Appraisal
EBS	Environmental Baseline Survey
EC	European Commission
EMS	Environmental Management System
EPS	European Protected Species
ERL	Effect Range Low
EU	European Union
EUNIS	European Nature Information System

Abbreviation	Meaning
EWC	European Waste Catalogue
GHG	Greenhouse Gas
GIS	Geographical Information Systems
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
IOGP	International Association of Oil and Gas Producers
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
MFE	Mass Flow Excavation
mLAT	Lowest Astronomical Tide
MMO	Marine Management Organisation
MPA	Marine Protected Area
MPE	Ministry of Petroleum and Energy
N_2O	Nitrous oxide
NCMPA	Nature Conservation Marine Protected Area
Ni	Nickel
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NNS	Northern North Sea
NOAA	National Oceanic and Atmospheric Administration
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)
OGUK	Oil and Gas UK
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	The Oslo Paris Convention

Abbreviation	Meaning
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
PMF	Priority Marine Feature
ROV	Remotely Operated Vehicle
ROVSV	Remotely Operated Vehicle Support Vessel
SAC	Special Area of Conservation
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SACFOR	Super-Abundant, Abundant, Common, Frequent, Occasional, Rare
SBM	Synthetic-based Mud
SCANS-IV	Small Cetaceans in European Atlantic waters and the North Sea - Fourth Series Survey
SDU	Subsea Distribution Unit
SEEMP	Shipboard Energy Efficiency Management Plan
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SMP	Sectoral Marine Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
SOSI	Seabird Oil Sensitivity Index
SO_x	Sulphur oxide
SPA	Special Protection Area
SSIV	Subsea Isolation Valve
SSVS	Subsea Valve Skid
TAQA	TAQA Bratani Limited
THC	Total Hydrocarbon Content
TOC	Total Organic Carbon
TOM	Total Organic Matter
UKBAP	United Kingdom Biodiversity Action Plan
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UKHO	UK Hydrographic Office
UKOOA	UK Offshore Operators Association
UMC	Underwater Manifold Centre
UNESCO	The United Nations Educational, Scientific and Cultural Organisation
UTA	Umbilical Termination Assembly
VOCs	Volatile Organic Compounds
WAT	Wax Appearance Temperature
WDT	Wax Dispersion Temperature
XT	Xmas Tree
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 Pelican subsea facilities. The purpose of this EA is to understand and communicate any potential significant environmental impacts associated with the proposed decommissioning of the Pelican subsea facilities. As the Pelican Field produced to the Cormorant Alpha platform, Pelican infrastructure proximate to the Cormorant Alpha platform is also considered part of the Pelican Area (see Section 3.1).

The Pelican subsea facilities are located in the United Kingdom Continental Shelf (UKCS) Block 211/26 of the Northern North Sea (NNS), in a water depth of approximately 154 m. The Pelican Field production was exported to the Cormorant Alpha platform. The Cormorant Alpha platform is located in UKCS Block 211/26, 8.3 km north northeast of the Pelican manifold, approximately 105 km northeast of Shetland and 39 km west of the UK/Norway median line.

The Cormorant Alpha platform was installed in May 1978 and began production in December 1979. TAQA Bratani Limited (TAQA) acquired the asset from Shell in 2008. The Pelican Field was discovered in 1970 and started production in 1996. The Pelican subsea facilities have not been able to produce since Cormorant Alpha's Cessation of Production (CoP), due to dependence on the Cormorant Alpha platform as its export route. CoP for Cormorant Alpha took place on 10 September 2024.

The facilities within the Pelican Area which are included in the Pelican Subsea Decommissioning Programme (Xodus, 2025a) and therefore the scope of this EA, are listed below.

1.1.1 Structures and Pipelines

- Pelican manifold (including roof panels);
- Extension manifold;
- Subsea Valve Skid (SSVS);
- Subsea Distribution Unit (SDU) 1[1];
- SDU 2[1];
- P10B Acid Skid[1];
- P19 Acid Skid[1];
- Concrete Deflectors;
- Pelican W23 Integrated Structure; and
- Pipelines and umbilicals.

[1]The removal of these structures is covered under ML/1183.

1.1.2 Protection/Stabilisation Materials

- Concrete mattresses;
- Grout bags;
- Sand bags; and
- Rock cover.

The Pelican wells PU-P10B, PU-P11, PU-P12, PU-P15, PU-P16, PU-P19 and PU-P21 will be decommissioned to Phase 3 in alignment with Offshore Energies United Kingdom (OEUK) Well Decommissioning Guidelines (OEUK, 2022). Operations will be supported by appropriate regulatory applications and submissions and are not covered within the scope of this EA, other than PU-W23. Well PU-W23 has an integrated protection structure and is therefore included in the scope of the DP and this EA.

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) 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 Environmental Assessment (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. With regards to pipelines (including flowlines and umbilicals), the Guidance Notes (BEIS, 2018) require that these should be considered on a case-by-case basis and highlights instances where pipelines could be decommissioned *in situ*. For example, pipelines that are adequately buried or trenched or which are expected to self-bury could be considered as candidates for *in situ* decommissioning. Where an Operator is considering decommissioning pipelines *in situ*, the decision-making process must be informed by a Comparative Assessment (CA) of the feasible decommissioning options. However, small diameter pipelines, including flexible flowlines and umbilicals, are expected to be entirely removed (BEIS, 2018). Finally, the Guidance Notes (BEIS, 2018) state that mattresses and grout bags installed to protect pipelines should be removed for disposal, reuse or recycling onshore if their condition allows.

1.3 Proposed Schedule

The precise timing of the decommissioning activities is not yet confirmed and will be subject to market availability of decommissioning services and contractual agreements. Plug and abandonment of W23 is expected to occur between 2026 and 2027. The removal of the wellhead protection structure associated with W23 is within scope of the DP. The potential window for the remaining Pelican infrastructure decommissioning activities is between 2030 and 2033.

1.4 Options for Decommissioning

TAQA used a CA process in line with the recommendations in the relevant Guidance (BEIS, 2018) to determine the preferred decommissioning options for the Pelican subsea infrastructure. Each decommissioning option was assessed against five criteria – safety, environment, technical, societal and economic. The CA outlined the decommissioning options available for the various types of pipelines. Recommended options for pipelines include:

- De-burial via Mass Flow Excavation (MFE) where required for buried pipelines;
- Full removal of jumpers and spools by cut and lift techniques or reverse installation;
- Full removal of spools by cut and lift removal techniques;
- Full removal of flexible flowlines and umbilical ends / lines to be decommissioned *in situ* with ends remediated with rock cover; and

- Removal and/or remediation of fishing critical spans and exposures for shallow buried / rigid pipelines to be decommissioned *in situ*. Removal of pipeline ends and remediation with rock cover.

Protection and stabilisation materials (including mattresses, grout bags and grouted supports) will be removed from the seabed. Where difficulties arise TAQA will discuss and agree with OPRED alternative decommissioning solutions.

1.5 Environmental and Socio-Economic Baseline

The key environmental and social sensitivities in the Pelican Area (described in Section 1.1) are summarised in Table 1-1. Data from the Cormorant Alpha survey area is included to provide coverage at the Cormorant Alpha end of the pipelines and to account for any environmental sensitivities near the Cormorant Alpha cuttings pile.

Table 1-1 Key Environmental and Social Sensitivities for the Pelican Area

Physical Characteristics
The water depth across the Pelican Area ranges from 142 – 156 m Lowest Astronomical Tide (mLAT) across the decommissioning area. The bathymetry across the Pelican Area is locally variable with northeast to southwest slope with a gradient of 0.06 º. The physical seabed characteristics recorded from survey work indicated medium reflectivity across most of the Pelican site relating to the ambient muddy sand sediment. Areas of higher reflectivity are associated with anchor scars radiating out from the Pelican manifold. The sediment closer to the manifold consisted of finer material intermixed with small amounts of coarse sediment. Under the European Nature Information System (EUNIS) habitat classification, the most widespread seabed type around the Pelican 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. Occasional depressions (<1 m) resembling pockmarks have been recorded throughout the Pelican and Cormorant Alpha survey area. Two cuttings piles have been identified: one at the Cormorant Alpha platform and one at the Pelican manifold. These cuttings piles result from drilling the Cormorant Alpha platform wells and the Pelican wells respectively. 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.The physical extent of the Pelican manifold cutting pile is estimated to cover an area of 25,450 m^2 and an approximate volume of 10,883 m^3. Both piles are categorised as “medium cuttings piles” (5,000-20,000 m^3 as per Norsk Olje Gass (NorOG) guidance (2016)).
Sediment Chemical Composition
Hydrocarbon concentrations in the Pelican Area were above the UKOOA 95th percentile for the NNS (20.3 mg kg^{-1}) at 90% of the survey stations. Higher levels were found at stations close to the Pelican manifold and close to the Cormorant Alpha platform where most of the stations within 190 m exceeded the OSPAR (2006) 50 mg kg^{-1} threshold. At three stations adjacent to the Cormorant Alpha platform, concentration of several metals exceeded UKOOA (2001a) 95th percentile including chromium, copper, lead and zinc. Near the Pelican manifold and P11a wellhead, concentrations of barium, chromium, copper, nickel, lead and zinc were elevated. Surveys were undertaken of the Pelican and Cormorant Alpha cuttings piles to determine their chemical composition. A gradient of total hydrocarbon content (THC) levels decreased with distance from both locations, suggesting a point source of hydrocarbons most likely related to drilling discharges, with THC levels sampled exceeding the OSPAR ‘ecological effect’ threshold in the majority of Pelican and Cormorant Alpha cuttings piles. The sediment leachate analysis results indicated that both the oil loss to the water column and the persistence of the Pelican and Cormorant Alpha cuttings pile fell below the relevant

OSPAR threshold values and could generally be ascribed as typical for cuttings piles at North Sea installations.

Seabed Habitats and Species
In broad terms, the infauna present as characterised by the most abundant species present, appears very similar in all surveys undertaken in the Pelican Area. Species consistently appearing in the lists of most abundant taxa centre were Nematoda followed by the polychaetes such as *Eclysippe vanelli, Galathowenia oculata*, and *Spiophanes bombyx* and Actiniaria. The epifauna present in all areas is generally noted as sparse (in direct contrast to the infauna) and typically features mobile species that have wide distributions throughout the North Sea.
Fish and Shellfish
The Pelican Area represents spawning ground for cod, saithe, Norway pout, whiting and haddock. Cod is the only species with a high intensity spawning ground in the Pelican Area while other species have a lower spawning intensity. The Pelican Area also represents a potential nursery ground for blue whiting, European hake, haddock, herring, ling, mackerel, spurdog, whiting and Norway pout. Blue whiting is the only species with a high intensity nursery ground in the Pelican Area while other species have a lower nursery intensity. Fisheries sensitivity maps indicates the presence, in medium densities, of juvenile fish (less than one year old) for six species within the Pelican Area. This includes haddock, whiting, Norway pout, blue whiting and European hake.
Seabirds
In the NNS the most numerous species present are likely to be northern fulmar, black-legged kittiwake and common guillemot. The Pelican Area is located within or in the vicinity of a wider area of aggregation for northern fulmar, sooty shearwater, European storm petrel, northern gannet, long-tail skua, great skua, black-legged kittiwake, great black-backed gull, lesser black-backed gull, herring gull, glaucous gull, common guillemot, razorbill, little auk and Atlantic puffin. Seabird sensitivity to oil pollution is low throughout the year in the Block 211/26 containing the Pelican infrastructure.
Marine Mammals
Harbour porpoise, Atlantic white-sided dolphin, minke whale and white beaked dolphin are the most abundant species recorded in the Pelican Area. Harbour porpoise is by far the most frequently recorded cetacean in the Pelican Area, which is reflective of this being the most abundant and widely distributed cetacean species in the North Sea. Both grey and harbour seal densities are low in the Pelican Area, 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 Pelican Area. The closest protected site is the Pobie Bank Reef SAC, approximately 63 km southwest of the Pelican Area. The seabed in the Pelican Area 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 platform and Pelican survey area. However, no features characteristic to large pockmarks were identified and ground-truthing did not identify methane derived authigenic carbonates (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. Thirteen individuals were identified across the Cormorant Alpha and Pelican surveys area but not 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 and Pelican survey areas. However upon further assessment, only one survey station recorded macrofauna burrows of a high enough density to be classified as an OSPAR habitat.
Fisheries and Shipping
The Pelican Area is located in International Council for the Exploration of the Sea (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 trawl fishing gears. Annual fishery landings by weight and value are considered to be broadly comparable to other high-performing ICES rectangles in the UKCS. Shipping density in the Pelican Area is low, with a localised increase in vessel activity around surface installations including the Cormorant Alpha platform and the Heather Alpha platform (13 km west southwest of the Pelican Area), due to the presence of operational and maintenance vessels.
Other Sea Users
The Pelican Area is located in a well-developed area for oil and gas extraction. The closest surface infrastructures include the Cormorant Alpha and Heather Alpha platforms located approximately 8 km north northwest and 13 km west southwest of the Pelican Area respectively. Apart from pipelines and cables associated with the Cormorant Alpha and Heather platforms, there are no other cables or pipelines in the vicinity. There are 23 wrecks within 40 km of Pelican Area. The two closest wrecks are unidentified non dangerous wrecks, located approximately 7 km east southeast and 9 km west northwest of the proposed decommissioning activities. The are no known interactions between the adjacent facilities and the proposed Pelican decommissioning activities, other than the Cormorant Alpha platform and the Pelican pipelines crossing over the Shell-owned, 16-inch gas pipeline (Western Leg) from Cormorant Alpha to Brent Alpha (PL17) and TAQA owned 3-inch production pipeline from well P1 to Cormorant Alpha (PL118). Decommissioning of Pelican and Cormorant Alpha are inextricably linked, as the Cormorant Alpha platform provided the only export route for Pelican production. There are no planned or operational renewable energy sites, cables or pipelines or designated military practice and exercise areas within 40 km of the Pelican Area.

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 screening exercise, and consultation with key stakeholders (the Marine Directorate, the Joint Nature Conservation Committee (JNCC) and the Scottish Fishermen's Federation (SFF)).

An impact assessment exercise addressed the proposed decommissioning activities (Section 3.3) and any potential impacts these may pose. This assessment identified 10 potential impact areas based on the chosen proposed removal method. Six potential impacts were screened out of further assessment based on the low level of severity, or likelihood of significant impact occurring. An overview of the ten potential impacts is provided in Table 1-2, together with a rationale for the screening decisions and proposed mitigation measures.

Based on the initial scoping, four aspects warrant further assessment within the EA as having potential environmental and/ or socioeconomic impacts. These are emissions to air, disturbance to the seabed, disturbance to drill cutting piles and the physical presence of infrastructure decommissioned *in situ* in relation to other sea users. These four aspects are assessed further in Sections 6.2, 6.3, 6.4 and 6.5 of this EA respectively.

Table 1-2 Environmental Impact Screening Summary for the Pelican Area Decommissioning

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Emissions to air	Yes	• Potential to contribute to global climate change. 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 Pelican 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.
Disturbance to drill cutting piles	Yes	• Potential disturbance to cuttings piles located at Cormorant Alpha, Pelican manifold and satellite wells. Potential impact of long-term discharges from degrading infrastructure on the receiving environment. 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	• Pipelines and umbilicals have been flushed to an appropriate standard. • 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. • 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 Pelican Area subsea infrastructure is estimated to require up to five vessels 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.
Physical presence of infrastructure decommissioned *in situ* in relation to other sea users	Yes	Scoping considered the highly unlikely but potentially major consequences on the fishing industry of decommissioning the infrastructure and drill cuttings piles *in situ*. The physical presence of infrastructure decommissioned *in situ* in relation to other sea users (namely commercial fisheries) has been fully assessed in Section 6.5.	See Section 6.5.

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
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 method will be determined during detailed engineering, and appropriate Marine Licence applications and a supporting environmental assessment will be submitted at that stage. • With industry-standard mitigation measures and adherence to 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. Recently published 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." On this basis, 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.
Resource use	No	• Limited raw materials required (largely restricted to fuel use). • Estimated total energy usage for the activities is 434,610 Gigajoules (GJ). • Of this total, 360,570 GJ is associated with offshore operation of vessels and 52,228 GJ with the remanufacture of recyclable materials decommissioned *in situ*. The remaining energy usage is associated with onshore transport, dismantling and recycling of materials. • Material returned to shore as a result of project activities will be managed in line with the waste hierarchy. 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.

Impact Area	Further assessment?	Rationale	Proposed Mitigation and Best Practice
Onshore impacts/ Waste	No	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's Active Waste Management Plan (AWMP), using licenced waste contractors and in liaison with the relevant Regulators. Waste management is a highly regulated activity and is considered to be of a minor consequence (not significant). It is therefore not assessed further.	• '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, 2022a) will be updated to cover the Pelican 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 *in situ* decommissioning of some infrastructure will also limit the potential for dropped objects or dislodged materials/objects. 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 DPs for the Pelican Area. 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 Pelican Area subsea 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 Pelican Area; 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 Pelican Area decommissioning activities

The Pelican Area experiences a low level of fishing activity. Trawling activity in the area is highest in close proximity to both the Cormorant Alpha platform and Pelican manifold where seabed infrastructure will be removed. From the burial data for PL1086 and PL1087 (Appendix A), it is not immediately obvious that these lines are buried within a trench. However, the average difference between the top of the pipelines (within a trench, below the seabed) and the mean seabed is 0.9 m

and 1.2 m respectively, therefore surpassing the 0.6 m threshold for minimum depth above the top of the pipeline stipulated within the Guidance Notes (BEIS, 2018). It is apparent that this depth could increase further, and this will be confirmed during pre-decommissioning surveys. Pipelines scheduled to be decommissioned *in situ*, which have existing exposures or fishing critical spans along their lengths will be appropriately remediated during decommissioning therefore no snagging risk should remain to fisheries. Overall, there is not expected to be an impact on commercial fisheries from buried infrastructure decommissioned *in situ*.

A program for monitoring pipelines scheduled to be decommissioned *in situ* will be agreed with OPRED. Should any subsequent exposures or spans appear, these will be appropriately mitigated where necessary. Pipelines scheduled to be decommissioned *in situ* which have existing exposures or free spans along their lengths will be appropriately remediated during decommissioning; no snagging risk should remain to fisheries. The drill cuttings piles to be decommissioned *in situ* fall below the relevant OSPAR threshold values for oil leaching and persistence, and trawling is not expected to spread contaminants in amounts or at rates that would pose serious wider contamination or toxicological threats to the marine environment. Overall, there is not expected to be an impact on commercial fisheries from buried infrastructure or drill cuttings decommissioned *in situ*.

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 subsea infrastructure associated with the Pelican Field, which produced to the Cormorant Alpha platform prior to Cessation of Production (CoP) of the asset.

This EA has been conducted to assess the potential environmental impacts that may result from undertaking the subsea decommissioning activities as part of the decommissioning of the Pelican Field and associated subsea infrastructure (referred to as the Pelican Area) (Figure 2-1). Various pipelines which connect Pelican subsea infrastructure to the Cormorant Alpha platform are within scope of this EA and are therefore also regarded as being part of the Pelican Area (Table 3-2)

The Cormorant Alpha platform topsides are the subject of a separate Decommissioning Programme (DP) (TAQA, 2022b) that was issued in January 2022 and subsequently approved by OPRED. The Cormorant Alpha substructure will be addressed by further DPs.

2.1 Project Overview

The Pelican infrastructure lies in Northern North Sea (NNS) UKCS Block 211/26 in a water depth of approximately 154 m. The Pelican Field produced to the Cormorant Alpha platform, along with the underwater manifold centre (UMC) and the North Cormorant platform. The Cormorant Alpha platform represents a central location for the infrastructure in Block 211/26, 8.3 km north northeast of the Pelican manifold, approximately 105 km northeast of Shetland and 39 km west of the UK/Norway median line (Figure 2-2). Crude oil which entered the platform was exported via the Brent System directly to the Sullom Voe Terminal on the Shetland Islands, together with the Cormorant Alpha production.

The Cormorant Alpha platform was installed in May 1978 and began production in December 1979. TAQA acquired the asset from Shell in 2008. The Pelican Field was discovered in 1970 and started production in 1996.

The Pelican Area has been unable to produce following Cormorant Alpha CoP, as it depended on Cormorant Alpha as its export route. CoP for Cormorant Alpha took place on 10 September 2024.

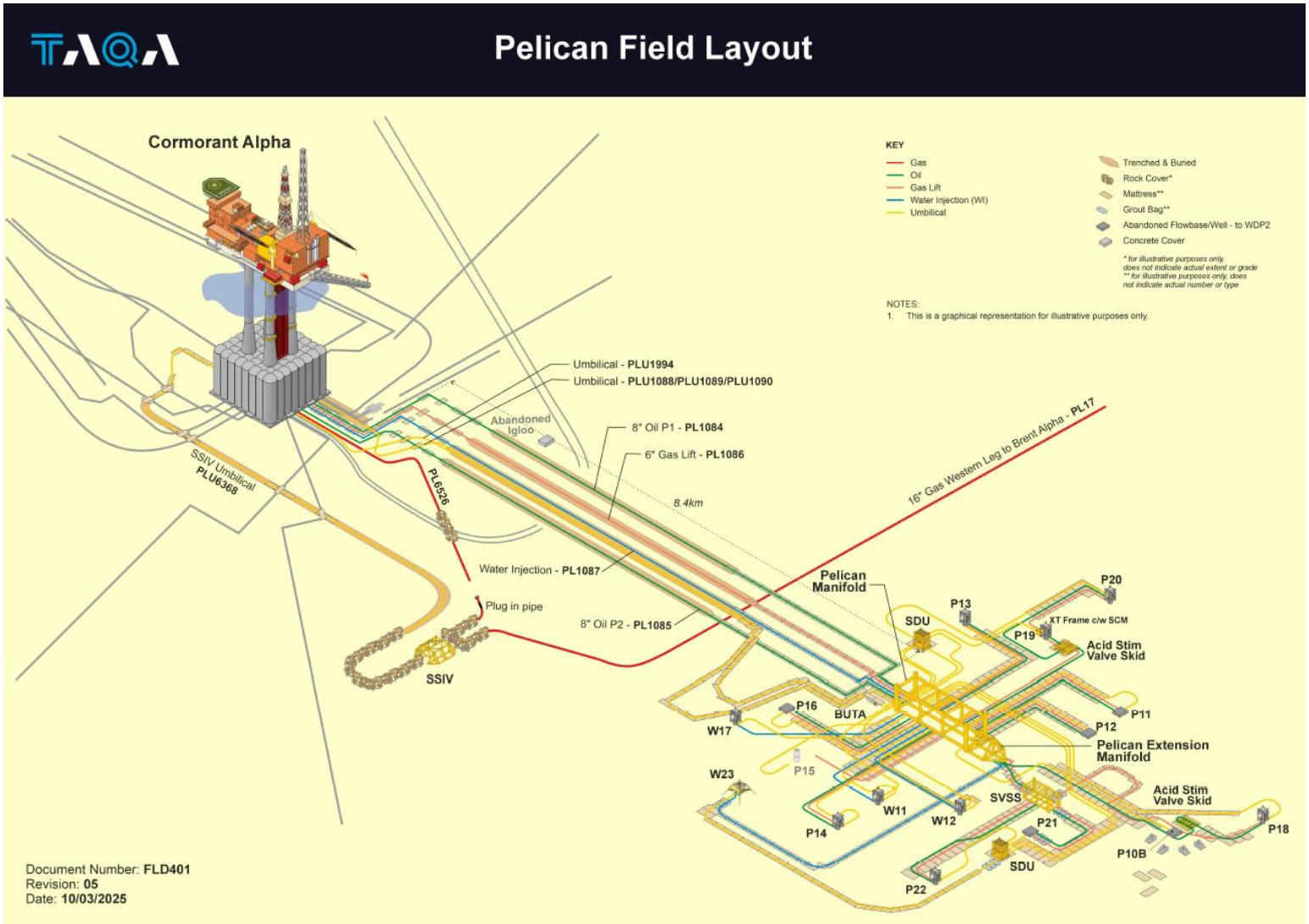


Figure 2-1 Overview of the Pelican Area Pipelines and Subsea Infrastructure

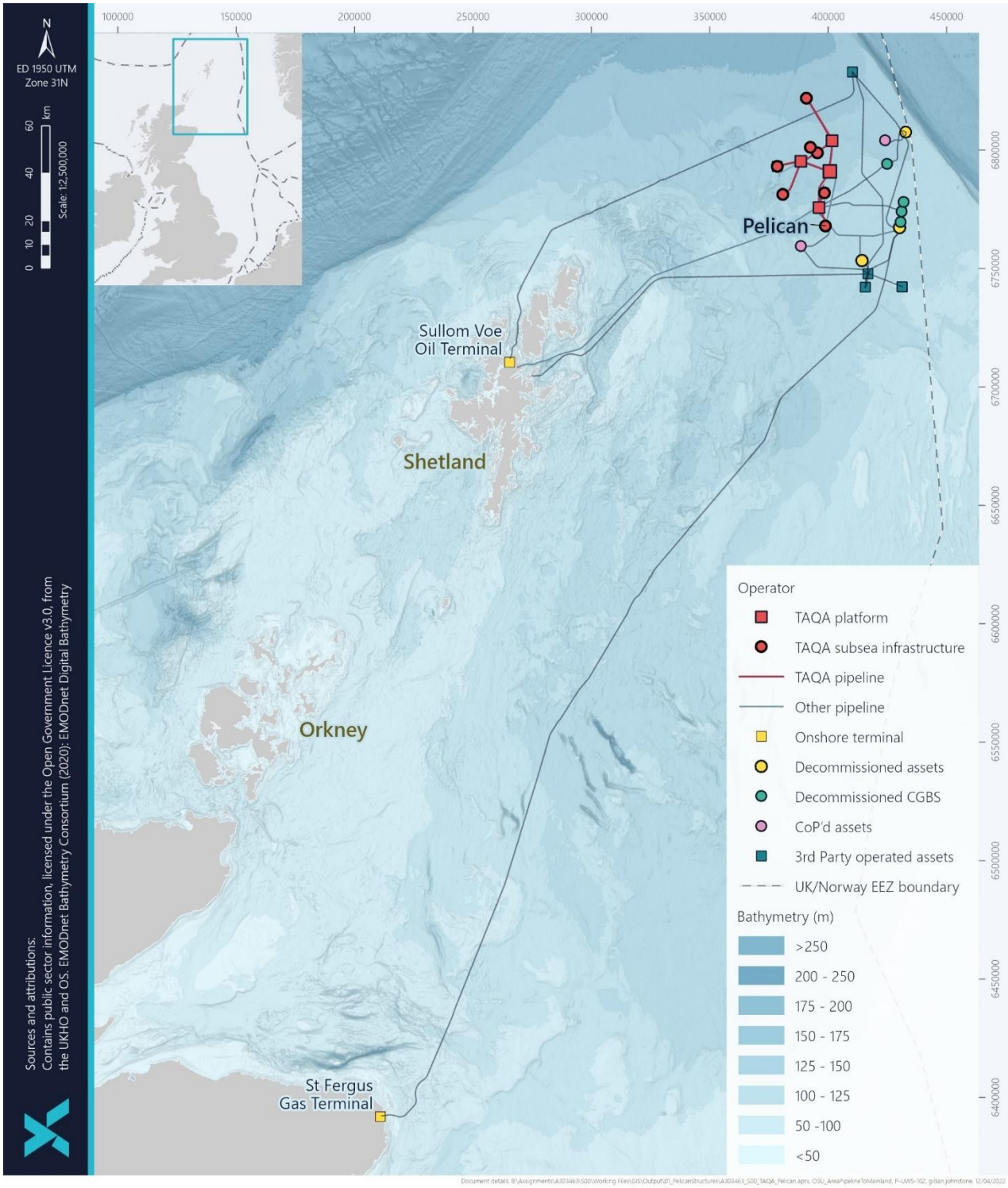


Figure 2-2 Location of the Pelican Area Subsea Infrastructure

2.1.1 Purpose of the Environmental Appraisal

This EA assesses the potential environmental impacts associated with the proposed Pelican Area subsea 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 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) Convention). 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 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 (e.g. drilling template and wellheads) 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 flowlines and umbilicals), 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 (including flexible flowlines and umbilicals), 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.*

The guidance also highlights instances where pipelines could be decommissioned *in situ*. For example, pipelines that are adequately buried or trenched or which are expected to self-bury could be considered as candidates for *in situ* decommissioning. Where an operator is considering decommissioning pipelines *in situ*, the decision-making process must be informed by 'Comparative Assessment' (CA) of the feasible decommissioning options. The CA takes account of safety, environmental, technical, societal and economic factors to arrive at a preferred decommissioning solution.

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 BEIS guidance is supported by Decom North Sea's (Decom North Sea, 2017) Environmental Appraisal Guidelines for Offshore Oil and Gas Decommissioning, 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, 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 Pelican Area infrastructure, 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 3.1.3);
- 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 Pelican Area Infrastructure

3.1.1 Decommissioning Programme

The facilities included in the Pelican Area 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 to Table 3-5.

Subsea installations (Table 3-1):

- Pelican manifold (including roof panels);
- Extension manifold;
- Subsea Valve Skid (SSVS);
- Subsea Distribution Unit (SDU) 1[1];
- SDU 2[1];
- P10B Acid Skid[1];
- P19 Acid Skid[1];
- Concrete Deflectors; and
- PU-W23 XT, flow base and wellhead

[1]The removal of these structures is covered under ML/1183.

Pipelines and umbilicals (Table 3-2):

- The production pipelines (PL1084 and PL1085), gas lift pipeline (PL1086), water injection pipeline (PL1087) and the associated risers and guide caisson, control and chemical injection umbilicals (PL1088/1089/1090 and PLU1944) and control umbilical PLU3136 connecting the Pelican manifold to the Cormorant Alpha platform;
- Production jumpers connecting the PU-P11, PU-P12, PU-P13, PU-P14, PU-P15, PU-P16 well locations to the Pelican manifold (PL1085);
- Production jumpers connecting PU-P10B to H piece tie-in flange at isolation manifold (PL1085), PU-P18 to PU-P18 acid injection jumpers (PL1085), PU-P19 acid injection jumpers to the Pelican manifold (PL1085) and PU-P20 to PU-19 Acid Skid (PL1085);
- Gas lift jumper connecting Pelican manifold to PU-P11, PU-P12, PU-P13, PU-P14, PU-P15 and PU-P16 (PL1086), Pelican extension manifold to PU-P10B (PL1086), PU-P10B isolation valve to 4” gas lift jumper, gas lift reducing jumper to 4” x 2” gas lift reducing jumper, gas lift flexible jumper to PU-P18 isolation valve and Pelican isolation manifold to PU-P19 tee-piece;
- Water injection jumper connecting the Pelican manifold to PU-W11, PU-W12, PU-W17 and PU-W23; and
- Control umbilical jumpers connecting the manifold umbilical termination assembly (UTA) to wells PU-P11, PU-P12, PU-P13, PU-W11, PU-W12, PU-P16, PU-P14, PU-P15, PU-W17, PU-P10B, PU-P18, PU-19 and SDU

Protection/Stabilisation materials:

- Concrete mattresses (Table 3-3);
- Grout bags and sand bags (Table 3-4); and
- Rock cover (Table 3-5).

3.1.2 Well Decommissioning

The Pelican wells PU-P10B, PU-P11, PU-P12, PU-P15, PU-P16, PU-P19 and PU-P21 will be decommissioned to Phase 3 in alignment with Offshore Energies United Kingdom (OEUK) Well Decommissioning Guidelines (OEUK, 2022). Operations will be supported by appropriate regulatory applications and submissions and are not covered within the scope of this EA, other than PU-W23. The PU-W23 Xmas tree is integrated with the wellhead structure, hence the requirement for inclusion within the scope of this EA.

Table 3-1 Pelican Area Subsea Installations

Item	Number	Size (m) [LxWxH]	Weight (Te)	Location		Comments / Status
Pelican manifold	1	19.2 x 7.6 x 4.2	127.5	WGS84 Decimal	61.0354° N 01.1292° E	Manifold structure is secured to the seabed by four steel piles. Piles to be cut to 3 m below seabed. Weight includes weight of roof panels and piles.
				WGS84 Decimal Minute	61° 02.12' N 01° 07.75 E	
Extension manifold	1	5.8 x 5.8 x 4.2	22	WGS84 Decimal	61.0353° N 01.1291° E	The manifold structure is a suction anchor foundation system.
				WGS84 Decimal Minute	61° 02.12' N 01° 07.75' E	
Pelican W23 Integrated Structure	1	4.4 x 4.1 x 3.1	52.9	WGS84 Decimal	61.0339° N 01.1295° E	Weight includes over-trawable Xmas Tree, flowbase and wellhead
				WGS84 Decimal Minute	61°02.03' N 01°07.77' E	
SSVS	1	6 x 4.5 x 3	32	WGS84 Decimal	61.0348° N 01.1291° E	The SSVS is gravity based.
				WGS84 Decimal Minute	61° 02.09' N 01° 07.75' E	
SDU 1	1	1.8 x 1.5 x 1.3	1.2	WGS84 Decimal	61.0354° N 01.1293° E	SDU 1 is gravity based.
				WGS84 Decimal Minute	61° 02.13' N 01° 07.75' E	
SDU 2	1	1.8 x 1.5 x 1.3	1.2	WGS84 Decimal	61.0327° N 01.1268° E	SDU 2 is gravity based.
				WGS84 Decimal Minute	61° 01.97' N 01° 07.61' E	
P10B Acid Skid	1	2 x 1.2 x 1.7	4	WGS84 Decimal	61.0345° N 01.1292° E	The Acid Skid is located on the seabed adjacent to well P10B. The P10B Acid Skid is gravity based.
				WGS84 Decimal Minute	61° 02.07' N 01° 07.75' E	
P19 Acid Skid	1	4.3 x 2.2 x 2.2	5.5	WGS84 Decimal	61.0353° N 01.1296° E	The Acid Skid is located on the seabed adjacent to well P19. The P19 Acid Skid is gravity based.
				WGS84 Decimal Minute	61° 02.12' N 01° 07.78' E	

Item	Number	Size (m) [LxWxH]	Weight (Te)	Location		Comments / Status
Concrete Deflector 1	1	2 x 2 x 2	10	WGS84 Decimal	61.0324° N 01.1272° E	Concrete deflector lying on the seabed surrounding Well PU-P10B.
				WGS84 Decimal Minute	61° 01.95' N 01° 07.64' E	
Concrete Deflector 2	1	2 x 2 x 2	10	WGS84 Decimal	61.0324° N 01.1271° E	Concrete deflector lying on the seabed surrounding Well PU-P10B.
				WGS84 Decimal Minute	61° 01.95' N 01°07.63' E	
Concrete Deflector 3	1	2 x 2 x 2	10	WGS84 Decimal	61.0325° N 01.1271° E	Concrete deflector lying on the seabed surrounding Well PU-P10B.
				WGS84 Decimal Minute	61° 01.95' N 01° 07.63' E	
Concrete Deflector 4	1	2 x 2 x 2	10	WGS84 Decimal	61.0325° N 01.1271° E	Concrete deflector lying on the seabed surrounding Well PU-P10B.
				WGS84 Decimal Minute	61° 01.95' N 01° 07.63' E	
				WGS84 Decimal Minute	61°02.03' N 01°07.77' E	

Table 3-2 Pelican Area Pipelines and Umbilicals

Description	Pipeline No	Diameter	Length (km)	Component Parts	Product Conveyed	From – To	Burial Status	Pipeline Status	Current Content
Production Flowline	PL1084	8”	8.601	Steel	Hydrocarbons	Pelican Manifold – pig trap on Cormorant Alpha Platform Topsides	Trenched and buried	Out of use	Treated sea water
Production Riser[2]	PL1084	8”	0.204	Steel	Hydrocarbons	El + 18.500 - EL-93.960	N/A	Out of use	Treated sea water
Production Flowline	PL1085	8”	8.489	Steel	Hydrocarbons	Pelican Manifold – Cormorant Alpha Platform	Trenched and buried	Out of use	Treated sea water
Production Riser[2]	PL1085	8”	0.204	Steel	Hydrocarbons	El + 18.500 - EL-93.960	N/A	Out of use	Treated sea water
Production Jumper	PL1085JP20	6”	0.039	Steel	Hydrocarbons	Well PU-P20 – Well PU-P19[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL1085JP21	6” & 8”	0.077	Steel	Hydrocarbons	Well P21 – SVSS SVSS – Pelican Ext Manifold[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL1085JP22	8”	0.081	Flexible	Hydrocarbons	Well PU-P22 – SSVS[1]	Surface laid	Out of use	Treated sea water
Gas Lift Flowline	PL1086	6”	8.538	Steel	Hydrocarbons	Cormorant Alpha Platform– Pelican Manifold	Trenched and buried	Out of use	Treated sea water
Gas Lift Riser[2]	PL1086	6”	0.202	Steel	Hydrocarbons	El + 18.500 - EL-93.960	N/A	Out of use	Treated sea water
Gas Lift Jumper	PL1086JP10	6”	0.083	Flexible	Hydrocarbons	SSVS – 6”x4” Tee Piece - Well P10[1]	Surface laid	Out of use	Treated sea water
Gas Lift Jumper	PL1086JP18	4”	0.040	Flexible	Hydrocarbon	Well PU-P10 – PU-P18[1]	Surface laid	Out of use	Treated sea water
Gas Lift Jumper	PL1086JP20	2”	0.038	Flexible	Hydrocarbon	Pelican PU-P19 -PU-P20[1]	Surface laid	Out of use	Treated sea water
Gas Lift Jumper	PL1086JP21	6”	0.082	Steel	Hydrocarbons	Well PU-P21 – Manifold Ext. Isolation Module[1]	Surface laid	Out of use	Treated sea water
Water Injection Riser[2]	PL1087	6”	0.202	Steel	Water	El + 18.500 - EL-93.960	N/A	Out of use	Treated sea water

Description	Pipeline No	Diameter	Length (km)	Component Parts	Product Conveyed	From – To	Burial Status	Pipeline Status	Current Content
Water Injection Jumper	PL1087JW23	6”	0.114	Flexible	Water	Manifold Ext. Isolation Module – Well W23	Surface laid	Out of use	Treated sea water
Chemical Injection Umbilical	PL1088	3/8”	8.597	Umbilical	Chemicals	Cormorant Alpha Platform – Pelican Manifold[1]	Trenched and buried	Out of use	Treated sea water
Chemical Injection Umbilical	PL1089	3/8”	8.597	Umbilical	Chemicals	Cormorant Alpha Platform – Pelican Manifold[1]	Trenched and buried	Out of use	Treated sea water
Chemical Injection Umbilical	PL1090	3/4”	8.597	Umbilical	Chemicals	Cormorant Alpha Platform – Pelican Manifold[1]	Trenched and buried	Out of use	Treated sea water
Chemical Injection Umbilical	PLU1944	4”	8.625	Umbilical	Chemicals	Cormorant Alpha Platform – Pelican BUTA	Trenched and buried	Out of use	Treated sea water
Control/ Chemical Injection Umbilical Jumper	PLU1944JPU-SDU	3/8”	0.020	Umbilical	Control/ Chemicals	Disconnected adjacent to Pelican Manifold – Pelican SDU1	Surface laid	Out of use	Treated sea water
Chemical Injection Umbilical Jumper	PLU1944JPU-P10	3/8”	0.112	Umbilical	Chemicals	Pelican Manifold - Production Well PU-P10[1]	Surface laid	Out of use	Treated sea water
Chemical Injection Umbilical Jumper	PLU1944JPU-P11	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold – Production Well PU-P11[1]	Surface laid	Out of use	Treated sea water
Control/ Chemical Injection Umbilical Jumper	PLU1944 JPU-W11	2.9”	0.057	Umbilical	Chemicals	Pelican Manifold UTA – Well PU- W11[1]	Surface laid	Out of use	Treated sea water
Chemical Injection Umbilical Jumper	PLU1944JPU-P12	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold UTA – Production Well PU-P12[1]	Surface laid	Out of use	Treated sea water
Chemical Injection Umbilical Jumper	PLU1944 JPU-W12	2.9”	0.057	Umbilical	Chemicals	Pelican Manifold UTA – Production Wellhead PU-W12[1]	Surface laid	Out of use	Treated sea water

Description	Pipeline No	Diameter	Length (km)	Component Parts	Product Conveyed	From – To	Burial Status	Pipeline Status	Current Content
Chemical Injection Umbilical Jumper	PLU1944JPU-P13	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold UTA – Production Well PU-P13[1]	Surface laid	Out of use	Treated sea water
Hydraulic Control Umbilical Jumper	PLU1944JPU-P14	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold – Production Well PU-P14[1]	Surface laid	Out of use	Treated sea water
Chemical Injection Umbilical Jumper	PLU1944JPU-P15	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold – Production Well PU-P15[1]	Surface laid	Out of use	Sea water
Chemical Injection Umbilical Jumper	PLU1944JPU-P16	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold – Production Well PU-P16[1]	Surface laid	Out of use	Sea water
Control Injection Umbilical Jumper	PLU1944 JPU-W17	3/8”	0.057	Umbilical	Chemicals	Pelican Manifold – Well PU-W17[1]	Surface laid	Out of use	Sea water
Chemical Injection Umbilical Jumper	PLU1944JPU-P18	3/8”	0.155	Umbilical	Chemicals	Pelican Manifold UTA – Production Well PU-P18[1]	Surface laid	Out of use	Sea water
Control / Chemical Umbilical Jumper	PLU1944JPU-P19	0.5”	0.05	Umbilical	Replacement Control/ Chemicals	Pelican SDU1 – Disc. Flange adjacent to Pelican Well 19	Surface laid	Out of use	Sea water
Control / Chemical Umbilical Jumper	PLU1944JPU-P19A	1.3”, 0.97”, 1.15”	0.06	Umbilical	Chemicals	Pelican Manifold UTA – Pelican Well P19[1]	Surface laid	Out of use	Sea water
Control / Chemical Injection Umbilical Jumper	PLU1944JPU-P20	1.3”, 1.6”, 0.97”	0.08	Umbilical	Control/ Chemicals	Pelican SDU1 – Disconnected flange adjacent to Well P20	Surface laid	Out of use	Sea water
Hydraulic/ Chemical/ Electrical Control Jumper	PLU1944 JPU-P21	2.9”	0.020	Umbilical	Hydraulic/ Chemical/ Electrical Control Jumper	SDU2 – Disconnected flange adjacent to Well P21	Surface laid	Out of use	Sea water
Hydraulic/ Chemical/ Electrical Control Jumper	PLU1944 JP22	2.9”	0.04	Umbilical	Chemicals, Power	SDU2 – Well PU-P22[1]	Surface laid	Out of use	Sea water

Description	Pipeline No	Diameter	Length (km)	Component Parts	Product Conveyed	From – To	Burial Status	Pipeline Status	Current Content
Control Umbilical Jumper	PLU1944 JPU-W23	2.9”	0.120	Umbilical	Control Umbilical	SDU 2 – W23 Water Injection Tree[1]	Surface laid	Out of use	Sea water
Electric/ Signal Jumper	PLU2756	1.97”	0.115	Flexible	Power/signal	Pelican Manifold UTA – Production Wellhead PU-P10[1]	Surface laid	Out of use	Power, Signal
Replacement Control/ Chemical Umbilical Jumper	PLU2980JW11	2.9”	0.1	Umbilical	Chemicals	Pelican SDU1 – Water Injection Well W11[1]	Surface laid	Out of use	Sea water
Replacement Control/ Chemical Umbilical Jumper	PLU2980JW12	2.9”	0.1	Umbilical	Chemicals	Pelican SDU1 – Pelican Well W12[1]	Surface laid	Out of use	Sea water
Control Umbilical	PLU3136	5”	8.539	Umbilical	Power	Cormorant Alpha Platform TUTU – SDU 2	Trenched and buried	Out of use	Power
Chemical Hose	PL4026	1.3”	0.060	Umbilical	Chemicals	BUTA –Disconnected flange adjacent to Pelican Manifold	Surface laid	Out of use	Treated sea water
Chemical Hose	PL4027	1.3”	0.060	Flexible	Chemicals	BUTA - Disconnected flange adjacent to Pelican Manifold	Surface laid	Out of use	Treated sea water
Chemical Hose	PL4392	1”	0.015	Chemical Hose	Methanol	Pelican Umbilical BUTA – Pelican Manifold UTA	Surface laid	Out of use	Treated sea water
Gas Lift Jumper	PL4396	2.374”	0.041	Flexible	Hydrocarbons	Pelican Manifold – Well P16[1]	Surface laid	Out of use	Treated sea water
Hydraulic Control Umbilical	PLU4447	3.9”	0.115	Umbilical	Hydraulic Fluid	Pelican Manifold – Well PU-P14[1]	Surface laid	Out of use	Treated sea water
Electrical Umbilical	PLU4448	2”	0.155	Umbilical	N/A	Pelican Manifold – Well PU-P14[1]	Surface laid	Out of use	N/A
Electrical umbilical	PLU4449	0.8”	0.115	Umbilical	N/A	PU-P14 – Well PU-P19[1]	Surface laid	Out of use	N/A
Gas Lift Jumper	PL6317	2”	0.040	Steel	Hydrocarbons	Pelican Manifold – Well P11[1]	Surface laid	Out of use	Treated sea water
Gas Lift Jumper	PL6318	2”	0.041	Steel	Hydrocarbons	Pelican Manifold – Pelican Well P16[1]	Surface laid	Out of use	Treated sea water

Description	Pipeline No	Diameter	Length (km)	Component Parts	Product Conveyed	From – To	Burial Status	Pipeline Status	Current Content
Gas Lift Jumper	PL6319	2”	0.031	Steel	Hydrocarbons	Pelican Manifold – Pelican Well P15[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6320	6”	0.029	Steel	Hydrocarbons	Well PU-P11 – Pelican Manifold[1]	Surface laid	Out of use	Treated sea water
Gas Jumper	PL6321	6”	0.038	Steel	Hydrocarbons	Well PU-P13 – Pelican Manifold[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6322	6”	0.038	Steel	Hydrocarbons	Well PU-P12 – Pelican Manifold[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6324	8”	0.110	Flexible	Hydrocarbons	Well PU-P18 – Pelican Ext. Manifold[1]	Surface laid	Out of use	Treated sea water
Water Injection Jumper	PL6327	6”	0.030	Steel	Water	Pelican Manifold – Well PU-W12[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6328	6”	0.027	Flexible	Hydrocarbons	Well PU-P19 – Pelican Manifold[1]	Surface laid	Out of use	Treated sea water
Gas Jumper	PL6329	2.5”	0.027	Flexible	Hydrocarbon	Pelican Manifold – Well P19[1]	Surface laid	Out of use	Treated sea water
Gas Jumper	PL6330	2”	0.031	Steel	Hydrocarbons	Pelican Manifold – Well P12[1]	Surface laid	Out of use	Treated sea water
Gas Jumper	PL6331	2”	0.041	Steel	Hydrocarbons	Pelican Manifold – Well P13[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6332	6”	0.033	Steel	Hydrocarbons	Well P16 – Pelican Manifold[1]	Surface laid	Out of use	Treated sea water
Gas Lift Jumper	PL6333	2”	0.040	Steel	Hydrocarbons	Pelican Manifold – Well P14[1]	Surface laid	Out of use	Treated sea water
Water Injection Jumper	PL6334	6”	0.038	Steel	Water	Pelican Manifold – Well W11[1]	Surface laid	Out of use	Treated sea water
Water Injection Jumper	PL6335	6”	0.050	Steel	Water	Pelican Manifold – Well W17[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6336	6”	0.050	Steel	Hydrocarbons	Well PU-P14 – Pelican Manifold[1]	Surface laid	Out of use	Treated sea water
Production Jumper	PL6337	6”	0.023	Steel	Hydrocarbons	Manifold-Manifold[1]	Surface laid	Out of use	Treated sea water

Notes:

1. Pipelines have been disconnected at both ends and left on the seabed, adjacent to each tie-in point.
2. The riser caisson contains PL1084, PL1085, PL1086, and PL1087 risers.

Table 3-3 Pelican Area Concrete Mattresses

Location	Number	Total Weight (Te)*	Exposed/Buried/Condition
PL1084	49	480	Partially covered with sediment
PL1085	30	294	
PL1086	28	274	
PL1087	35	343	
PL1088,89,90	31	146	
PLU1944	42	198	
PL1084, PL1085, PL1086, PL1087 Shared	12	118	
On PL1085J-P21a, PL1086J-P21b, PLU1944JPU-2 from Well P21 to SVSS	5	24	
On PL1085J-P21b, PL1086J-P21a from SVSS to Ext Manifold	10	47	
On PL1086-JP10 from SSVS & Well PU-P10B	8	38	
On PL1085J-P22, PL1086J-P22 between SVSS & PU-P22	20	94	
On PL1085J-P21 from SVSS & Ext Manifold	4	19	
On PL1087J-W23 from Ext Manifold to W23 Tree	25	118	
On PLU1944JPU-W23 from SDU 2 to PU-W23	10	47	
On PL1085J-P20, PL1086J-P20 P20 to P9 Acid skid	5	24	
From Well PU-P10B to Ext. Manifold	6	28	
From Well PU-P11 to Ext. Manifold	7	33	
From Well PU-P12 to Ext. Manifold	8	38	
From Well PU-P13 to Ext. Manifold	9	43	
From Well PU-P14 to Ext. Manifold	5	24	
From Well PU-P16 to Ext. Manifold	9	43	

Location	Number	Total Weight (Te)*	Exposed/Buried/Condition
From Well PU-P18 to Ext. Manifold	5	24	
From Well PU-W17 to Ext. Manifold	4	19	
Ext Manifold	4	19	
Wet Stored	16	76	
At P16 Well site	2	9.4	
Total	**389**	**2,620.4**	

* Each mattress weights approximately 7.0 Te. Approximate mattresses dimensions are 6 m (L) x 3 m (W) x 0.15 m (H).

Table 3-4 Pelican Area Grout and Sand Bags

Location	Type	Number	Total Weight (Te)*	Exposed/Buried/Condition
PL4026, PL4027 Ext Manifold to BUTA	25 kg grout bags (0.45 x 0.35 x 0.15 m)	40	1	Partially covered with sediment
PL1085J-P22, PL1086J- Well PU-P22 At SVSS		300	7.5	
PL1085J-P22, PL1086J – Well PU-P22 At Well PU-P22		800	20	
PL1087J Between Ext Manifold & Well PU-W23		200	5	
PL1087J-W23 Between Ext Manifold & Well PU-W23		600	15	
PL4396 At Well PU-P16 Well Site		40	1	
PLU1944JPU-SDU		6	0.2	
P20 To P19 Acid Skid		24	0.6	
PLU1944JPU – Well PU-P20		6	0.2	
PLU1944J – Well PU-P19		2	0.1	
PL1085		93	2.3	
PL1086		363	9.1	
PL1087		80	2	
PL1088-89-90		300	7.5	
PL1084		350	8.8	
PLU1944		677	17	
PL1086-JP21, Between Ext Manifold To SVSS		200	5	
PL1085J-P22 Between SVSS to Ext. Manifold		300	7.5	
SVSS Tie-in Location		100	2.5	
PLU1944JPUW23 Between SDU 2 to Well PU-W23 Tree		600	15	
PLU2980J – Well PU-W11 Between SDU1 & Well PU-W11	(0.9 x 0.9 x 0.9 m)	100	2.5	
PLU2980J – Well PU-W12 Between SDU1 & Well PU-W12		100	2.5	
PL1087J- Well PU-W23 Between Ext Manifold & Well PU-W23	Sand bags	400	10	
Total grout and sand bags		**5,681**	**142.3**	

* Each grout bag weighs 25kg. Each gabion includes 40 grout bags and as a whole, weighs 1 Te.

Table 3-5 Pelican Area Rock Placement (as-laid)

Location	Total Weight (Te)	Exposed/Buried/Condition
PL1084	12,662	Spot rock placement at 8 locations along whole length of pipeline between Pelican manifold and COA Platform.
PL1085	12,737	Spot rock placement at 9 locations along whole length of pipeline between Pelican manifold and COA Platform.
PL1086	2,439	Spot rock placement at 1 location along whole length of pipeline between Pelican manifold and COA Platform.
PL1087	3,038	Spot rock placement at 2 locations along whole length of pipeline between Pelican manifold and COA Platform.
Total	**30,876**	

3.1.3 Pipeline Wax Management

Dissolved wax can be present in crude oil and may be deposited on the internal surfaces of pipelines and other production equipment under certain conditions. Wax will not be present in gas or water injection pipelines, nor in umbilicals that convey chemicals or hydraulic fluid. Wax is composed of long chain molecules containing between 18 and 50 carbon atoms. It may be deposited if the fluid temperature in a pipeline falls below the Wax Appearance Temperature (WAT) but disperses if the fluid temperature is above the Wax Dispersion Temperature (WDT). The presence of water in produced fluids in oil pipelines may reduce the likelihood of wax deposition, as the water tends to increase the temperature of the fluids. This is particularly the case towards CoP at the end of field life when the proportion of water in the fluids increases.

TAQA developed a Wax Management Strategy (2024). This included assessing the Pelican Area subsea pipelines and umbilicals using the criteria below. These were formulated as questions in a decision tree, to determine whether the presence of wax was “Possible” or “Unlikely”:

- Did the pipeline or umbilical convey crude oil? If not, wax will not be present.
- Was the arrival temperature at the downstream end of the pipeline above the WDT at CoP? If yes, then the presence of wax is unlikely, as any wax that may have been deposited early in field life will have dispersed in later field life.
- Was the arrival temperature of the fluid above the WAT throughout field life? If yes, then the presence of wax is unlikely, as wax will not have been deposited during field life.
- Was wax inhibitor used as required throughout field life? If yes, then the presence of wax is unlikely, as the inhibitor will have prevented wax deposition.
- Was an appropriate cleaning pig run through the pipeline after CoP? If yes, then the presence of wax is unlikely as the pig run will have removed it.
- Was the pipeline multiphase, i.e. did it convey a mixture of oil, gas and water, was it insulated and was there any history of wax in the line? If the answers to these questions were respectively, “yes”, “yes” and “no” then the presence of wax is unlikely. This is because the presence of water tends to elevate the temperature of the fluids, insulation tends to keep the fluids warm and a history of no wax being present in the line demonstrates that it is very unlikely to be present.

Using these criteria, TAQA concluded that wax is unlikely to be present in the majority of the Pelican Area subsea oil pipelines and will not be present in water injection pipelines, gas pipelines or umbilicals. The exceptions to this are PL1084 and PL1085 which met the criteria for possibly having wax present. In order to verify this, spools from the field were backloaded during the recent pipeline disconnection project and inspected for the presence of wax. In both cases, there was no evidence of wax in the pipelines.

In parallel with the development of the Wax Management Strategy, TAQA also commissioned a Wax Discharge Environmental Assessment (Xodus, 2024). This assessed the environmental impact of any wax that may be present in pipelines decommissioned *in situ.* The following paragraphs provide an overview of any potential environmental impacts should any pipelines decommissioned *in situ* contain any residual wax.

The Xodus (2024) study considers the following aspects in the instance that pipelines with wax are decommissioned *in situ* with no further treatment:

- The physical, chemical, and ecological properties of wax.
- Potential release pathways to the marine environment.
- Environmentally sensitive receptors and their potential mechanism of interaction with wax.

- Potential environmental impacts from wax dissolving chemical cleaning.

Any wax that enters the sedimentary environment from a degrading pipeline could be ingested by benthic organisms that rework the sediment and as a result may bioaccumulate and enter the food chain potentially causing toxicity. However, paraffinic hydrocarbons with carbon numbers greater than 14 show no chronic toxicity (CONCAWE, 2001). Additionally, due to low temperatures (~4˚C) at the seabed, any residual wax in the pipelines will have low mobility and a restricted pathway to reach the seabed. Wax is often classed as a stable chemical since it is unaffected by most common chemical reagents and at seabed conditions, no further chemical activity is envisaged. Microbial activity could, in principle, change the composition of wax over time, although this is not expected due to the limited availability of nitrogen, phosphorus and oxygen required to enable biological activity.

If released from an open pipeline, as wax has a density of less than seawater, it would rise through the water column and not interact with the seabed. Adverse impact is therefore not expected for benthos or demersal fish species.

In the water column, the limited exposure duration and low toxicity result in a negligible environmental hazard and adverse impact is not expected for the water column, pelagic fish species, marine mammals, or plankton. On reaching the sea surface although the temperature is above that at the seabed, it remains below the melting point of wax. Hence wax would remain a hard substance which will not form surface sheens or emulsions. Adverse impact is therefore not expected for seabirds either.

It can therefore be concluded that the potential environmental hazard of discharging any residual wax treatment chemical from pipelines would be greater than the limited hazard presented from leaving the immobile non-toxic wax *in situ*. The environmental impact assessment concludes that the decommissioning *in situ* with no additional intervention approach proposed by TAQA can be considered Best Available Technique (BAT)/Best Environmental Practice (BEP).

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 CA is required to identify the recommended option for decommissioning the Pelican Area pipelines which may be decommissioned *in situ*.

3.2.1 CA Overview

The Pelican Area infrastructure 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.

The pipeline groups identified during the CA specific to the Pelican Area are listed in Table 3-6.

Table 3-6 Pelican Area Pipeline Groups Identified

Field(s)/ DP	Group Number	Group Description
Pelican	Group 3	Flexible Pipelines and Umbilicals (Trenched and Buried)
	Group 9	Rigid Pipelines (Trenched and Buried)

The NNS subsea infrastructure CA process followed a combined quantitative and qualitative approach where group decommissioning options were scored using a pairwise process with 'Neutral, Stronger, Much Stronger, Very Much Stronger, Weaker, Much Weaker and Very Much Weaker' scores. For each group, the options were classified from most preferred to least preferred irrespective of the number of options for that group. The classification was performed as a balanced consideration of the five CA criteria derived from BEIS (2018) and Oil and Gas UK (OGUK; 2015) Guidance. The criteria and associated sub-criteria are listed in Table 3-7.

Table 3-7 Primary and Sub-criteria for The CA Process

Primary Criteria (weighting)	Sub-criteria
1 –Safety	Operations personnel
	Other users
	High consequence events
	Legacy risk
2 – Environment	Operational marine impact
	Atmospheric emissions & fuel consumption
	Other consumptions
	Seabed disturbance
	Legacy marine impacts
3 – Technical	Technical risk
4 – Societal	Fishing
	Other aspects
5 – Economic	Short-term costs
	Long-term costs

3.2.2 Pipeline Preferred Decommissioning Options

A CA workshop was undertaken to explain the CA process and obtain feedback from stakeholders as part of the overall NNS subsea decommissioning programme. The acceptability of decommissioning options was discussed and recorded and the most preferred decommissioning option for each segment was identified (Table 3-9).

'Depth of Burial' plots for PL1084, PL1085, PL1086 and PL1087 are provided in Appendix A and a summary of exposures and free spans is provided in Table 3-8. The burial data for PL1086 and PL1087 does not obviously indicate that these lines are within a trench, however, the average difference between the top of the pipeline (below the seabed) and the mean seabed is 0.9 m and 1.2 m respectively, therefore surpassing the 0.6 m threshold for minimum depth above the top of the pipeline stipulated within the Guidance Notes (BEIS, 2018).

Following completion of the CA, further work was undertaken that identified additional remediation may be required on some of the Pelican Area pipelines. As such, TAQA proposes the following approach to assess the worst-case environmental impact for these pipelines: rock placement to remediate spans, exposures and shallow burial < 20 m long and removal of spans, exposures and shallow burial > 20 m long by cut and lift. See Section 6.3.2.3 for further explanation.

Pipeline status will be confirmed using pipe-tracker survey techniques prior to the commencement of decommissioning activities, to provide an accurate and current picture of the situation for each of the Pelican Area pipelines proposed to be decommissioned *in situ*. Should remediation of these pipelines be required following the pre-decommissioning surveys, a Marine Licence will be sought at the appropriate time.

Table 3-8 Pelican Area Pipeline Exposures and Free Spans

Line	Free spans	Exposures	Length of exposure (m)	Total length of exposures (m)
PL1084	4	14	0.8 - 20.3	135.1
PL1085	2	13	1.4 - 15.1	84
PL1086	3	54	0.4 - 23.4	318.9
PL1087	2	142	0.5 - 21.6	697.4

Table 3-9 Preferred Decommissioning Methods for the Pelican Pipelines and Umbilicals

Equipment	Description	Selected Decommissioning Option
PL1084 Production Pipeline[1]	The rigid pipeline runs from the Pelican manifold to the Cormorant Alpha platform. Short lengths adjacent to the Cormorant Alpha platform and the Pelican Manifold are on the seabed surface with the majority of the 8" production line being trenched with localised (limited) natural backfilling and some spot rock cover.	**4C: Remove areas of spans/exposure/shallow burial.** Pipelines will be disconnected. Removal and recovery of the surface laid sections out with existing trenches. Rock placement to remediate snag risk from cut ends. Removal of areas of span, exposure and shallow burial depth (<0.6 m) using cut and lift techniques. Areas of pipeline which are suitably trenched or buried will be decommissioned *in situ.* If following pre-decommissioning surveys fishing critical spans are identified, the full length of the span would be remediated.
PL1085 Production Pipeline[1]	The rigid pipeline runs from the Pelican manifold to the Cormorant Alpha platform. Short lengths adjacent to the Cormorant Alpha platform and the Pelican Manifold are on the seabed surface with the majority of the 8" production line being trenched with localised (limited) natural backfilling and some spot rock cover.	
PL1086 Gas Lift Pipeline[1]	The rigid pipeline runs from the Cormorant Alpha platform to the Pelican manifold. Short lengths adjacent to the Cormorant Alpha platform and the Pelican manifold are on the seabed surface, with the majority of the 6" gas lift line being trenched with localised (limited) natural backfilling and some spot rock cover.	
PL1087 Water Injection Pipeline[1]	The rigid pipeline runs from the Cormorant Alpha platform to the Pelican manifold. Short lengths adjacent to the Cormorant Alpha platform and the Pelican manifold are on the seabed surface, with the majority of the 8" water injection line being trenched with localised (limited) natural backfilling and some spot rock cover.	
PL1088/1089/1090 Control Umbilical (failed)	The umbilical runs from the Cormorant Alpha platform to the Pelican manifold and is 8.654 km long. The umbilical is trenched with some natural backfill.	**5: Remove ends & remediate snag risk** Pipeline/Umbilicals will be disconnected. Removal by cut and lift of surface laid sections out with existing trenches (including transitions). Rock placement to remediate snag risk from cut ends[2]. If following pre-decommissioning surveys fishing critical spans are identified, the full length of the span would be remediated.
PLU1944 Control Umbilical (replacement)	The umbilical runs from the Cormorant Alpha platform to the Pelican manifold and is 8.583 km long. The umbilical is laid within the same trench as the original umbilical (PL1088/PL1089/PL1090).	
PLU3136 Control/Power umbilical	The umbilical runs from the Cormorant Alpha platform to the Pelican manifold and is 8.54 km long. The umbilical is laid within the same trench as water injection pipeline PL1087.	
Flexible Risers and Riser Umbilicals, Rigid risers, Spools and jumpers, Protection and Stabilisation relating to all of the above pipelines and umbilicals		**Full removal**

Notes:

1. TAQA is committed to undertaking a pre-decommissioning pipe-tracker (depth of burial) survey along the Pelican Area pipelines to assess the extent of natural backfill pre-decommissioning and inform the requirement for remediation activities. In the instance that additional backfill has occurred, TAQA will ensure that focussed remediation is undertaken and is limited to the pipeline lengths still showing evidence of spanning, exposure or <0.6 m burial.
2. Limited sections of surface laid pipelines and umbilicals in close proximity to the Cormorant Alpha platform Concrete Gravity Base Structure (CGBS) may be decommissioned in place, subject to derogation to decommission the CGBS in place and agreement with OPRED. "Close proximity" is considered within approximately 75 m of the platform CGBS. Logical break points between portions decommissioned *in situ* and portions removed will be selected, e.g., pipeline crossings, etc. This option represents a reasonable balance between the level of risk associated with removing the facilities, the degree of disturbance of the seabed, the use of resources during decommissioning and following decommissioning, and the loss of amenity for other sea users. If derogation to decommission the CGBS in place is not granted, all surface laid pipelines and umbilicals will be recovered and taken to shore for appropriate re-use, recycling, or disposal. The precise limit of "close proximity" will be agreed with OPRED on a case by case basis for each pipeline and umbilical.

3.2.3 Subsea Installations Selected Decommissioning Options

The Guidance (BEIS, 2018) states that subsea installations must be completely removed for reuse or recycling or final disposal on land, unless there are exceptional and unforeseen circumstances that prevent their removal. Any piles used to secure such installations in place should be cut 3 m below natural seabed level as to ensure that any remains are unlikely to become uncovered. Table 3-10 outlines the selected decommissioning options for the Pelican Area subsea installations.

Table 3-10 Decommissioning Options for the Pelican Area Subsea Installations

Field(s)/ DP	Equipment	Description	Selected Decommissioning Option
Pelican	Water injector well 211/26a-P21Z (PU-W23)	Well includes a horizontal Xmas Tree, flow base and integrated wellhead.	Phase 3 abandonment with reference to OEUK guidance. Remove Xmas trees, wellheads and the well conductor section (cut 3 m below the seabed) to shore for reuse, recycling, or appropriate disposal.
	Manifold	Manifold, which includes various equipment, e.g., piping, valves, distribution unit and control jumpers. The manifold comingles production from the production wells into the production pipelines PL1084 and PL1085, routes lift gas from gas lift pipeline PL1086 to each of the production wells, routes water injection from the water injection pipeline PL1087 to the water injection wells and distributes control, chemicals and power to all wells. The manifold structure is secured to the seabed by four steel piles.	Cut piles at 3 m below seabed, recover to shore for reuse, recycling, or appropriate disposal.
	Extension Manifold	Extension manifold structure, connected to the Pelican manifold via rigid piping, provides additional capacity to the field. The manifold is gravity based.	Return to shore for reuse or recycling or other waste treatment as appropriate.
	SSVS	The SSVS serves as an isolation module for the Pelican manifold. The SSVS is gravity based.	Return to shore for reuse or recycling or other waste treatment as appropriate.

Field(s)/ DP	Equipment	Description	Selected Decommissioning Option
	SDU-1	SDU provides distribution of control and chemical services. The SDU is gravity based.	Return to shore for reuse or recycling or other waste treatment as appropriate.
	SDU-2	SDU provides distribution of control and chemical services. The SDU is gravity based.	Return to shore for reuse or recycling or other waste treatment as appropriate.
	P10B Acid Skid	Small steel framed skid providing stimulation facilities to the P10B well.	Return to shore for reuse or recycling or other waste treatment as appropriate.
	P19 Acid Skid	Small steel framed skid providing stimulation facilities to the P19 well.	Return to shore for reuse or recycling or other waste treatment as appropriate.
	Concrete Deflectors	Concrete deflectors lying on the seabed surrounding Well PU-P10B.	Return to shore for reuse or recycling or other waste treatment as appropriate.
	Riser Caisson Structure	Caisson structure between cell top and cell wall of the COA platform.	Return to shore for reuse or recycling or other waste treatment as appropriate.

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 fields for efficiency. Activities include pipeline end and infrastructure removal, rock placement and post-decommissioning monitoring among others and different vessel types are required for these different activities. The main decommissioning vessels are likely to be Dive Support Vessels (DSV), Construction Support Vessels (CSV) and Remotely Operated Vehicle Support Vessels (ROVSV). Phase 3 well decommissioning will take place from a CSV. Time has also been accounted for a fall-pipe rock placement vessel, where rock remediation is required and survey vessels to support any non-intrusive post-decommissioning survey activities. 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 dredging and cutting activities to remove the items listed in Section 3.1. Where possible, to facilitate removal of the piled structures, it is the intent to cut each of the foundation piles 3 m below the seabed using an internal cutter to avoid having to carry out substantial seabed excavation at the pile locations. The preference is to make the cuts using abrasive water jet technology and an inert garnet cutting medium. Such jet cutters are routinely used subsea for cutting piles and provide an efficient method with little impact to the environment.

At each foundation pile location, the cutting operation will comprise the following steps;

- Removal of the locking pin securing the structure to that pile, to give access to the inside of the pile. This operation is expected to require the use of divers;
- Running an internal clean out tool to remove any sediment infill, etc. from within the pile, and then removing the tool;
- Running a jet cutter into the pile to the required cutting depth; and
- Making the pile cut and withdrawing the cutting tool.

Following removal of the subsea structure, the cut off portions of the piles will be recovered to deck. Deployment of the cleaning and jet cutting tools and recovery of the structure and pile cut-offs will be by means of Remotely Operated Vehicle (ROV) and vessel cranes. It may be necessary to install rock cover to mitigate any depressions resulting from structure removal if these cannot easily be backfilled.

3.3.3 Decommissioning of Pipelines and Umbilicals

A CA workshop was undertaken to explain the CA process and obtain feedback from stakeholders as part of the overall NNS subsea decommissioning programme. The acceptability of decommissioning options was discussed and recorded and the most preferred decommissioning option for each segment was identified (Table 3-9).

As outlined in Section 3.2.2, exposures, free spans and significant areas of shallow burial have been identified along the length of the Pelican rigid pipelines (PL1084, PL1085, PL1086 and PL1087) which were originally laid within trenches (Appendix B). Pipeline status will be confirmed using pipe-tracker survey techniques prior to the commencement of decommissioning activities, to provide an accurate and current picture of the situation for each of the Pelican Area pipelines proposed to be decommissioned *in situ*. Should remediation of these pipelines be required following the pre-decommissioning surveys, this will be carried out via the permitting process.

There are a couple of options for the removal of the surface laid (non-trenched) portions of the rigid pipelines close to the Cormorant Alpha platform and Pelican manifold including:

- Cut surface laid sections into discrete lengths and recover each section using subsea grab or similar, and
- Cut surface laid sections into discrete lengths and recover multiple sections using subsea basket to vessel.

Surface laid umbilicals will be fully removed by reverse installation, either onto a back deck mounted reel, or carousel, or cut on deck into short sections for storage before return to shore.

The cutting equipment used to cut the rigid pipeline and spools will typically be either a diamond wire saw or hydraulic shears. In terms of environmental impact and the time taken to complete the cutting operation(s), there is little difference between the two methods, especially given the relatively small diameters of the pipelines.

The majority of surface laid umbilicals, flexible spools and jumpers will be fully removed, in line with the BEIS (2018) Guidance and the CA outcomes.

Limited sections of surface laid pipelines and umbilicals in close proximity to the Cormorant Alpha platform CGBS may be decommissioned in place, subject to derogation and agreement with OPRED. “Close proximity” is considered within approximately 75 m of the platform CGBS. Logical break points between portions decommissioned *in situ* and portions removed will be selected, e.g., pipeline crossings, etc. This option represents a reasonable balance between the level of risk associated with removing the facilities, the degree of disturbance of the seabed, the use of resources during decommissioning, and following decommissioning, the loss of amenity for other sea users. If derogation to decommission the CGBS in place is not granted, all surface laid pipelines and umbilicals will be recovered and taken to shore for appropriate re-use, recycling, or disposal. The precise limit of “close proximity” will be agreed with OPRED on a case by case basis for each pipeline and umbilical.

3.3.4 Removal of Protection/Stabilisation Material

Concrete mattresses and grout bags will be removed from the seabed unless it is not feasible to do so. If recovery of the protection/stabilisation materials will not be possible, TAQA will inform OPRED and agree an alternative approach to decommissioning these items. The protection/stabilisation material in close proximity to the Cormorant Alpha CGBS may be

decommissioned in place, subject to derogation and agreement with OPRED. “Close proximity” is considered within approximately 75 m of the platform CGBS. Logical break points between portions decommissioned *in situ* and portions removed will be selected, e.g., pipeline crossings, etc. This option represents a reasonable balance between the level of risk associated with removing the facilities, the degree of disturbance of the seabed, the use of resources during decommissioning, and following decommissioning, the loss of amenity for other sea users.

3.3.5 Remediation

Some pipelines (including umbilicals) will be decommissioned *in situ* in accordance with the CA outcome. Ends of pipelines which have been cut will be remediated. At present, no fishing critical spans have been identified from the surveys, however, if pre-decommissioning surveys identify any fishing critical spans these will be remediated. The remaining buried sections of the pipelines shall be decommissioned *in situ*.

The approach to remediation will be assessed on a case-by-case basis and rock cover represents a worst-case scenario. The worst-case scenario assessment is based on rock remediation of any future spans/exposures less than 20 m and cutting out areas of spans/exposures longer than 20 m (see Section 6.3.2.3 for more detail).

Subject to future surveys, permission to deploy additional rock cover required for remediation activities would be sought via applications for the relevant environmental licences and consents. These applications would address associated seabed and emissions impacts (if required).

The factors that will be considered in determining remediation requirements include:

- The length of time required to cut a span / spans and the associated GHGs;
- The GHGs associated with quarrying, transporting, and placing rock;
- The amount of rock required to safely remediate a cut end, versus that required to remediate a span; and
- The GHGs generated by manufacturing new steel to replace steel that might have been recycled had it been recovered in the form of a spool cut out and transported to shore.

TAQA will conduct pre-decommissioning surveys within the Pelican Area prior to the commencement of the decommissioning programme and the latest environmental information will be incorporated in relevant permits. The areas of spans/exposures or shallow burial on any of these pipelines will be the subject of a future surveys and monitoring program. Should any exposures or free spans be identified during pre-decommissioning surveys, these will be appropriately remediated via rock placed by fall pipe vessel or using rock bags. An indicative and highly conservative estimate has been made for the rock cover required to remediate potential mid-line spans and exposures by the time the pre-decommissioning survey is undertaken. This estimate is based on the assumptions and approach detailed previously and a contingency for rock cover remediation, accounting for a worst-case environmental impact informed by the burial data. For estimating the tonnage and footprint of remedial rock cover, it is assumed that the rock will be laid in a 5.1 m-wide corridor and will be designed with a 1:3 slope to be overtrawlable. On this basis, the estimated total weight of rock that may be required for the remediation of spans and exposure is 1,100 Te, with a total footprint of 800 m^2.

Where required, rock cover will be used to remediate any cut pipeline ends, with a worst-case of 750 Te estimated. Rock berm profiles will be within a 10 m-wide corridor and will be designed to be overtrawlable with a 1:3 slope. Rock will be laid precisely using a fall pipe vessel or with rock bags.

The removal of the foundation piles associated with subsea structures may leave depressions in the seabed, therefore TAQA will monitor the seabed to assess any seabed depressions and ensure

that they are overtrawlable. Rock may be used as localised remediation locally for depressions where natural backfill is not possible.

3.3.6 Post-Decommissioning Surveys

Following the subsea infrastructure decommissioning, it will be necessary to identify snagging hazards associated with changes to the seabed and remove or remediate these. A clear seabed will be verified by an independent survey of the installation sites and pipeline corridors. The aim of seabed verification is to ensure the seabed is left in a safe condition for future fishing effort and in line with the guidance (BEIS, 2018).

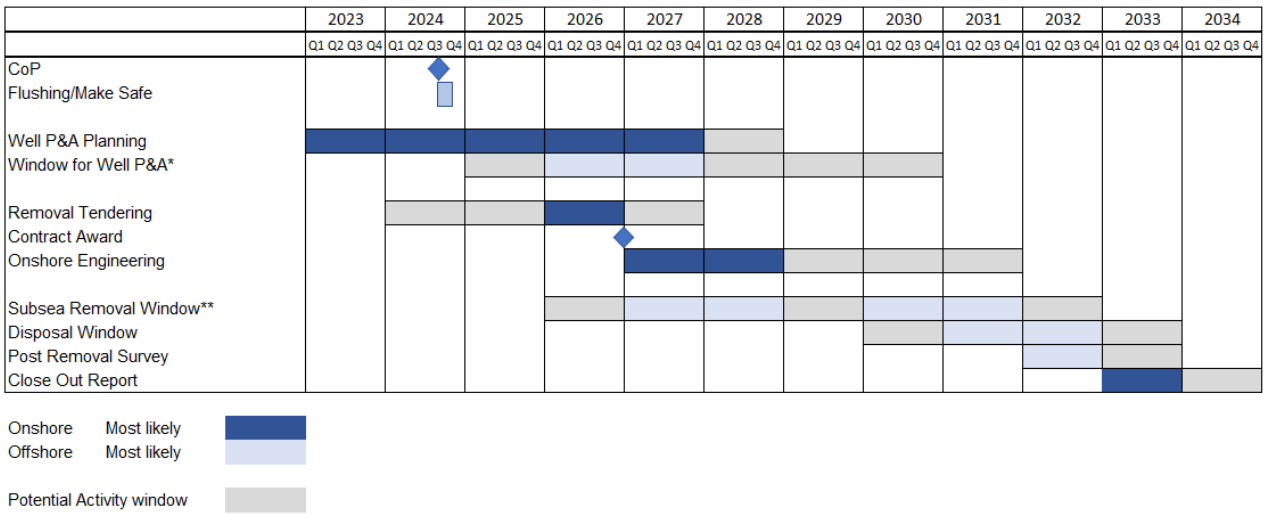
The survey methods will be discussed and finalised with OPRED prior to survey commencement to ensure the survey meets the requirements for clear seabed verification. Non-intrusive verification techniques will be considered in the first instance. These may include techniques which do not make contact with the seabed, such as side scan sonar and ROV surveys. Any oil field debris identified shall be recovered and recycled / disposed of accordingly. Relevant stakeholders, e.g. the SFF, will also be consulted on appropriate verification methods.

3.3.7 Ongoing Inspections & Evaluation

Where materials are decommissioned *in situ*, the Operator has a liability to monitor and mitigate any impacts from these materials. As the buried pipelines and associated rock remediation will likely be decommissioned *in situ*, they will be subject to on-going inspections when the Pelican Area decommissioning activities are concluded. After the initial post-decommissioning site survey reports have been sent to OPRED and reviewed, a post-decommissioning inspection regime will be agreed with OPRED by TAQA.

3.3.8 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. Plug and abandonment of W23 is expected to occur between 2026 and 2027. The removal of the wellhead protection structure associated with W23 is within scope of the DP. The window for the decommissioning of the Pelican Area subsea infrastructure is provisionally expected to be 2030 – 2033 (Figure 3-1).



* The Well P&A offshore activity shown is for Phase 3 Well Abandonment activity
**Includes the potential Pelican Riser Caisson wet storage window (2027 - 2029)

Figure 3-1 Project Schedule for the Pelican Area Infrastructure Decommissioning Activities

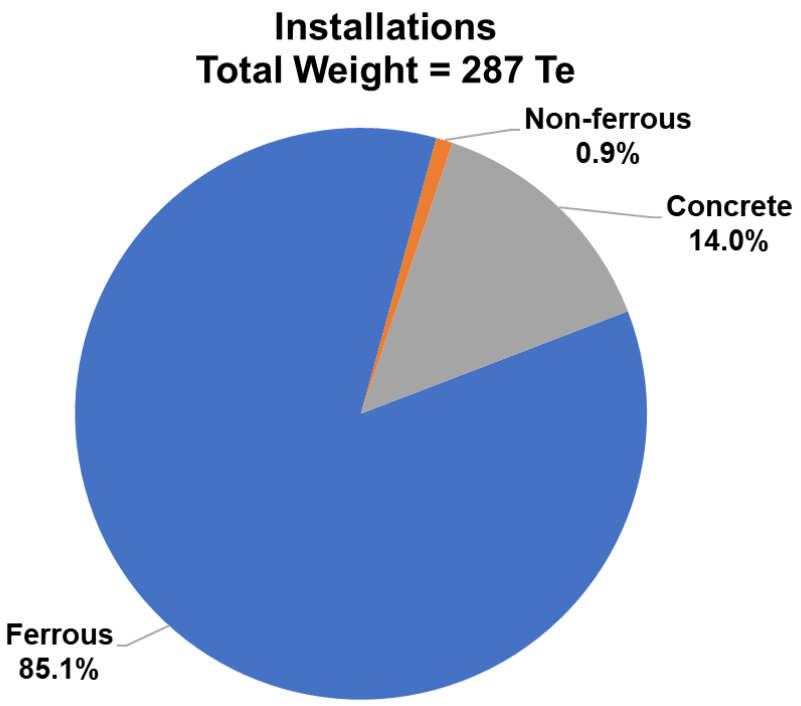
3.4 Summary of Materials Inventory

The approximate amounts of materials that make-up the Pelican Area infrasructure 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 (Xodus, 2025b) for the Pelican Area is presented in Table 3-11 and Figure 3-2.

Table 3-11 Summary of Pelican Area Subsea Materials Inventory

Material	Pelican Area				
	Pipelines / Umbilicals / Protection / Stabilisation Material (Te)	Subsea Installations (Te)	Total (Te)	Planned Tonnage decommissioned *in situ* (Te)	Planned Tonnage to Shore (Te)
Ferrous metals (all grades)	3,099	244	3,343	1,986	1,356
Non-ferrous metals (copper, aluminium alloys)	70	3	73	26	47
Plastics	623		623	505	119*
Concrete (mattresses and grout bags)	2,750	40	2,790		2,790
Other (sandbags)	10		10		10
Hazardous – Naturally Occurring Radioactive Material (NORM)	6		6	5	<1
Hazardous – Residual fluids	16		16	14	2
Total Inventory Tonnage	**6,574**	**287**	**6,861**	**2,536**	**4,325**
Rock Placement	30,876		30,876	30,876	
Total Inventory Tonnage + Rock Placement	**37,449**	**287**	**37,737**	**33,412**	**4,325**

*The proportion of plastics that will be recycled versus disposed of to landfill depends on the condition and type of the plastics when they are recovered.



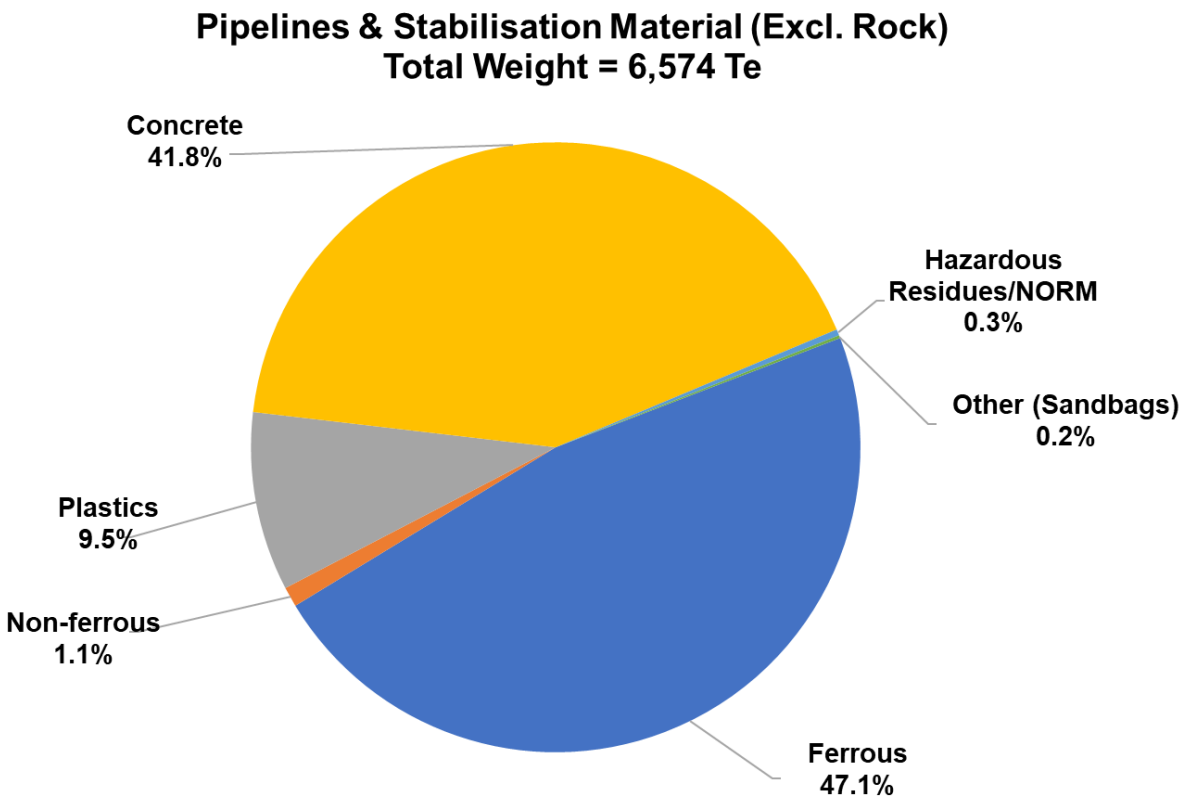


Figure 3-2 Pelican Area Subsea Infrastructure Material Inventory

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 Pelican Area subsea decommissioning activities will be non-hazardous, including steel, non-ferrous metals, plastic and concrete as outlined in Section 3.4. The majority of hazardous waste and NORM will be decommissioned in situ (Table 3-11).

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 Codes (EWC) as required for disposal of wastes within the European Union (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, concrete and plastics 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 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 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 exploration for and production of hydrocarbons in defined license areas of the UK sector of the North Sea. This scope encompasses the Pelican Area pipelines and subsea infrastructure 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 HSSE Policy is presented in Appendix C.

The project has limited activity associated with it beyond the main period of preparation for decommissioning of the Pelican Area pipelines and subsea infrastructure. 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 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 Pelican Area. 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 Pelican Area 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 GJ Strategic Environmental Assessment (OESEA) 4 programme (BEIS, 2022)) and site-specific investigations commissioned as part of the exploration and development processes. The surveys listed below provide full coverage of project area, including the Cormorant Alpha end of the pipelines, and have been used to inform this baseline section:

- Pelican Site and Environmental Survey (Gardline, 2009);
- Pelican Manifold – Pre-Decommissioning Cuttings Pile, Environmental Baseline and Habitat Survey (Benthic Solutions, 2020)
- Cormorant Alpha Environmental Monitoring Survey (Fugro, 2013); and
- Cormorant Alpha combined Environmental Baseline, Habitat Assessment Survey and Cuttings Pile Assessment Report (Benthic Solutions, 2024)

4.1 Seabed Environment

4.1.1 Bathymetry

The water depth within the Pelican Area ranges from approximately 142 – 156 mLAT. The topography of the seabed is undulating with a northeast to southwest slope gradient of 0.06º throughout (Benthic Solutions, 2020).

The Pelican Area infrastructure is not located on any large-scale features of functional significance such as shelf deeps, shelf banks and mounds, seamounts, or continental slopes (NMPI, 2024), although potential pockmarks or seabed depressions, boulders, scour marks and anthropogenic debris were recorded around the Pelican manifold and along the main pipeline route to the Cormorant Alpha platform (Benthic Solutions, 2020) (see Section 4.2.3.1).

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, 2024). 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 within the Pelican Area ranges from 2.71 – 3.00 m and the annual mean wave power ranges from 36.1 – 42.0 kW/m (NMPI, 2024).

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 Pelican 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 surveys conducted in the project area have all indicated similar species and sediment compositions which provide evidence of a relatively uniform nature of the seabed habitats and communities in the vicinity of the Cormorant Alpha platform area, Pelican pipeline route and the wider NNS setting. All Benthic Solutions (2020) survey reports covering the Pelican Area have been assessed and the full coverage of the field surveys conducted in the area, including sampling station locations, are shown in Figure 4-1.

Under the European Nature Information System (EUNIS) habitat classification, the most widespread seabed type around the Pelican Area and Cormorant Alpha platform are predicted to be MD52: “Atlantic offshore circalittoral sand,” which represents offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands.

The physical seabed characteristics recorded from survey work show the sediment at the Cormorant Alpha platform generally conformed to a 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, 2024).

The physical seabed characteristics recorded from (Benthic Solutions, 2020) survey work in Pelican Area indicated medium reflectivity across most of the Pelican manifold site relating to the ambient muddy sand sediment. Areas of higher reflectivity are also associated with anchor scars radiating out from the Pelican manifold. The sediment closer to the manifold consisted of finer material intermixed with small amounts of coarse sediment. The Environmental Baseline Survey (EBS) revealed the sands and fines observed in the wider area were olive grey in colour according to the Munsell classifications, which is expected for offshore marine sediments of this type (Benthic Solutions, 2024).

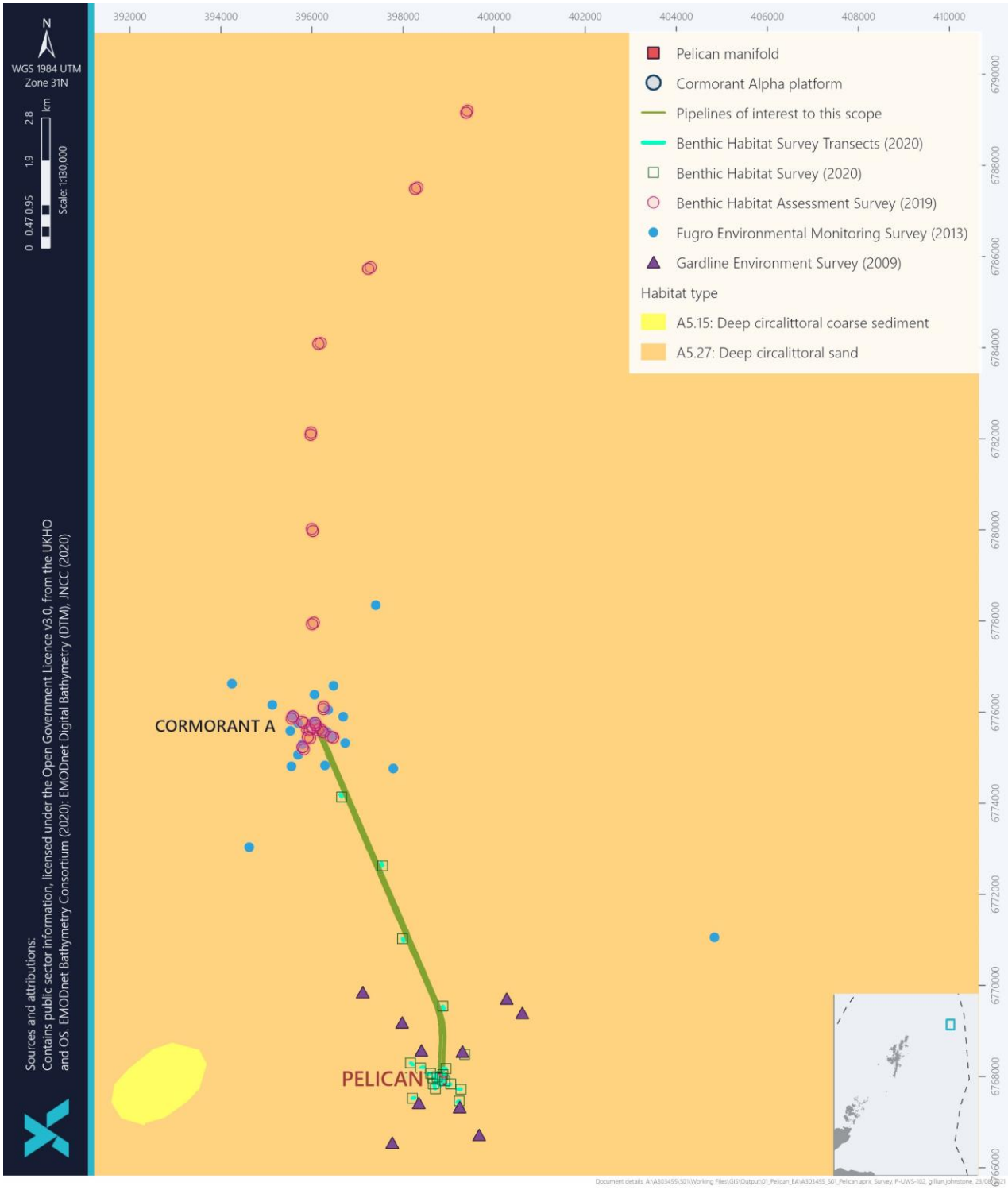


Figure 4-1 Coverage of Environmental Surveys in the Pelican and Cormorant Alpha Areas

Generally, the sediment characteristics reported by more recent surveys are comparable to those identified from earlier surveys, indicating limited temporal variability. Images of the seabed in the Pelican survey area are presented in Figure 4-2 (Gardline, 2009; Benthic Solutions, 2020).

Sediment analysis across the wider Cormorant Alpha 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 (Benthic Solutions, 2024) environmental 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, 2024). 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, 2024).

Similarly, sands dominated the stations surrounding the Pelican manifold and along the line routes from the Pelican manifold to the Cormorant Alpha environmental survey area, ranging from 33.1% - 90.0% of the sediment composition (Benthic Solutions, 2020). The mean particle size within the Pelican Area ranged from 0.02 mm to 0.23 mm demonstrating high variability in sediment sizes.

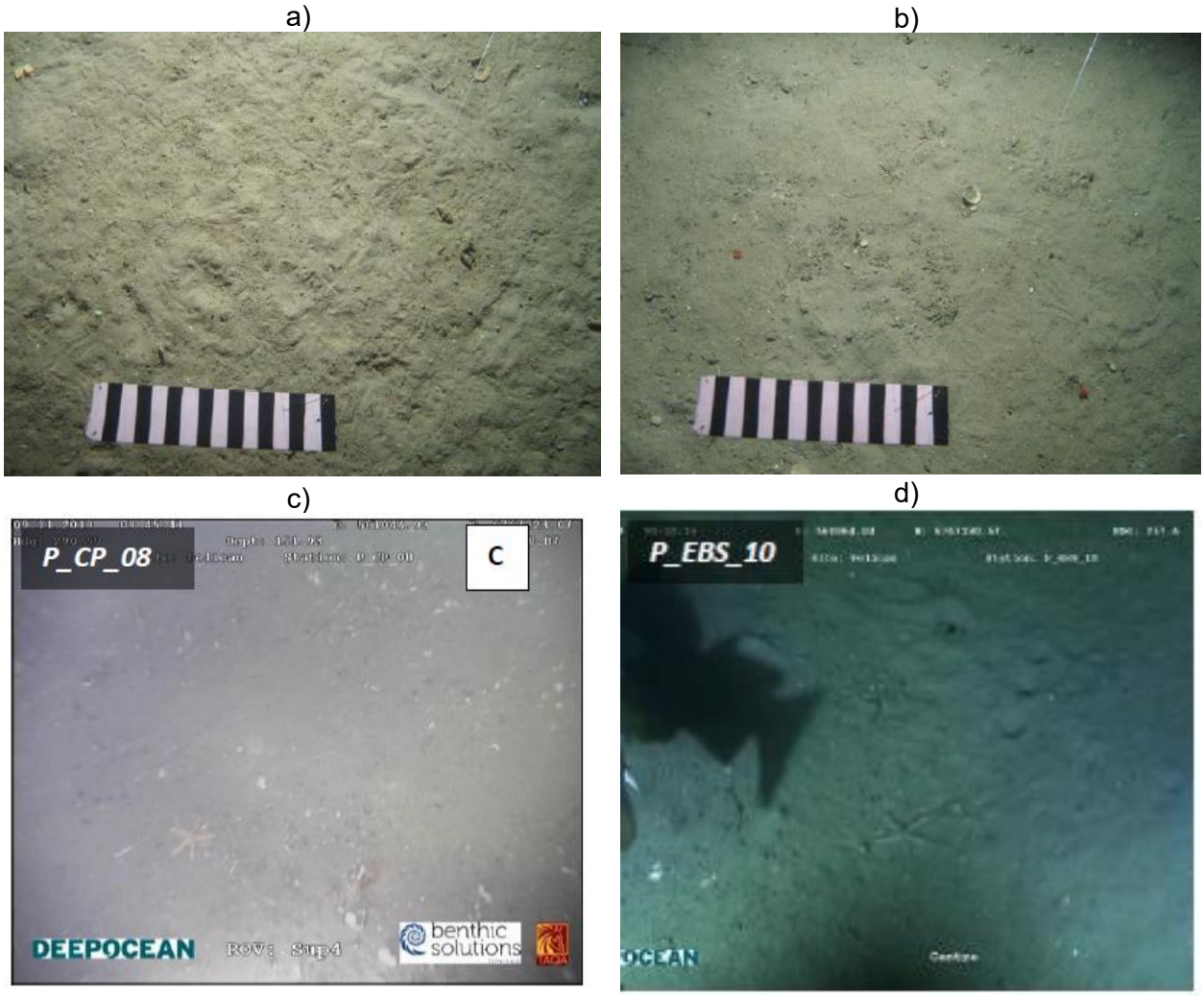


Figure 4-2 Seabed Imagery from the Pelican Area (Scale bars with 1 cm divisions shown) a) b) (Gardline, 2009), c) d) (Benthic Solutions, 2020)

4.1.4.2 Chemical Characteristics

Of relevance to the offshore oil and gas industry are metals associated with drilling-related discharges. Cuttings accumulate at drilling sites and comprise small amounts of drilling fluids which bind to drilling muds and rock fragments (cuttings) during the drilling activity, with larger particles settling rapidly to the seabed. Finer sediments comprising clay particles can be carried further away from platforms by water currents.

The discharge of oil-based muds (OBMs) was banned in the UK in 1984 (PARCOM, 1984), with their use also prohibited for exploratory drilling in 1987 and for all drilling in 1988. As a result, OBMs were gradually replaced by Low Toxicity OBMs, synthetic based muds (SBMs) and water-based muds (OSPAR, 2009b). These fluids consist of water and non-water dispersible fluids and include weighting agents like barium sulphate and other additives for viscosity, scale and corrosion control. The presence of barium (Ba) is frequently used to detect the deposition of drilling fluids around offshore installations (Muniz *et al*., 2004). Solid barites are often discharged during the drilling process and contain measurable concentrations of heavy metals as impurities, 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 1.456 mg kg^{-1} and were found to exceed the UK Offshore Operators (UKOOA) (2001a) 95th percentile (577.6 mg kg^{-1}) for the 8 out of 10 stations sampled >125 m from platform centre (Benthic Solutions, 2024). 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}). Heavy metal concentrations along the Pelican to Cormorant Alpha pipeline route were low and reflected background conditions for this region of the NNS, while stations closely related to the Pelican cutting pile (<120 m) demonstrated moderate levels of contamination relating to the drilling activity at the manifold (Benthic Solutions, 2020).

At three stations adjacent to the Cormorant Alpha platform, concentration of several metals exceeded 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, 2024).

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 mean 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 (Benthic Solutions, 2024). Levels of THC were found to decrease with distance from the platform (Benthic Solutions, 2024). Similar THC concentrations were noted between the stations located at >250 m distance as would be expected for the natural sediment sampled away from the influence of the Cormorant Alpha platform and the Pelican wellheads.

4.1.5 Drill Cuttings Piles

Surveys were undertaken of the Cormorant Alpha (Benthic Solutions, 2024) and Pelican (Benthic Solutions, 2020) cuttings piles to characterise their 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 strategies 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 each 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).

These survey data were 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 Sections 4.1.5.1 and 4.1.5.2 on both the Cormorant Alpha platform and Pelican manifold cuttings piles. Due to the proximity of decommissioning activities to both the Pelican manifold and the Cormorant Alpha platform, both cuttings piles are further assessed in terms of the potential disturbance to the seabed (Section 6.4).

4.1.5.1 Physical Characteristics

4.1.5.1.1 Cormorant Alpha

Bathymetry data (Benthic Solutions, 2014) revealed a cuttings pile with a 10 m elevation above the CGBS cell tops at the southeast corner of the CGBS. 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 4-3. 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).

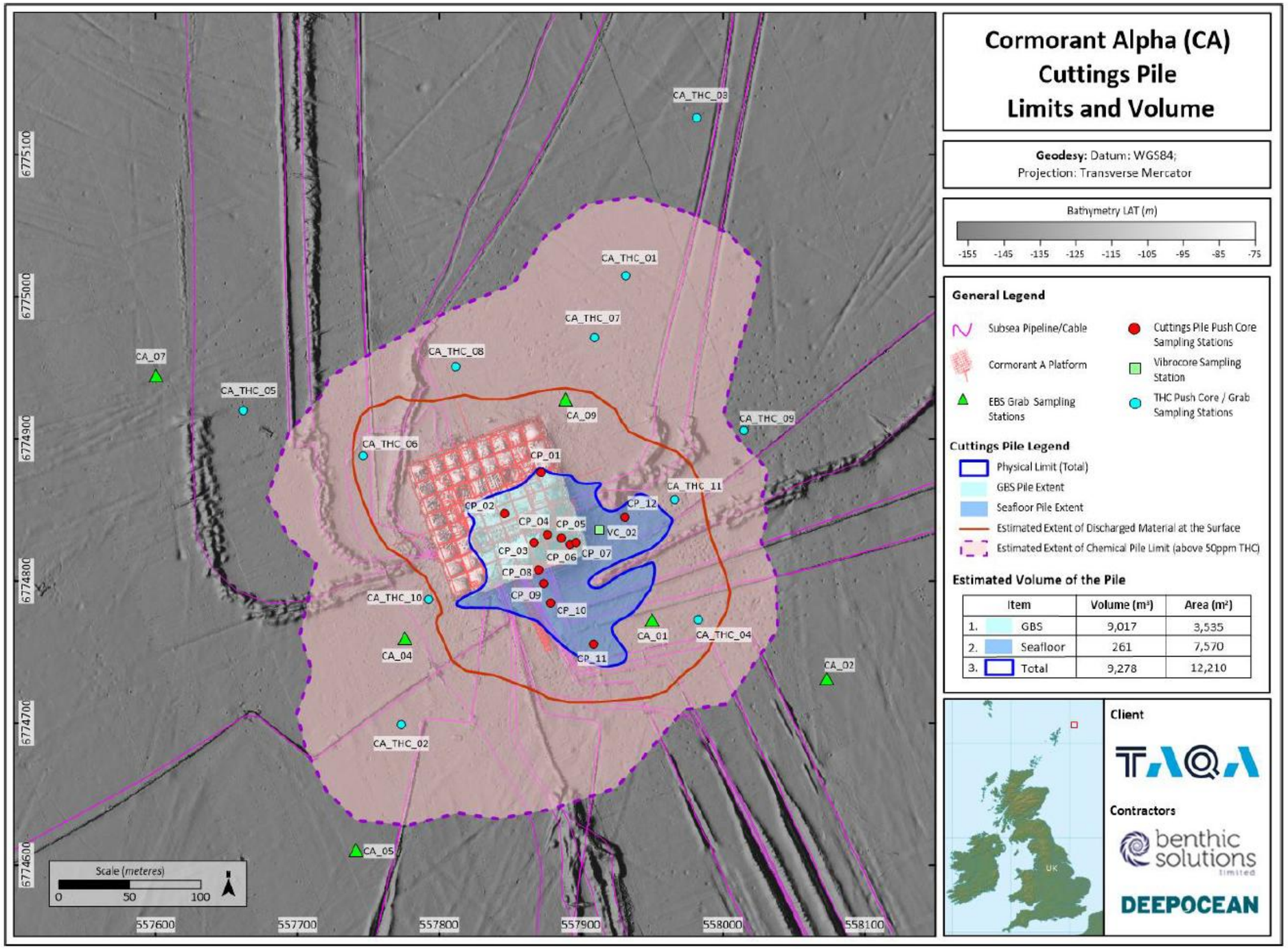


Figure 4-3 The Cormorant Alpha Cutting Pile Estimated Limits and Volume (Benthic Solutions, 2024)

4.1.5.1.2 Pelican Area

Bathymetric data (Benthic Solutions, 2020) indicates several discrete cuttings piles surrounding the satellite wellheads associated with the Pelican manifold (16 of the wells are included in this EA, the remaining two are historical decommissioned exploration wells (Figure 4-4). Due to the complexity of the site, it has been analysed and interpreted as one larger cuttings pile. The level of the natural seabed was interpolated from the surrounding bathymetry, indicating a maximum pile height of 1.5 m close to the PU-P9 and PU-P11 wellheads. This decreases to <10 cm above the surrounding bathymetry at between 70 and 90 m in all directions from the apex.

Following investigation of the natural morphology of the seabed and the vertical profiles of the push and piston core samples retained from the survey, Benthic Solutions (2020) delineated the approximate physical boundary and volume of the cuttings pile. The physical extent of the Pelican manifold cutting pile was estimated to be 25,450 m^2, with an approximate volume of 10,883 m^3 which is categorised as a “medium cuttings pile” (5,000-20,000 m^3; NorOG, 2016).

At the Pelican manifold the core surface layers were dominated by ‘slightly gravelly muddy sand’ and ‘muddy sand’ suggesting a mix of sediment types across parts of the cutting pile. The results of particle size analysis indicated this mixed sediment type to be composed primarily of sand. At most stations sampled in the Pelican Area, sand content ranged from 33.1 % to 90%. Higher proportions of sand were found across the eastern surface of the pile and close to the 211/26a-P16 wellhead with sand content ranging from 84% to 90%.

Core sub-layers were distinctly layered with ‘dark silty sand’ of ‘dark greyish olive’ colour and muddy cuttings reflecting the accumulation of historical drilling muds beneath the pile surface. An increased fines material relating to loose muddy cuttings material present was reported in the northwest of the cuttings pile. Peak proportions of fines were observed at cutting pile stations within 100 m of the Pelican manifold. Gravel was the least dominant proportion of the sediment across the survey areas (Benthic Solutions, 2020).

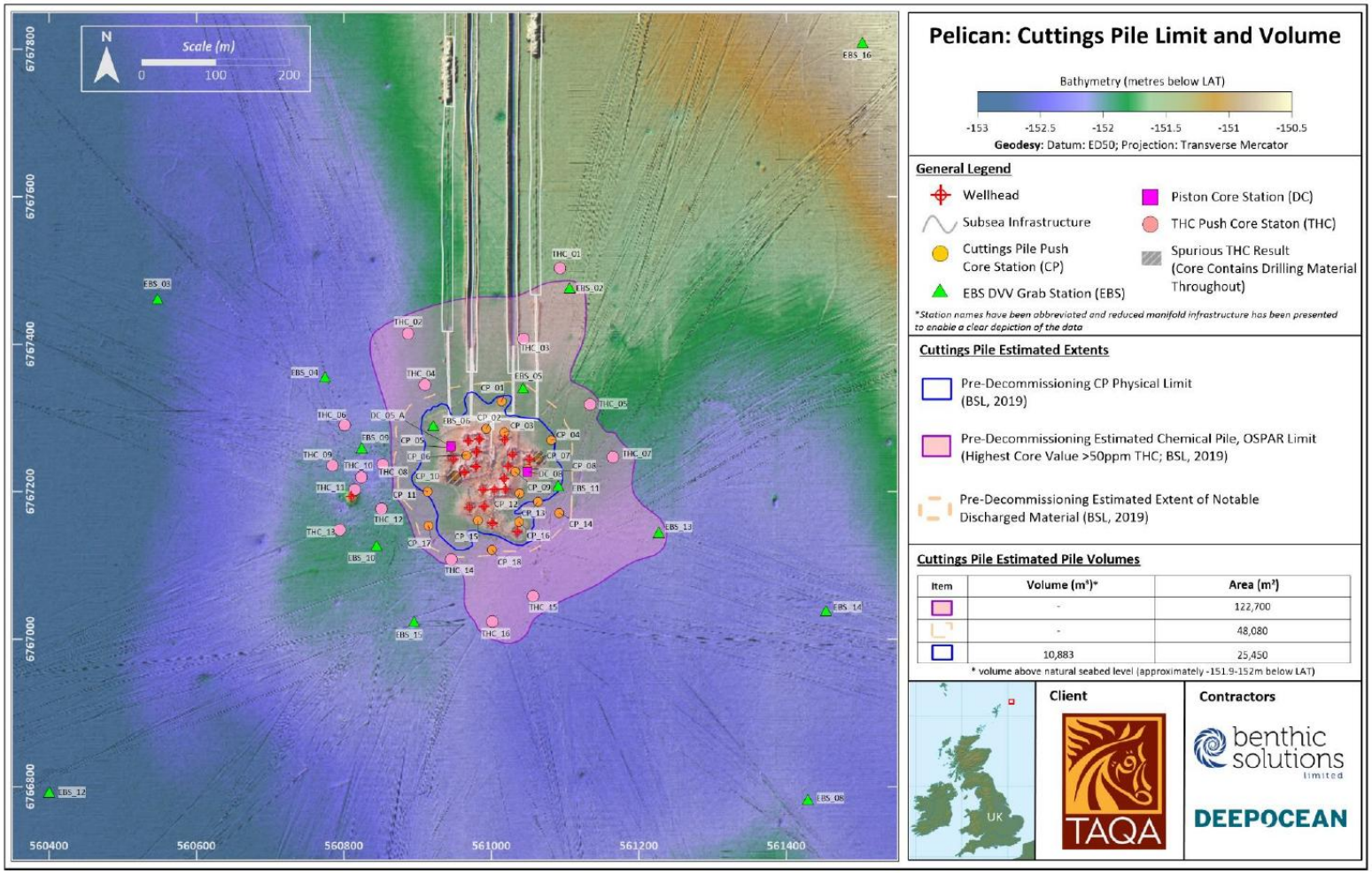


Figure 4-4 The Pelican Manifold Cutting Pile(s) (Benthic Solutions, 2020)

4.1.5.2 Chemical and Biological Characteristics

4.1.5.2.1 Cormorant Alpha

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 4-3 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 4-3).

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) concentration 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, 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 barium related metals at the stations close to the pile centre.

4.1.5.2.2 Pelican Area

The chemical footprint of the pile (where THC was above the OSPAR (2006) 50 mg kg^{-1} threshold) extended to within approximately 120 m from the physical edge of the Pelican cuttings pile, covering an area of approximately 122,700 m^2 (Figure 4-5).

Distinct layers were identified within all sample cores and most sub-samples taken from middle sections of the cores appeared to be hydrocarbon saturated. Gas chromatographic traces also showed the presence of drilling fluid contamination.

Most core profiles (95%) displayed THC levels that exceeded the OSPAR (2006) threshold with the highest THC concentrations recorded in the north and northwest of the cutting pile (Figure 4-5). At least one core sub-layer exceeded 2,000 mg kg^{-1}, and THC peaked at 63,523 mg kg^{-1} at sample station P_05_A. The higher THC in this area of the cuttings pile is likely associated with the cluster of five wells that were drilled in the period between 1997 and 2001 using second generation synthetic fluids. This trend was also evident at isolated eastern parts of the piles where samples were acquired at stations near wellheads developed in the mid 1990's (e.g., CP_09 near wells P1 & P2; Figure 4-5). Whilst most core profiles contained THC above background level, the concentrations are within the range of contamination observed in other NNS drill cutting piles (Benthic Solutions, 2020; CEFAS 2001).

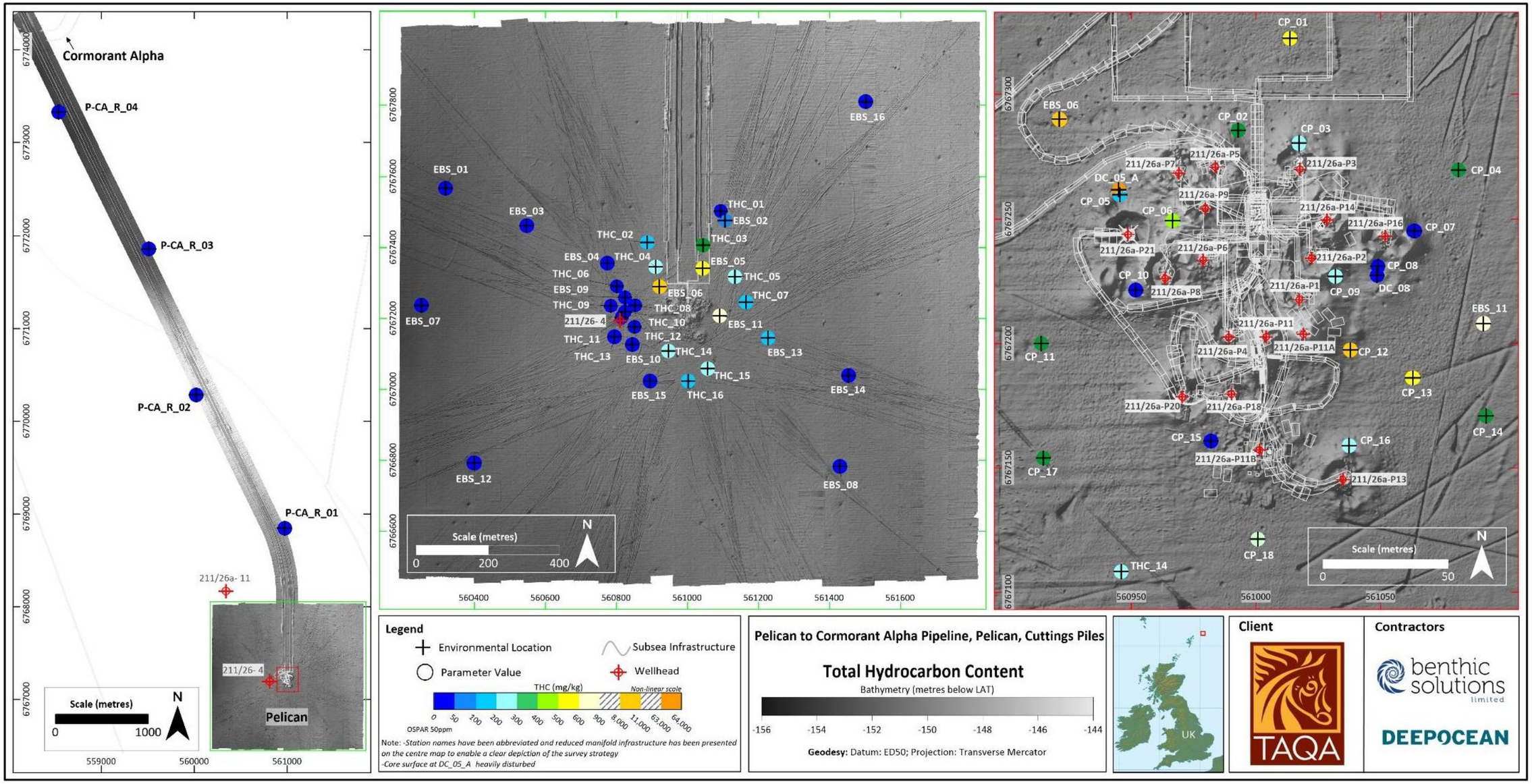


Figure 4-5 Total Hydrocarbon Content

THC below the 50 mg kg^{-1} threshold was recorded within 34% of the core samples, with the majority of these being at the nine stations that reached the natural seabed horizon in the deeper core layer. Stations with high sand content, which are in areas of higher current flow, also demonstrated a lower THC content. Additionally given the age of some of the wells (most notably P16 which was spudded in 2010; Figure 4-5), the low THC concentrations within the core middle may also relate to the use of newer synthetic or water-based drilling muds (Benthic Solutions, 2020).

Leachate analysis (Table 4-1) indicates that the yearly oil loss based on the physical extent of the cutting pile is low, ranging between 0.11 Te/yr (24-hour leachate rate) and 0.10 Te/yr (48-hour leaching rate). With a persistence of 8.76 km^2 per year, the pile is also significantly below the OSPAR threshold (500 km^2/year).

Table 4-1 Estimate of Oil Leaching Rate at the Pelican Cuttings Pile

Leachate Period	Are of Cuttings Pile[1] (m^2)	Mean Leachate THC Concentration	Estimated THC Leaching Rate ($mg/m^2/day$)	Yearly Oil Loss[2] (Te/yr)	Yearly Oily Loss[3] (Te/yr)
24-hour	25,540	46.39	11.47	0.11	4.9
48-hour		87.39	10.73	0.10	
OSPAR Oil Loss Threshold Value				**10**	

1 = Area of cuttings based on physical extent of the pile
2 = Annual oil loss based on physical extent of cuttings pile
3 = Annual loss based on UKOOA, 2005 Phase II drill cuttings initiative leaching rate

Total n-alkane concentrations ranged from 0.15 mg kg^{-1} at the bottom of core CP_ 08 (ambient sediment) to 5,224 mg kg^{-1} at the bottom of core CP_03, with 76% of samples exceeding the UKOOA 95th percentile for the NNS (0.83 mg kg^{-1}; Table 4.4). Similar to THC, the highest levels were recorded at the stations sampled in the north (CP_01, CP_02 and CP_03) and northwest (CP_05, CP_05_A and CP_06) of the cuttings pile.

Total polycyclic aromatic hydrocarbon (PAH) concentrations (2-6 compounds) were elevated across all cuttings pile stations with 44% of the core sub-layers exceeding the National Oceanic and Atmospheric Administration (NOAA) effect range low (ERL: 0.55 mg kg^{-1}) and the UKOOA 9^{5t}h percentile for the NNS (0.85 mg kg^{-1})

Elevated heavy and trace metal concentrations were recorded at stations sampled northwest of the Pelican manifold and 60 m east of the P11a wellhead. Six metals: (Ba, Cr, Cu, nickel (Ni), Pb and Zn) exceeded their corresponding OSPAR ERL reference values, above which a significant environmental impact might be expected. However, proportions of each metal's contamination differed, predominantly influenced by the different well's vicinity along with their years and methods of drilling.

Relatively high concentrations of Ba and Cr were present at the cuttings pile surface and core middle layers after normalisation. This pattern may reflect the presence of newer synthetic drilling fluids at the P16 wellhead, with barite and associated trace metals (e.g. Cr and Zn) reported to represent approximately 33% of synthetic fluids (Bleier *et al*, 1992; Sadiq *et al*, 2003).

A total of 19 samples exceeded the levels of Ba described by Cefas for stations located within 500 m of active UK oil and gas installations (33,562.12 mg kg^{-1}; Cefas, 2001), with the majority of these (11) in the middle core layers. Peak levels of Ba (by fusion) were noted at stations northwest and southeast of the Pelican cuttings pile ranging between 35,7010 mg kg^{-1} to 93,100 mg kg^{-1}. In general, higher concentrations of Ba (by fusion) were found at core samples obtained at the stations

sampled on the north and northwest of the CP, but also at the three stations (CP_12, CP_13, and CP_14) sampled within 60 m of the P11a wellhead.

Concentrations of Cd were observed to exceed the OSPAR BAC level (0.31 mg kg^{-1}) for all but two core samples. The highest concentrations of Cd were observed in the middle layers of CP_ 16 (3.5 mg kg^{-1}), the bottom of CP_DC_05 (2.6 mg kg^{-1}) and the surface layers of CP_ 05 (Up to 2.4 mg kg^{-1} above 25 cm). Scientific published literature describes Cd as “very toxic” suggesting toxification can occur around 4.2 mg kg^{-1} (e.g. EC, 2008).

PCB concentrations recorded across the Pelican cuttings pile below the OSPAR ERL threshold (11.50 µg kg^{-1}) and is unlikely to have had a detrimental impact on the benthic community.

Total organic carbon (TOC) and total organic matter (TOM) represent the proportion of biological material and organic detritus within the substrates. TOC in surface sediments is an important source of food for benthic fauna (Snelgrove & Butman, 1994), although an overabundance may lead to reductions in species richness and abundance due to oxygen depletion. Sediments within the Pelican cuttings pile displayed signs of organic enrichment with TOM in almost all core sub-layers exceeding the UKOOA 95th percentile for the NNS (2.0%). This is attributed to the higher proportion of silt dominated sediment in the core middle layers. The presence of black anoxic sediment noted in core logs could explain the elevated levels observed, with typically lower microbial activity found in anoxic sediments resulting in longer degradation of organic matter. Lower TOM levels (1.5-1.9%) were found further away from the wellheads and where sandy sediments were predominant.

Overall, high TOC and TOM levels along with deck log observations and sample photographs from the stations analysed within 100 m of the Pelican manifold, provide evidence of the sediment having been organically enriched by drilling related discharges, with this particularly evident at stations with high fines content sampled on the northwest extent of the cuttings pile.

Most stations sampled near or within the physical extent of the cuttings pile showed a reduced species richness. Variation in the macrofauna community composition is significantly correlated to the sediment particle size composition, hydrocarbons, and heavy metal concentrations of the site. Several species considered to be indicative of environmental disturbance and hydrocarbon contamination, both positive (e.g. *Galathowenia oculata* and *Eclysippe vanelli*) and negative (e.g. *Capitella, Cirratulus cirratus*, and *Thyasira sarsii*), were identified from the macrofaunal samples indicating contamination of sediment within close proximity to the cuttings pile.

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 in the Pelican Area, 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, 2024; 2020). 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.

Overall, the observed species richness and abundance data was particularly high along the Pelican to Cormorant Alpha pipeline route and at stations on the periphery of the Pelican Area, reflecting the uncontaminated background conditions within these areas.

4.2.3 Potential Sensitive Habitats and Species

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

- ‘Submarine structures made by leaking gases’ - Annex I Habitat
- ‘Sea-pen 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, 2024) and within 150 m of the Pelican Area (<1 m diameter and <0.5 m depth) (Benthic Solutions, 2020). However, no features characteristic to large pockmarks were identified and ground-truthing did not identify MDAC within the depressions (Benthic Solutions, 2024; 2020).

4.2.3.2 Sea-pen and Burrowing Megafauna Communities

According to 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 (2019) 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. Sea-pens 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 (Benthic Solutions, 2024). Similarly, burrowing megafauna communities were present throughout the Pelican Area survey area in low densities with small and large burrows (3-15cm) falling mostly into the 'occasional' and 'rare' SACFOR category (Benthic Solutions, 2020). Only one station at P_EBS_05 with a density of 17.3 burrows per 100 m^2 was identified as 'frequent' and this section could be considered as the 'Seapen and Burrowing Megafauna Communities' habitat (Benthic Solutions, 2020). P_EBS_05 is located 100 m NNE of the Pelican manifold.

4.2.3.3 Ocean Quahog

Ocean quahog *Arctica islandica* 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 also is listed as a marine conservation zone (MCZ) feature of conservation importance.

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, 2024) and eleven juvenile individuals at nine stations across the Pelican Area survey area (Benthic Solutions, 2020). However, no distinct *A. islandica* siphons were seen on the underwater footage. Although only 13 individuals were identified across both survey areas, 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; 2024). The distribution of *A. islandica* is relatively wide in the North Sea (OSPAR, 2009). In summary, the presence of ocean quahog individuals over the whole area of interest must be assumed, however the presence of aggregations is unlikely.

4.2.3.4 Other Environmentally Sensitive Species

Additionally, in addition to the above species and habitats, mobile fauna recorded during the survey (2020) included the urchin *Gracilechinus acutus*, the cushion star *Hippasteria phrygiana*, ling *Molva molva*, phosphorescent seapen *Pennatula phosphorea*, the rosy starfish *Stichastrella rosea,* the hermit crab *Pagurus bernhardus* and the deeplet sea anemone *Bolocera tuediae*. Ling are a Scottish PMF species. Free-swimming megafauna was limited to a few species, being mainly dominated by the species *Helicolenus dactylopterus* and members of the order Gadiformes including cod *Gadus morhua*, although individuals of the order Pleuronectiformes were found (Bentics Solutions, 2020). Cod is a PMF species and an OSPAR listed threatened and/or declining species.

No other benthic habitat or species features of conservation interest have been noted within the Pelican Area, including those listed on the Annex I of the EC Habitats Directive, the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, the OSPAR list of threatened and/or declining species, or the Scottish PMF list (NMPI, 2024).

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 (Himli *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. 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).

The percentage carbonate in the top 10 cm of superficial sediments in the Pelican Area, ranges from 0 to 20% (NMPI, 2024) which is above average when compared to the UKCS average value of 10.1% (Burrows *et al*., 2014; NMPI, 2024). 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).

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 Pelican Area infrastructure is 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 4-2.

Table 4-2 Fisheries Sensitivities Within the 51F1 ICES Rectangle

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); Species = High concentration spawning as per Coull *et al.*, 1998;

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) have very specific habitat requirements, and therefore their spawning grounds are relatively limited and potentially vulnerable to seabed disturbance and change.

The Pelican Area represents spawning ground for cod (*Gadus*), saithe (*Pollachius virens*), Norway pout *Trisopterus esmarkii*, whiting *Merlangius merlangus* and haddock *Melanogrammus aeglefinus* (Ellis *et al*., 2012; Coull *et al*.,1998). Cod is the only species with a high intensity spawning ground in the Pelican Area while other species have a lower or undetermined spawning intensity (Coull *et al*, 1998; Ellis *et al*., 2012). Figure 4-6 illustrates the general distribution of the particular spawning areas per species.

The Pelican Area 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 the Pelican Area while other species have a lower nursery intensity (Coull *et al*, 1998; Ellis *et al*., 2012). Figure 4-7 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 Block 211/26 where the Pelican infrastructure 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 NMPI (2024) (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 Pelican Area. 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 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 surveys are discussed in Section 4.2.3.

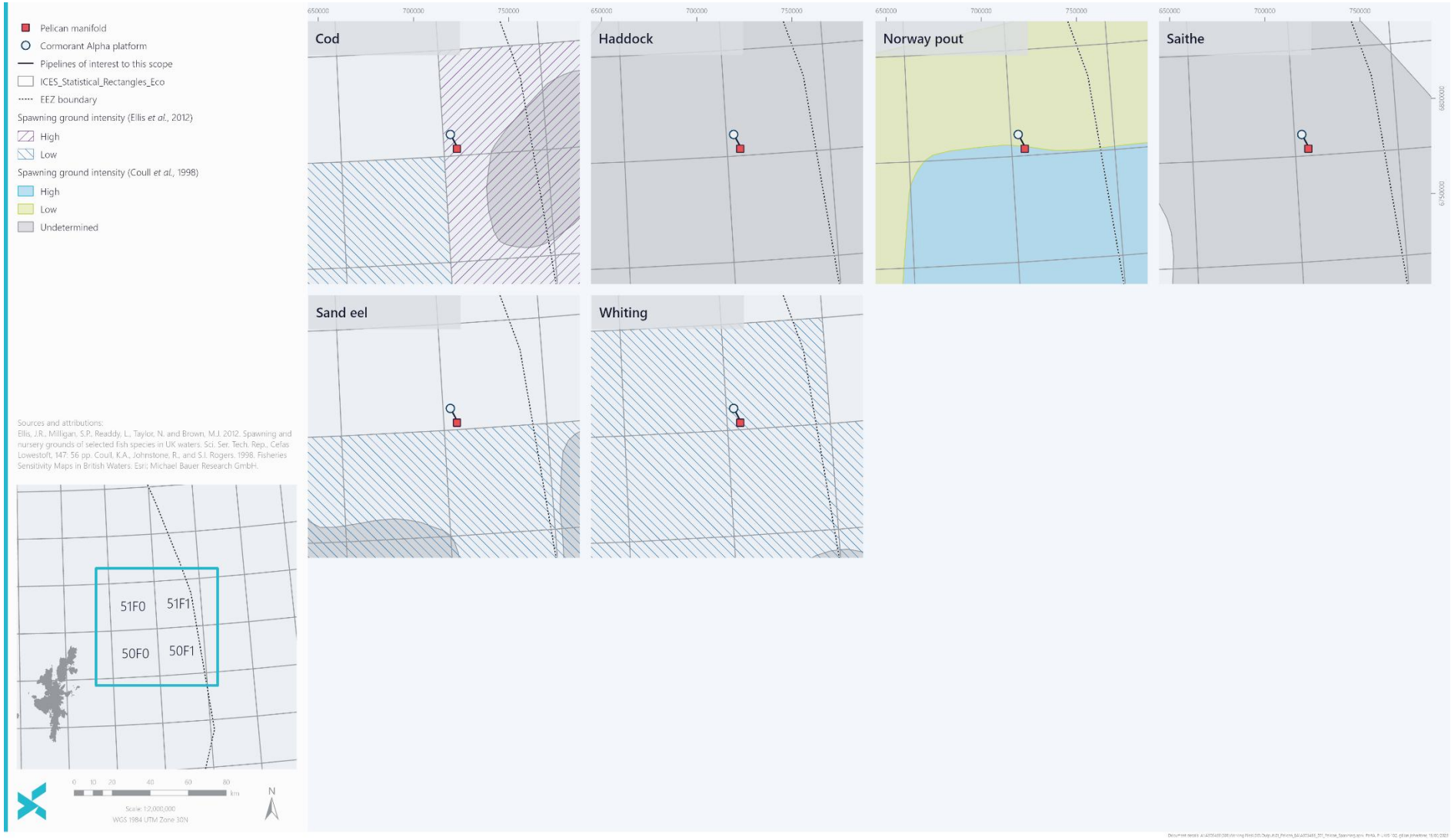


Figure 4-6 Potential Fish Spawning Grounds (Ellis *et al.,* 2012; Coull *et al.*, 1998)

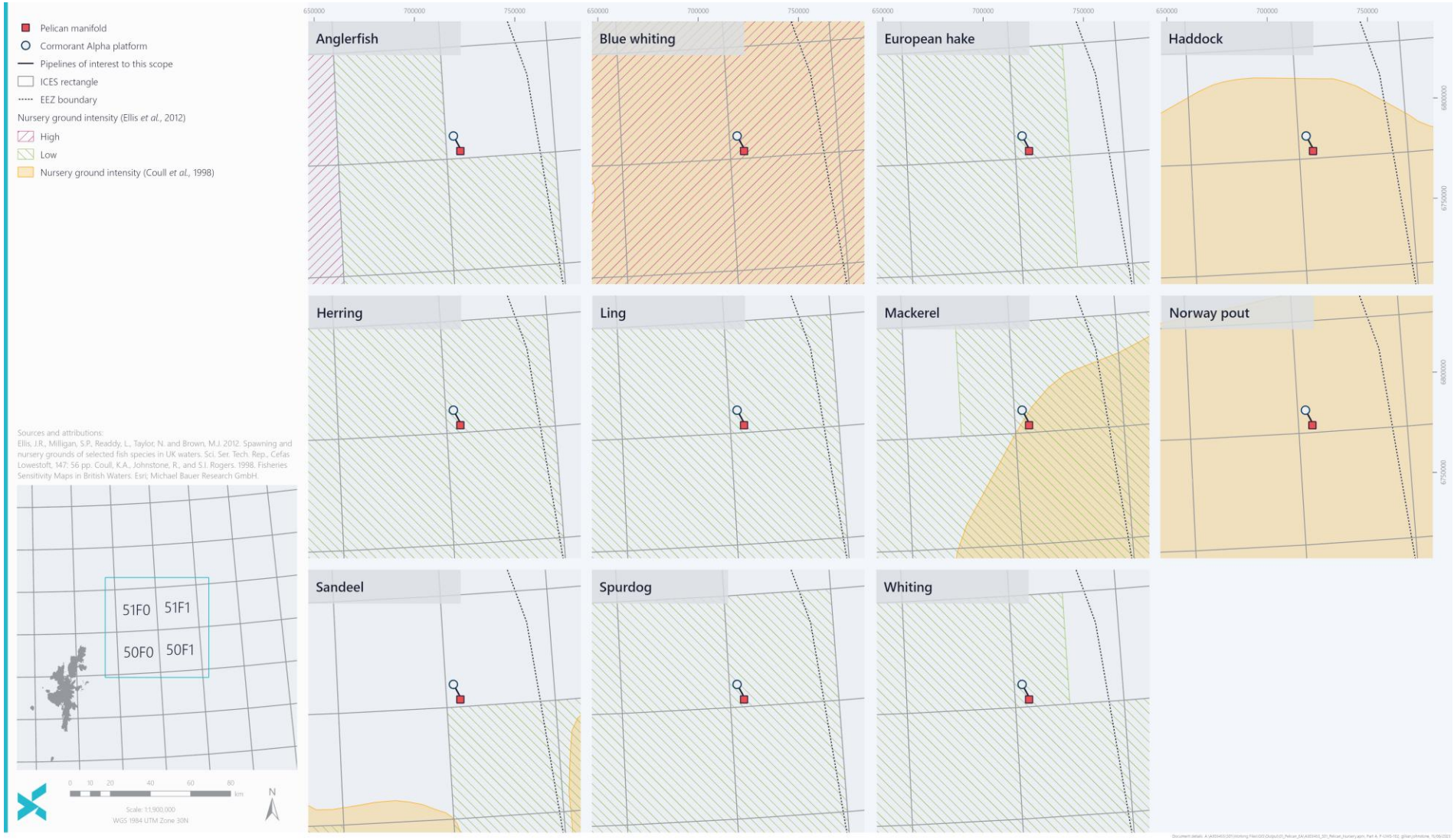


Figure 4-7 Potential Fish Nursery Habitats adapted from Ellis *et al.* (2012)

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 and CNS, 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 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 Pelican Area: northern fulmar, sooty shearwater, European storm petrel, northern gannet, long-tail skua, great skua, black-legged kittiwake, great black-backed gull, lesser black-backed gull, herring gull, glaucous gull, common guillemot, razorbill, little auk 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 the vicinity of the Pelican Area is considered low (score of 5) throughout most of the year. Oil sensitivity is considered medium (score of 4) across multiple Blocks in September through to December. However, in Block 211/26 containing the Pelican Area, oil sensitivity is low throughout the year (see Table 4-3).

Table 4-3 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 survey block covering the Pelican Area, with specific densities listed in Table 4-4 (Gilles *et al.*, 2023).

Table 4-4 Densities of Cetaceans in the Pelican 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 Pelican Area is located approximately 88 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.,* (2022), which are provided in the NMPI (2024). The maps report the presence of grey and harbour seals in the Pelican Area as between 0 and 1 per 25 km^2 for both species (Carter *et al*., 2022) (see Figure 4-8).

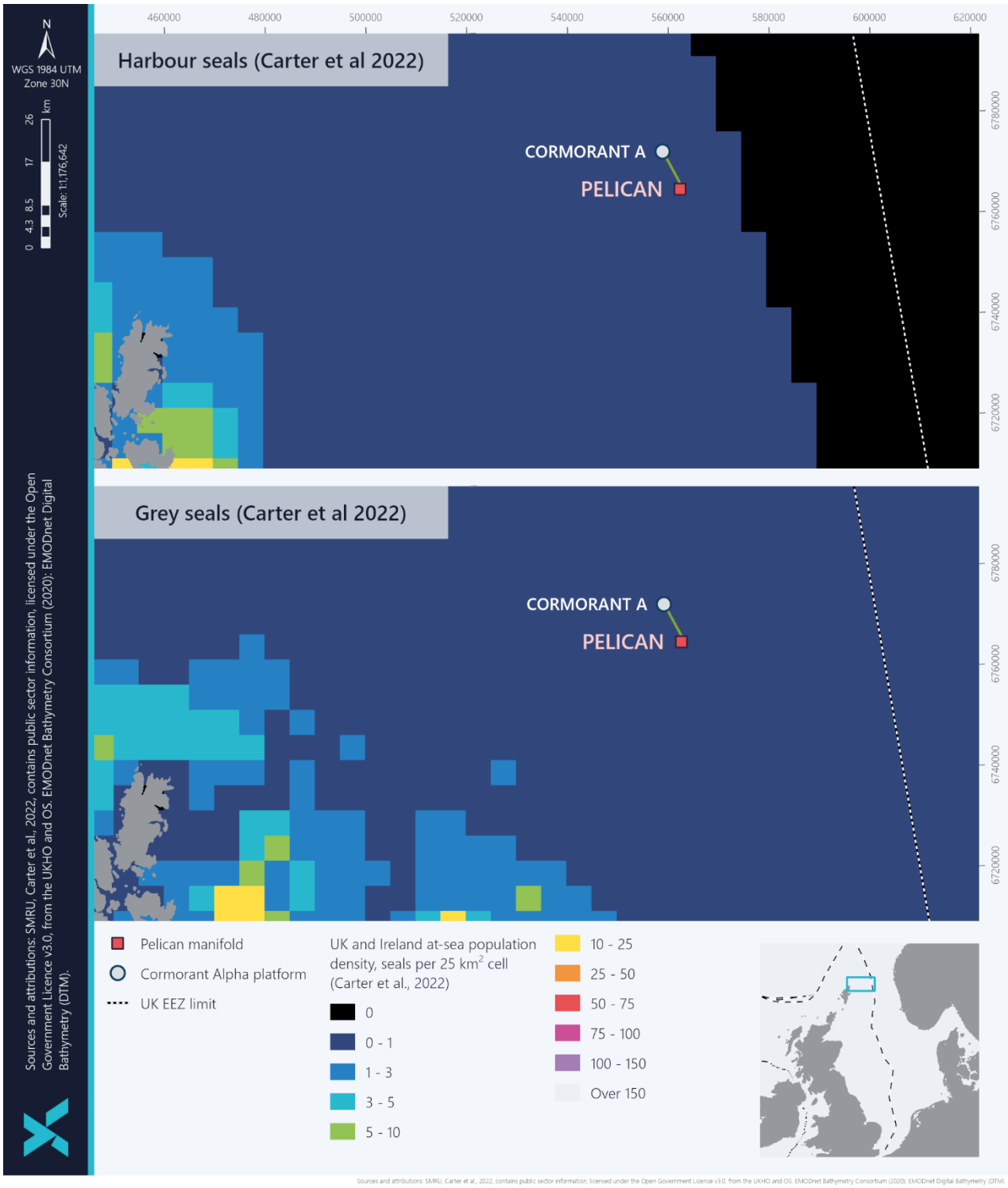


Figure 4-8 UK At-Sea Population Density, Seals per 25 km²

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 Marine Protected Areas (DR MPA) within 40 km of the Pelican Area. The closest protected site is the Pobie Bank Reef SAC, located approximately 63 km southwest of the Pelican Area. The closest designated site is the Fetlar to Haroldswick NCMPA, located approximately 109 km to the southwest of the Pelican Area. The closest SPA is Hermaness, Saxa Vord and Valla Field SPA, approximately 106 km west southwest of the Pelican Area (Figure 4-9).

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 proposed operations, the Pobie Bank Reef SAC will not be impacted from localised operations in the Pelican Area.

The seabed in UKCS Block 211/26 is within a wider area of 'subtidal sand and gravels' (NMPI, 2024), a seabed type designated as a PMF in Scottish waters (Tyler-Walters *et al.*, 2016). Whilst this feature is present within the Pelican Area, it is expected as this subtidal habitat is common throughout the North Sea (NMPI, 2025). '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 Pelican Area is located approximately 88 km from the northeast coast of Scotland. Due to this distance, no impacts to onshore conservation sites are expected from the Pelican Area decommissioning project.

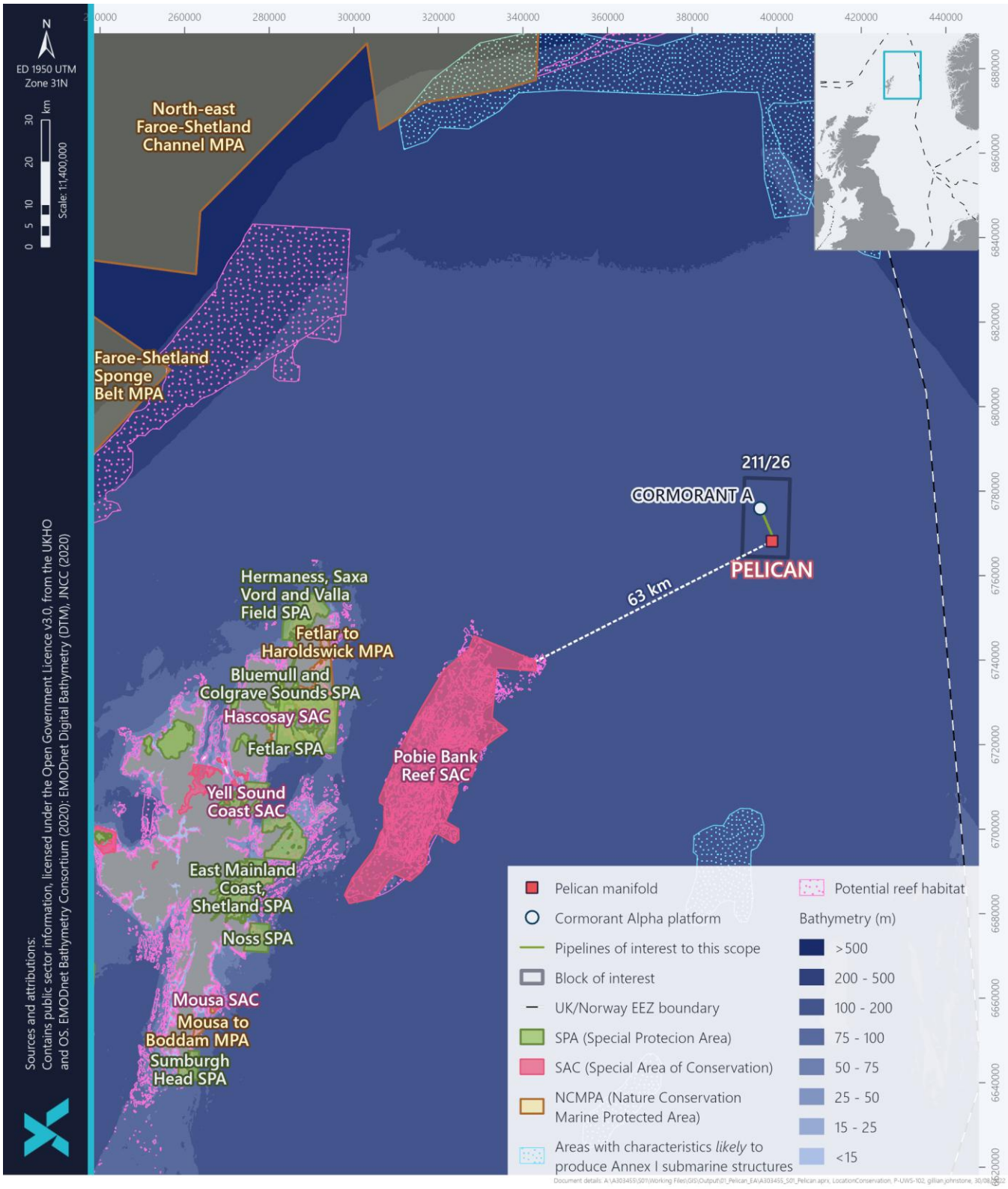


Figure 4-9 Location of the Pelican Area Relative to Protected Areas

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 Pelican Area 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 (2024). There is a resident population of bottlenose dolphins in the Moray Firth (approximately 430 km from the Pelican manifold), 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 Pelican Area.

All species of cetacean recorded within the Pelican Area 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.

In addition to the above species and habitats, mobile fauna recorded during the survey (2020) included ling and cod (Benthic Solutions, 2020). Ling and cod are Scottish PMF species. Cod is also an OSPAR listed threatened and/or declining species.

Ocean quahog (*A. 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, 2009). As described in Section 4.2.3, 13 individuals of *A. islandica* were identified during site-specific surveys; however, the abundances do not constitute an aggregation (Benthic Solutions, 2020; 2024).

All species of conservation concern which were identified in the Pelican 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 Pelican Area will result in the removal of around 4,325 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 Pelican Area 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 Pelican Area decommissioning activities, including those relating to the protected species which may be present within the Pelican Area. There are no protected areas within 40 km of the Pelican Area. There a number of PMFs (habitat and species) expected within the Pelican 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.

All pipelines and subsea infrastructure will be cleaned and 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 typically well controlled activities that are regulated through vessel and machinery design,

management and operation procedures. Controls will be in place, as required, through compliance with the Offshore Chemical Regulations and the Oil Pollution Prevention and Control Regulations.

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 Pelican subsea facilities 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. Recently published DESNZ (2023) guidance states that, “Sound radiated from either is not easily discernible above 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 Pelican Area 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 Waste Management Plan 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 2019 to 2023 are considered. The Pelican Area infrastructure is located in ICES rectangle 51F1, which is targeted primarily for demersal species in terms of both landed weights and value (see Table 4-5 and Table 4-6).

In ICES rectangle 51F1, demersal fish accounted for between 95% to 100% of the total landed value and between 84% to 100% of the total landed weight between 2019 and 2023. In 2021 and 2019, there was a higher proportion of landed weight attributed to pelagic fish, which accounted for 16% and 13% of the total landed weight respectively. Value landed was still relatively low at <1% and 3% for 2021 and 2019 respectively. There are very little shellfish fisheries in ICES rectangle 51F1 therefore shellfish represented <1% of the landed weight and value between 2019 – 2023 (Marine Directorate, 2024).

In 2023, the distribution of catch by landings weight and value was mainly attributed to demersal fish, accounting for 95% of the landed value and 90% of the landed weight for ICES rectangle 51F1. This was a slight decrease from 2022 where the distribution of catch by landings value and weight were and 100% attributed to demersal fishing (Marine Directorate, 2024).

In 2023, 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 2023. With regards to landed weight, the largest contribution was attributed to haddock, whiting and saithe (Marine Directorate, 2024).

The average landed value and weight in ICES rectangle 51F1 in 2023 were broadly comparable to those observed in other high-performing rectangles in the UKCS (Figure 4-10, Table 4-5 and Table 4-6). To put the landings into context, catches amounting to 545,648 Te with a value of £800 million were landed across the UKCS in 2023. Specifically, demersal fishing in the UK accounted for catches of 46,135 Te and a value of £180 million. Therefore, ICES rectangle 51F1 accounted for

3.4% of the total landed weight and 1.6% of the total commercial value of the UK's overall demersal fishing activity in 2023. When compared to other ICES rectangles in the UKCS, ICES rectangle 51F1 contributed a moderate to high proportion of total UK demersal fishing activity in 2023. In 2023, the UK landed 183,927 Te of pelagic catch valued at £213 million. ICES rectangle 51F1 represented just 0.09% of the total landed weight and 0.05% of the total value. A total of 3,041 Te of shellfish catch, valued at £7 million, was landed in the UK in 2023. The contribution from ICES rectangle 51F1 in 2023 comprised 0.09% of the landed weight and 0.2% of the total value (Marine Directorate, 2024).

Table 4-6 presents the fishing effort in ICES 51F1 rectangle in days per month, between 2019-2023. Fishing effort in 2023 amounted to 270 days in ICES rectangle 51F1, dominated by demersal (trawl) activities. Trends indicate that fishing effort has increased in the Pelican Area since 2022 (215 days fished; Marine Directorate, 2024).

Trawls were the dominant gear types used in ICES rectangle 51F1 in 2023 (accounting for approximately 237 days in 2023). Figure 4-10 presents average landings values by vessel length, species type and gear type in ICES rectangle 51F1 and the surrounding rectangles between 2019-2023.

Table 4-5 Live Weight and Value from ICES 51F1 from 2019-2023 (Marine Directorate, 2024)

Species type	2023		2022		2021		2020		2019	
	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)	Live weight (tonnes)	Value (£)
Demersal	1,577	2,796,679	1,327	2,398,088	1,701	2,923,354	887	1,321,277	1,205	2,137,572
Pelagic	179	116,103	-	-	324	1	0	199	175	59,457
Shellfish	3	16,363	2	9,137	3	10,631	2	5,734	3	12,510
Total	**1,759**	**2,929,145**	**1,329**	**2,407,225**	**2,028**	**2,933,986**	**889**	**1,327,210**	**1,383**	**2,209,539**

Table 4-6 Fishing Days Per Month (all gear) in ICES 51F1 from 2019-2023 (Marine Directorate, 2024)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2023	D	D	47	47	62	14	17	16	13	21	14	9	270
2022	10	D	37	23	25	14	D	9	21	24	20	14	215
2021	9	D	13	46	68	31	35	10	18	D	15	7	278
2020	D	9	11	16	D	11	24	14	7	12	11	D	128
2019	11	18	14	32	9	D	D	18	38	21	6	D	191

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.

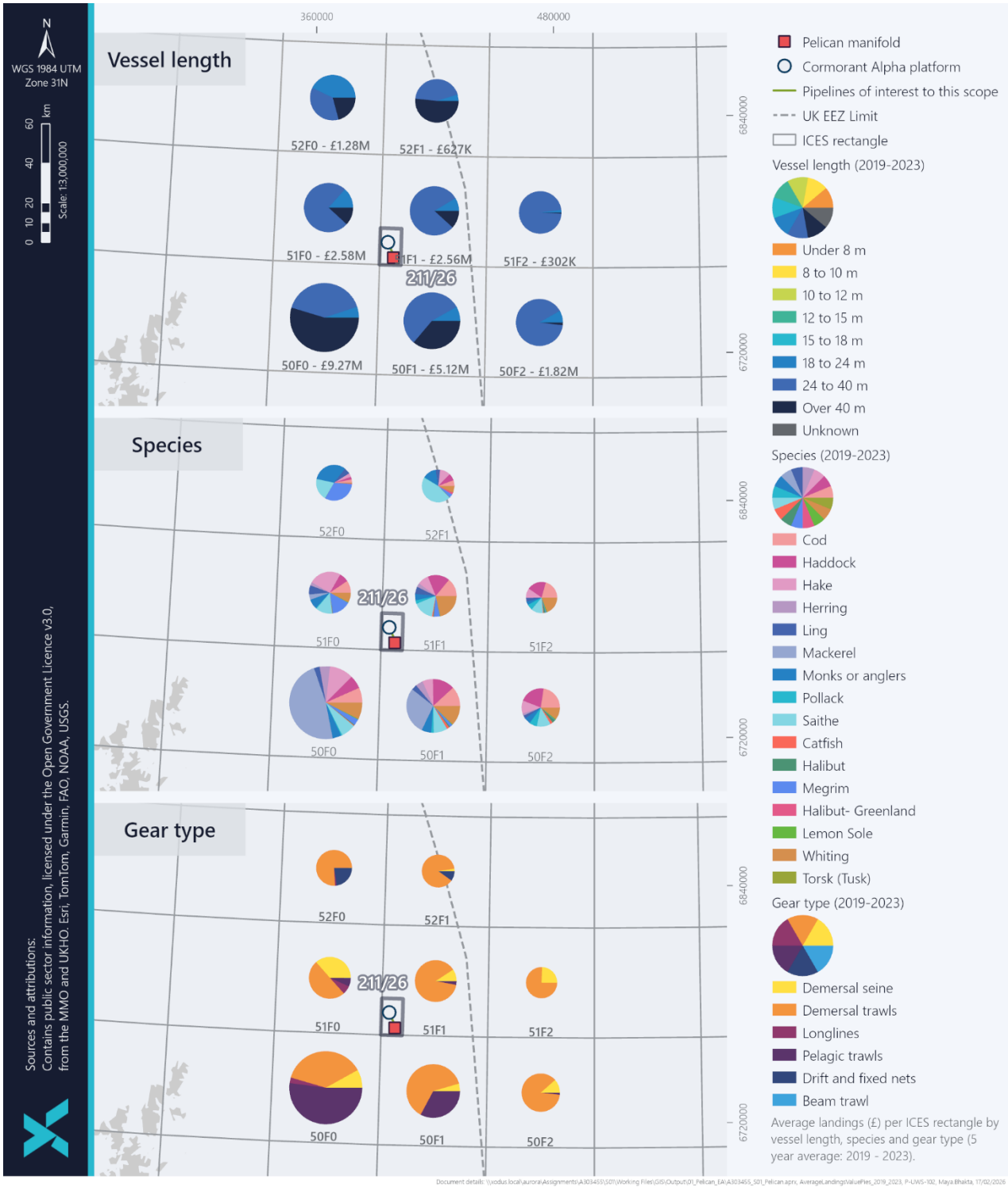


Figure 4-10 Average Landings Values (£) by Vessel Length, Species and Gear Type in the Pelican Area (5 year average; 2019-2023)

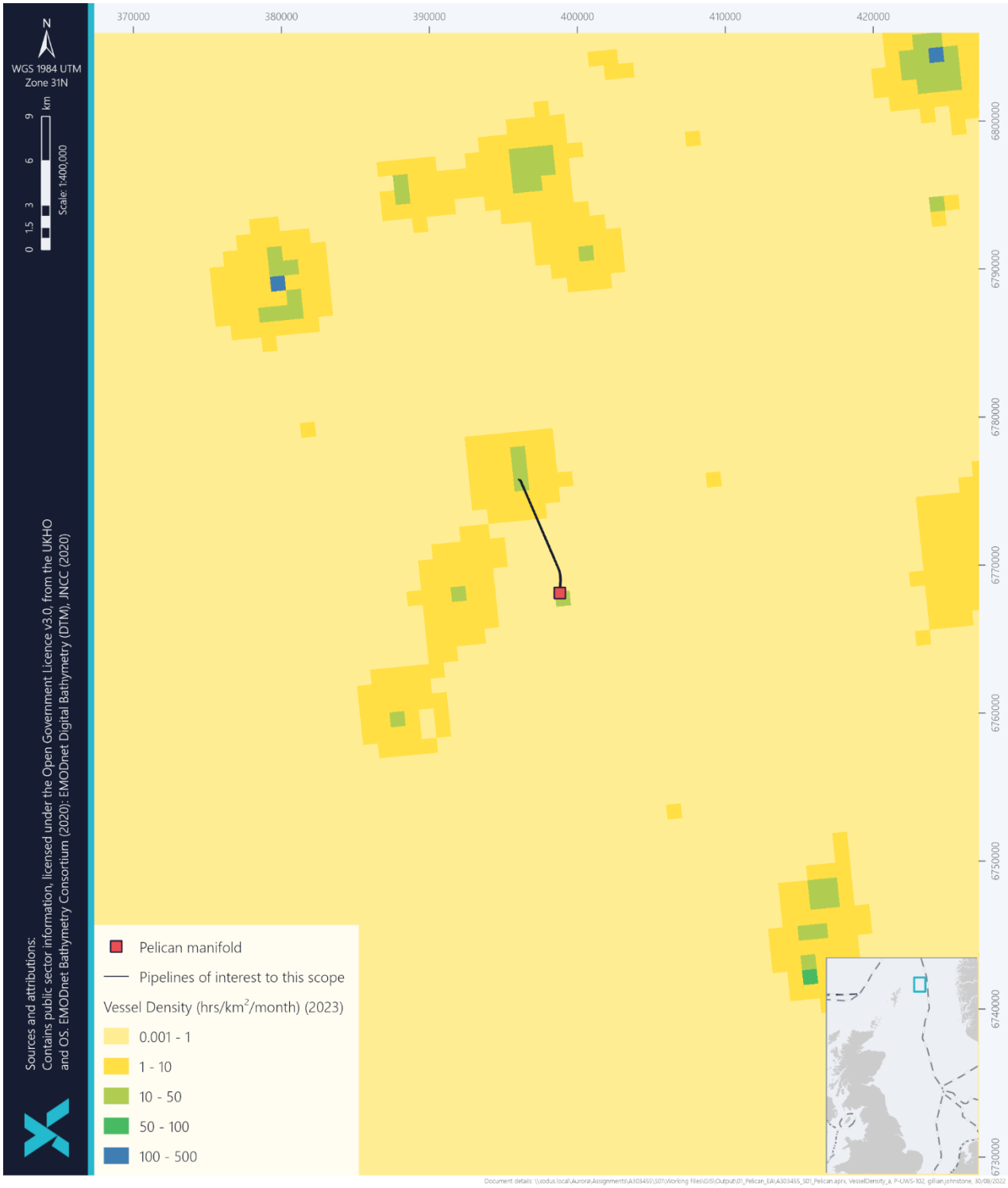


Figure 4-11 Vessel Density in the Pelican Area in 2023 (EMODnet, 2025)

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, an area of low vessel traffic (OGA, 2016). The average annual density of vessels (all combined) using 2023 data is variable across the Pelican facilities (Figure 4-11). Localised increase in vessel activity is observed around the Pelican manifold, the Cormorant Alpha platform and the Heather Alpha platform (13 km west southeast of the Pelican Area). 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. Generally, there is evidence of increased vessel density towards the coast of Shetland, and in the wider offshore area, average weekly vessel transits number < 50 (MMO, 2020).

4.4.3 Oil and Gas Activity

There are several oil and gas installations in the vicinity of the Pelican Area, as outlined in Figure 4-13. Table 4-7 provides the distances to surface installations within 40 km of the Pelican Area. The eventual decommissioning of nearby oil and gas installations, some of which may coincide with decommissioning of the Pelican Area, will alter the profile of ongoing oil and gas activities in the region.

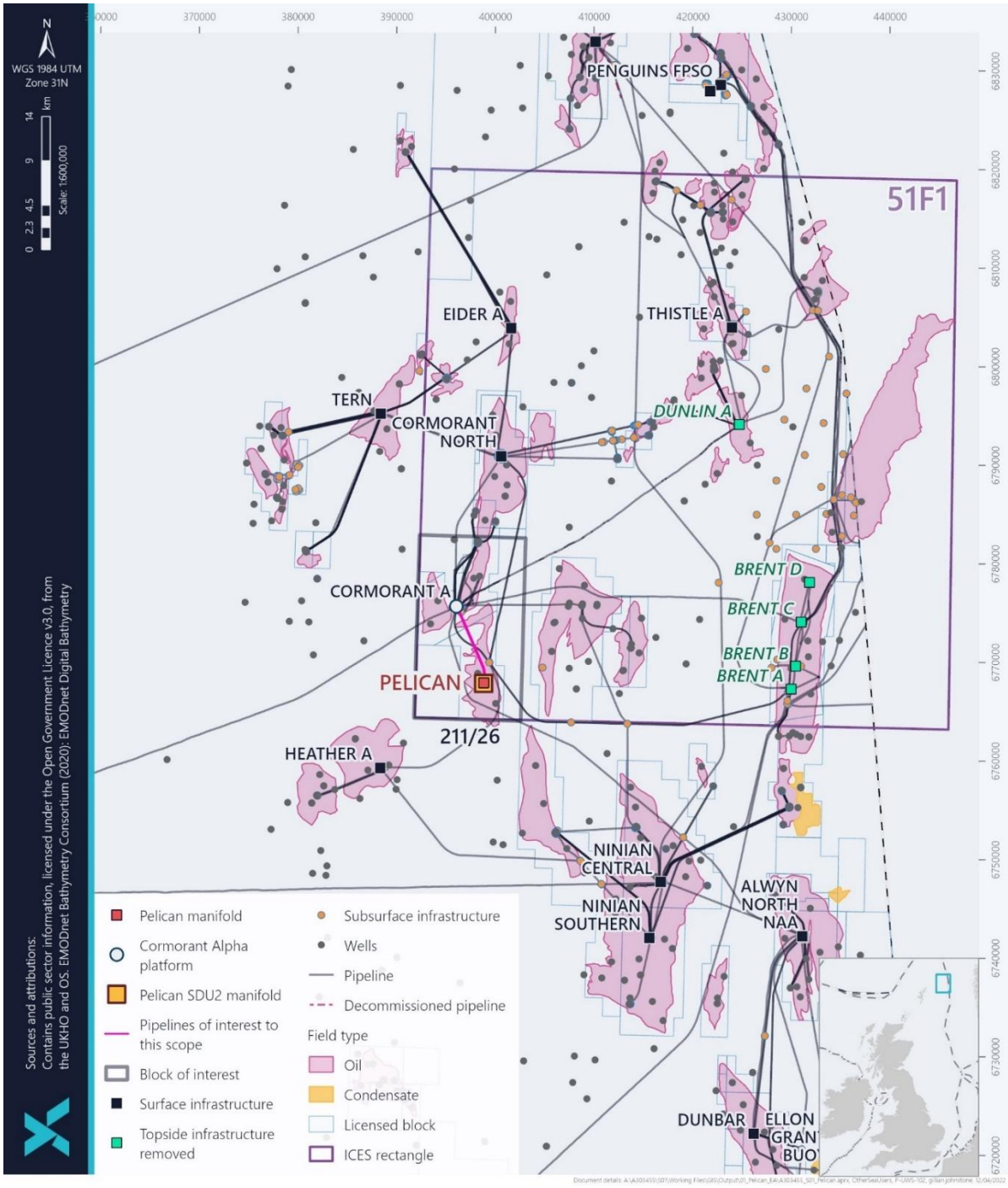


Figure 4-12 Installations in the Vicinity of the Pelican Area

Table 4-7 Surface Installations Located within 40 km of the Pelican Manifold

Installation	Type / Status	Operator	Distance from Pelican manifold (km)	Direction from Pelican manifold
Cormorant Alpha	Platform / Operational	TAQA	8	North northwest
Heather A	Platform / Operational	EnQuest	13	West southwest
Cormorant North	Platform / Operational	TAQA	23	North northeast
Ninian Central	Platform / Operational	CNRI	27	South southeast
Tern	Platform / Operational	TAQA	29	North northwest
Ninian Southern	Platform / Operational	CNRI	31	South southwest
Brent B	Platform / Topsides removed	Shell	32	East northeast
Brent C	Platform / Topsides removed	Shell	33	East northeast
Brent D	Platform / Topsides removed	Shell	34	East northeast
Eider A	Platform / Operational	TAQA	36	North northeast
Dunlin A	Platform / Topsides removed	Fairfield	37	North 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.

The Pelican Area, block 211/26 and the wider area are not located within a Ministry of Defence area or within any Military Practice and Exercise Areas (NMPi, 2024).

4.4.5 Renewable Energy

There are no planned or operating renewable activities in close vicinity (<40 km) to the Pelican Area (NMPi, 2024). The closest Sectoral Marine Plan (SMP) for wind is the NE1 plan, located approximately 92 km southwest of the Pelican manifold (NMPi, 2024).

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 4.2 km east of the Pelican Area and INTOG area NE-a is located 54 km northwest (NMPi, 2024).

4.4.6 Telecommunication Cables

There are no planned or operating telecommunication cables within 40 km of the Pelican Area. The nearest telecom cable is the Cantat 3 SEG.F3C telecoms cable, located 95 km east northeast of the Pelican manifold (KIS-ORCA, 2024).

4.4.7 Wrecks

According to the United Kingdom Hydrographic Office (UKHO) (UKHO, 2023), there are 23 wrecks within 40 km of Pelican manifold, with the closest wreck is located approximately 7 km southeast of the Pelican Area. 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, 2024).

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 and Best Environmental Practice; 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 Scottish Fishermen'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;
    - Physical presence of infrastructure decommissioned *in situ* in relation to other sea users;
    - Underwater noise emissions;
    - Resource use;
    - Onshore impacts / waste; and
    - Unplanned events.
- An initial screening 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 screening 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, 6.4 and 6.5); 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 for the Pelican Area subsea decommissioning has been largely based on sharing project expectations from the wider project area approach and overall NNS subsea infrastructure-specific considerations with the key stakeholders (Marine Directorate, JNCC and SFF).

5.2 EA Methodology

5.2.1 Overview

The Pelican Area 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 National Heritage (SNH), now NatureScot, in the handbook on environmental impact assessment (SNH, 2013) and by The Institute of Environmental Management and Assessment (IEMA) 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 Pelican Area subsea 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 Pelican Area decommissioning activities and the receptor. Impacts that are caused by the activities.
Indirect	Reasonably foreseeable impacts that are caused by the interactions with the Pelican Area 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 Pelican Area subsea 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 Pelican Area subsea 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 Pelican Area subsea 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 Pelican 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. , Marine Conservation Zone (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 Pelican 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 Pelican 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 Pelican 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 Pelican 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 stakeholders and/or represent a contentious issue during the decision-making process and should therefore be avoided or mitigated as far as reasonably practicable.	Not significant
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 Pelican Area subsea infrastructure 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 screening discussion was undertaken to discuss the proposed decommissioning activities and any potential impacts these may pose. This discussion identified ten potential impact areas based on the proposed removal methods. Of these ten potential impact areas, six were screened 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 screening decisions and proposed mitigation. The remaining four areas: emissions to air, disturbance to the seabed, disturbance to drill cuttings piles and physical presence of infrastructure decommissioned *in situ* in relation to other sea users, were scoped in for further assessment and are discussed in Sections 6.2, 6.3, 6.4 and 6.5 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 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	Scoping discussions for disturbance to the seabed focussed 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: • Submarine structures made by leaking gases; • Ocean quahog; • 'Seapens and burrowing megafauna in circalittoral mud'; and • Blue Carbon sequestration Decommissioning activities include activities associated with decommissioning of pipelines *in situ* (rock placement), the removal of subsea structures, the surface laid pipelines and umbilicals, potential temporary wet storage of the Pelican Riser Caisson and remediation of free spans and exposures. 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 drill cuttings piles	Yes	There is potential for decommissioning activities to generate disturbance to the seabed and cuttings piles located at the Pelican manifold and at the Cormorant Alpha platform; which have 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 and possible future interactions with fishing gear, will impact the lower water column and benthic communities. Decommissioning activities which could disturb the cuttings piles include activities associated with decommissioning of pipelines *in situ* (rock placement), the removal of subsea structures and the surface laid pipelines and umbilicals and remediation of free spans and exposures. Associated impacts are considered to be of a moderate consequence (significant) and are therefore assessed further in Section 6.4.	See Section 6.4.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Planned discharges to sea	No	Discharges to sea were considered during a screening workshop where discussion focussed on the highly regulated processes established through monitoring and permitting regimes. Discharges are negligible and temporary in nature, with low receptor vulnerability. Pipelines will be flushed prior to decommissioning to an appropriate standard. Where this is not possible, this will be discussed with OPRED and a mutual solution will be agreed. As far as practicable any hydrocarbon liquids in the pipelines will be flushed to the Cormorant Alpha platform. The Oil Discharge Permit for these operations will detail the measures to be used. Discharges from vessels are typically well-controlled activities that are regulated through vessel and machinery design, management and operation procedures. Discharges to sea are considered to be of a negligible consequence (not significant) and are therefore not assessed further.	• MARPOL compliance. • Treatment and maceration to 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. • 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 pipeline and umbilicals and subsea installation 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 Pelican Area pipelines, umbilicals and subsea structures is estimated to require up to five vessel types, however these would not all be on location at the same time (anticipated maximum of two at any one time). 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
Physical presence of infrastructure decommissioned *in situ* in relation to other sea users	Yes	Scoping conversations focussed on the low likelihood of an interaction but the possible major (significant) consequences should a snagging event occur, accounting for the concerns of the fishing industry. Subsea installations and surface-laid pipelines and umbilicals will be fully removed other than small sections of surface laid lines in close proximity to the Cormorant Alpha CGBS which may be decommissioned in place if derogation is granted to decommission the CGBS in place. “Close proximity” is considered within approximately 75 m of the platform CGBS. Logical break points between portions decommissioned in situ and portions removed will be selected, e.g., pipeline crossings, etc. The precise limit of “close proximity” will be agreed with OPRED on a case by case basis for each pipeline and umbilical. Seabed disturbance from the removal of infrastructure has the potential to modify the habitat in a way which might impact upon other sea users which utilise the seabed. The seabed typical of the Pelican Area may lend itself to the formation of clay mounds in areas of occasionally muddy benthic habitat. Clay mounds may pose a potential snagging hazard to commercial fishing gears which make contact with the seabed. Following decommissioning, the seabed will be surveyed and remediated as required. Due to the presence of cuttings contamination in the Pelican Area and at the Cormorant Alpha platform, there is the potential for demersal fishing gear to interact and disturb the contaminated sediment. Field studies designed to trawl over a known cuttings pile and measure the dispersion of cuttings resulting from the trawling activities were conducted by the Fisheries Research Services in 2000 (OSPAR, 2019). The results indicated that trawling activities disturbed relatively little material to a significant height into the water column. To address any Stakeholder concerns, Section 6.5 provides more detail regarding survey of the seabed and seabed remediation following decommissioning of the Pelican Area subsea facilities.	See Section 6.5.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Underwater noise emissions	No	Screening 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. The recently published Department for Energy Security and Net Zero (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 project 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.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Resource use	No	Screening 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 434,610 GJ. Most of this energy use is related to vessel operations (360,570 GJ). A large amount (52,228 GJ) of this total is associated with the remanufacture of steel decommissioned *in situ*. 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.

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 was considered to be of a minor consequence during screening discussions due to the highly regulated and routine nature of the activity. On this basis, onshore impacts and waste are not assessed further.	• '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., SEPA. • Project Waste Management Targets. • Supply Chain Action Plan.

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
Unplanned events	No	Screening 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. Pipeline flushing will be undertaken prior to decommissioning activities. The remaining risk for a hydrocarbon release relates to loss of diesel from a vessel involved in decommissioning activities. A maximum of five vessels will be deployed over the course of the decommissioning activities, but not all at one time. These may include a CSV, DSV, guard vessel, a rock placement vessel (if remediation is not carried out by DSV) and a survey vessel. Although the risk of oil spill is remote, the Cormorant South Field System Oil Pollution Emergency Plan (OPEP) (TAQA, 2022a) will be updated to cover the Pelican Area 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. The *in situ* decommissioning of some infrastructure will also limit the potential for dropped objects or dislodged materials/objects. 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 implementation of activities. • The location of any dropped or dislodged material will be

Impact Area	Further Assessment	Rationale	Proposed Mitigation and Best Practice
			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, carbon dioxide (CO_2), methane (CH_4), nitrous oxides (NO_x), ozone (O_3), chlorofluorocarbons (CFCs) and volatile organic compounds (VOCs) is focused on the impact they have on global climate change. The Intergovernmental Panel on Climate Change (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, new manufacture of recyclable material decommissioned *in situ*)

6.2.2 Sources of Potential Impacts

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. Reviewing historical EU Emissions Trading Scheme 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 Pelican Area decommissioning activities are 34,843 Te CO_2e, equating to approximately 0.17% of total UKCS oil and gas emissions in 2022 (OEUK, 2023, DESNZ, 2023). Most of these emissions are related to operation of vessels offshore (26,581 Te CO_2e) (Table 6-1), equating to less than 0.13% of the total UKCS oil and gas emissions of 20.6 million Te CO_2e (OEUK, 2023; DESNZ, 2023). The total of 20.6 million Te CO_2e is split as follows: 14.3 million Te of oil and gas CO_2e emissions (OEUK, 2023) and 6.3 million Te of shipping CO_2e emissions (DESNZ, 2023). Vessel emissions have been calculated assuming a worst case of 371 (24h) vessel days across the duration of the decommissioning project (Table 6-2). This vessel time is split across five types of vessels which will participate in a variety of activities including: structure removal, pipeline/umbilical end cutting, rock placement and a post decommissioning monitoring. The total emissions estimate also include the new manufacture to replace recyclable materials (3,937 Te CO_2e), which represents the next largest CO_2e contribution after onshore recycling of materials (4,160 Te CO_2e).

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	1,020	6
Onshore dismantling of materials	4,982	159
Onshore recycling of materials	15,811	4,160
New manufacture to replace recyclable materials	52,228	3,937
Operation of vessels offshore (Table 6-2)	360,570	26,582
TOTAL	**434,611**	**34,844**

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

Vessel type	Duration (days)*				Energy	Emissions
	Mob/ Demob	Transit	Working	TOTAL	(GJ)	CO_2e (Te)
DSV	5.25	5.17	28.59	39.01	25,411	1,873
CSV	14.00	9.42	186.19	209.61	200,115	14,753
Rock vessel	3.50	1.75	19.08	24.33	13,358	985
ROVSV	2	2	10.50	14.50	17,810	1,313
Survey vessel	2	2	12.28	16.28	23,954	1,766
CSV (WDP3)	0.43	0.14	67.00	67.57	72,215	5,324
			Total	**371**	**360,570**	**26,582**

**Worst case durations also account for waiting on weather.*

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 the emission of 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 ozone (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 ozone 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 ozone 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 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 33 million Te CO_2e in 2022, which represents 7% of the UK total emissions for that year, according to the Committee on Climate Change (CCC) latest Progress report to Parliament (CCC, 2023). The provisional emissions for 2022 show that the emissions from refineries and oil and gas production increased from 2021 (CCC, 2023). Emissions from refineries contributed 37% of UK fuel supply emissions in 2022. Total oil and gas production emissions show a similar pattern to refineries with emissions aligned with production (CCC, 2023). The total UKCS oil and gas emissions in 2022 were 20.6 million Te CO_2e (OEUK, 2023; DESNZ, 2023). The total of 20.6 million Te CO_2e is split as follows: 14.3 million Te of oil and gas CO_2e emissions (OEUK, 2023) and 6.3 million Te CO_2e of shipping emissions (DESNZ, 2023). This means that the emissions associated with the Pelican Area decommissioning activities (34,844 Te) will amount to approximately 0.17% of the total CO_2 generated in UK in 2022. Any releases 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 (47 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 Pelican Area decommissioning activities with other decommissioning projects, to minimise the number of vessel deployments, mobilisations and demobilisations.
- Opportunity to incorporate post-decommissioning surveys as part of wider NNS decommissioning programmes.
- 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, medium 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 is the physical disturbance of seabed sediments and habitats and has the potential to cause temporary or permanent changes to the marine environment, depending upon the nature of the associated activity. Permanent impacts are generally considered to represent a worst-case where required. 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 armour) on the seabed. The total area of seabed expected to be impacted by direct physical disturbance has been calculated by adding together the individual areas of physical disturbance estimated for each activity.

Indirect disturbance is that which occurs outside of the direct disturbance footprint. It may be caused by the suspension and re-settlement of natural seabed sediments and cuttings pile materials disturbed during activities. This secondary impact pathway is considered temporary in all instances. The scale of indirect disturbance due to 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. The indirect disturbance area is estimated to be double the direct disturbance area for all installations and activities taking place.

The seabed impacts resulting from the activities associated with the Pelican Area infrastructure decommissioning are classified here as temporary or permanent. Temporary impacts are defined here as those which have transient impacts lasting a few days to a few years. Permanent impacts are those which will continue to have an impact for decades to centuries following decommissioning. In the following sections, potential impacts will also be defined either as temporary or permanent.

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:

- Removal of piled structures and other infrastructure in the Pelican Area (Figure 6-1), including Pelican manifold, extension manifold, SSVS, SDUs, skids and adjoining spools jumpers and protection materials (Section 6.3.2.1).
- Removal and remediation of pipeline ends, (pipeline spools and jumpers), and associated protection/ stabilisation materials at the Cormorant Alpha and Pelican pipeline ends (Figure 6-1; Section 6.3.2.2).
- Removal and/or remediation of areas of shallow burial, spans and exposures of pipelines decommissioned *in situ* (Figure 6-2; Section 6.3.2.3)
- Potential temporary wet storage of the Pelican Riser Caisson (Cell Top Caisson and Cell Wall Caisson).

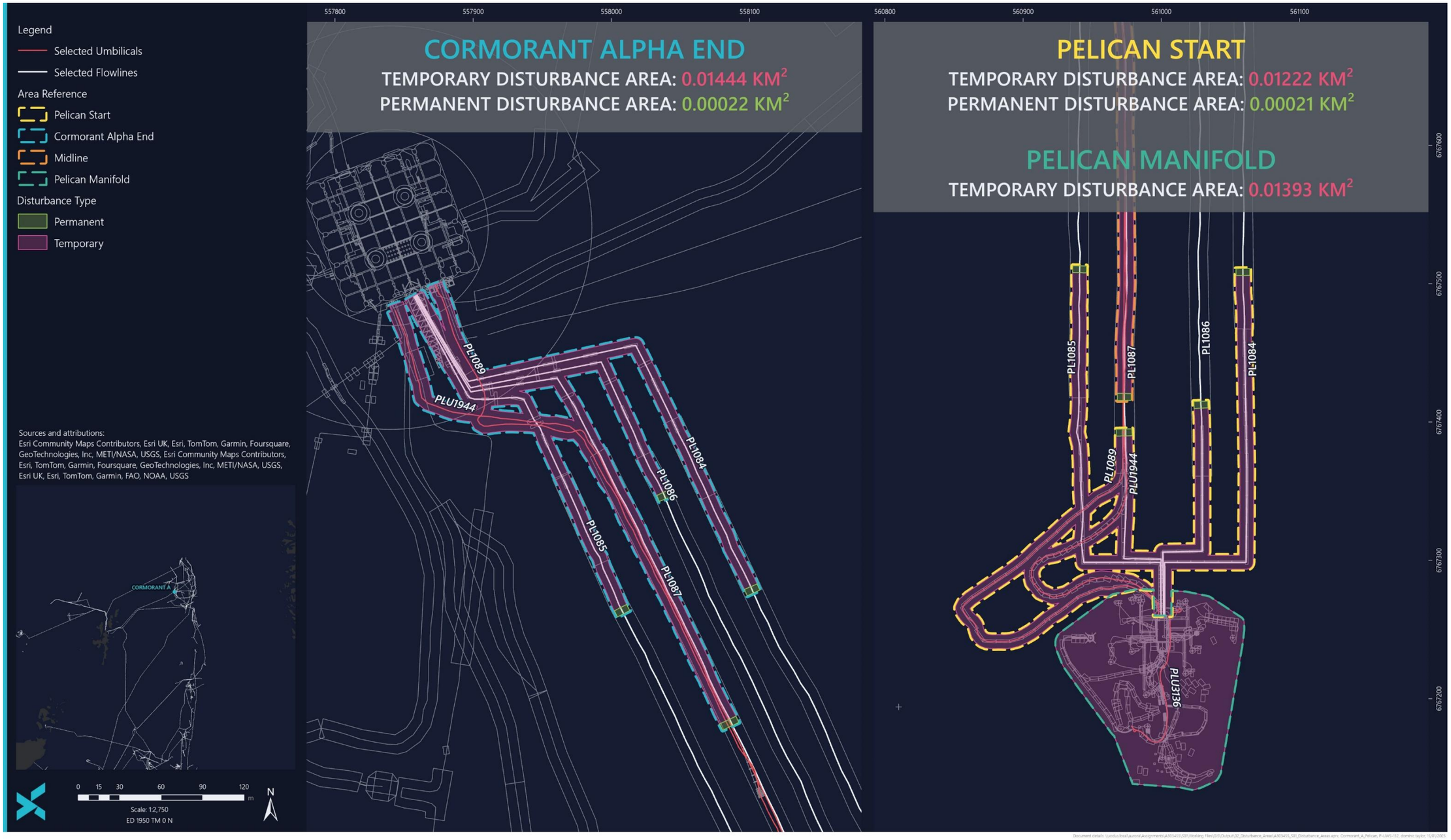


Figure 6-1 Worst-case Seabed Disturbance at the Cormorant Alpha and Pelican Manifold Pipeline Ends

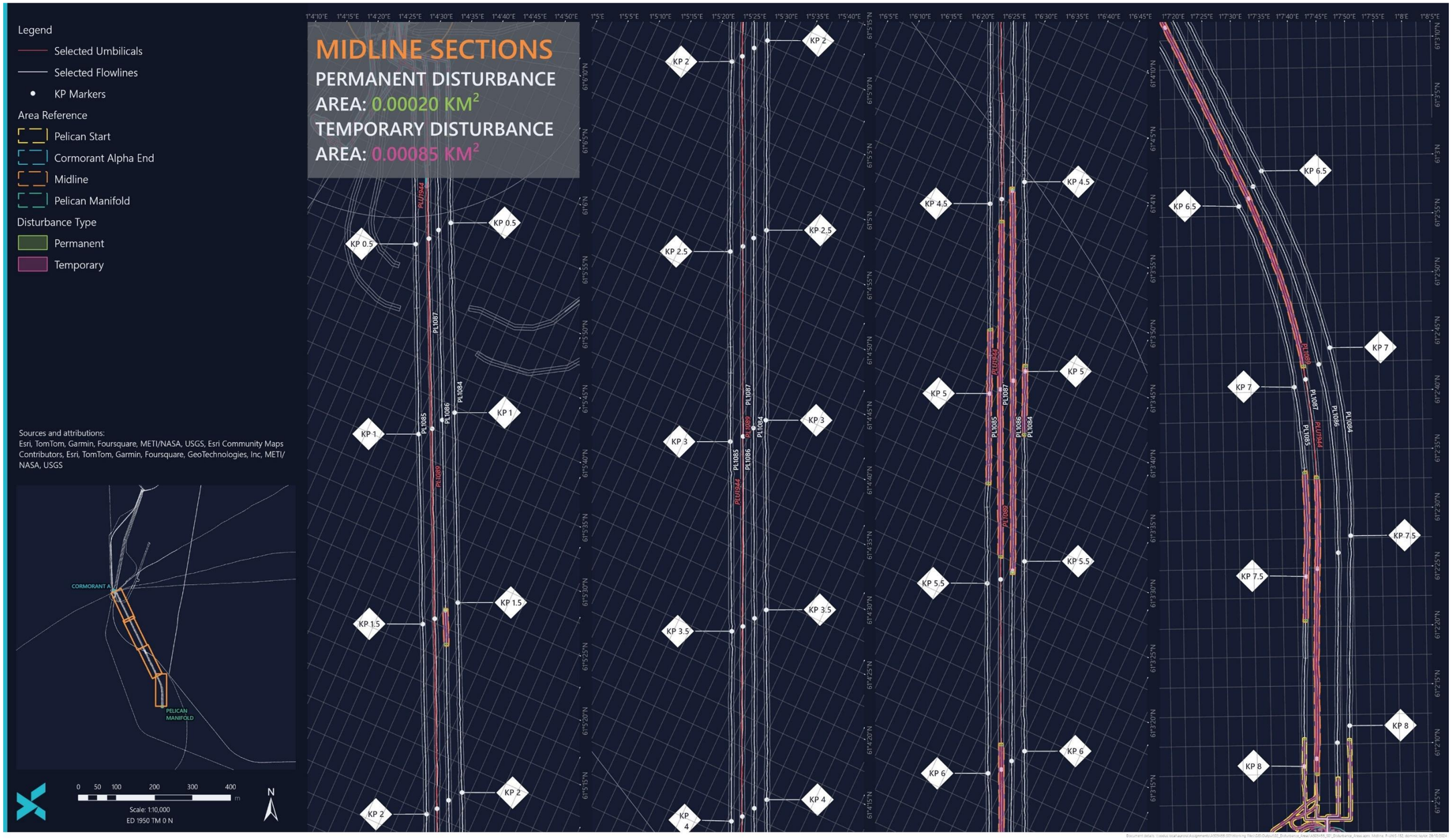


Figure 6-2 Worst-case Seabed Disturbance Along the Cormorant Alpha to Pelican Manifold Pipeline Corridor

6.3.2.1 Pelican Area

All subsea infrastructure in the area around the Pelican manifold (Figure 6-1) is to be fully removed. The Pelican Riser Caisson will potentially be wet stored on the seabed until it is returned to shore for dismantling and recycling. The worst-case temporary disturbance footprint for wet storage was calculated by accounting for the dimensions of both the Cell Top Caisson and the Cell Wall Caisson, with the individual footprints subsequently combined to determine the total area. Decommissioning of the wellheads is out-with the scope of the decommissioning activities addressed by this EA and a complete impact assessment will be undertaken as part of the permit applications associated with well decommissioning.

Given the complexity of the infrastructure in the vicinity of the Pelican manifold, the outer extent of all the infrastructure due for removal was defined using Computer-Aided Design (CAD) drawings and Geographical Information Systems (GIS). A 5 m buffer has been added to the extent of this area to define a worst-case scenario for direct, temporary impact for the removal activities in this area.

An estimate has been made (using an inhouse Xodus methodology) of the possible indirect disturbance due to re-suspension and settlement of sediment. Most re-suspended sediment will settle within the initial disturbance area, but it has been assumed that some will land beyond that area. As a conservative estimate, the area of indirect disturbance has been assumed to be double the area of direct disturbance. This disturbance will be temporary, and resettlement will only occur when activities are underway and shortly afterwards. The direct and indirect disturbance areas associated with these proposed operations are summarised in Table 6-3.

6.3.2.2 Removal of Pipeline Ends

Where outlined in Section 3.2.2, pipeline ends and the surface laid flowlines and umbilicals at both the Cormorant Alpha platform and Pelican manifold locations (Figure 6-1) will be cut and removed. Where required, rock will be placed over the pipeline ends as remediation. It should be noted that the seabed impact of the removal of the Cormorant Alpha pipeline ends has been considered here, however, limited sections of surface laid pipelines and umbilicals near the Cormorant Alpha platform may be left in place, subject to derogation to leave the CGBS in place, and agreement with OPRED. “Close proximity” is considered within approximately 75 m of the CGBS. Logical break points between portions left *in situ* and portions removed will be selected, e.g., pipeline crossings, etc. This is the lowest risk, least seabed disturbance option. If derogation to leave the CGBS in place is not granted, all surface laid pipelines and umbilicals will be recovered and taken to shore for appropriate re-use, recycling, or disposal. The precise limit of “close proximity” will be agreed with OPRED on a case by case basis for each pipeline and umbilical.

The area of seabed disturbed by recovery of the pipeline ends and associated remediation (concrete mattresses and grout bags) has been estimated in GIS defining the outer extent of all the pipelines due for removal and a 5 m buffer width was added to ensure that all pipeline remediation had been incorporated in the disturbance footprint.

Where pipeline ends become exposed during removal activities (e.g. where spools are removed either side of existing rock placement; (Figure 6-1)) they will be covered by an overtrawlable rock berm which will be 10 m wide, 5 m long. This represents a permanent impact. Four such locations have been identified at the Cormorant Alpha end, five locations at the Pelican end and an additional eight locations across the midline sections due to the removal of areas of shallow burial, spans or exposures.

Again, Indirect disturbance has been assumed to be twice that of the direct (temporary or permanent) disturbance area. This accounts for the potential resuspension of sediment generated due to the direct disturbance, most of which will settle within the direct footprint. The direct

(temporary and permanent) and indirect disturbance areas associated with these proposed operations are summarised in Table 6-3.

6.3.2.3 Pipelines Decommissioned *in situ*

The flexible pipelines and umbilicals to be decommissioned *in situ* will undergo removal and recovery of areas of spans, exposures and shallow burial with cut ends remediated via rock placement. Should the survey and monitoring programme provide evidence of increase in a level of potential risk (from snagging), the areas of concern shall be remediated on a case-by-case scenario.

The rigid pipelines and umbilicals will have the ends removed and remediated via rock placement to prevent snag risk. TAQA will conduct pre-decommissioning survey within the Pelican Area prior to the commencement of the DP scope and any fishing critical spans identified will be remediated. The approach to remediation will be assessed on case-by-case basis and rock cover represents a worst-case scenario. The worst-case scenario (presented in Table 6-3) is a contingency estimate for the remediation of future formation of mid-line spans and exposures. The approach considers rock remediation of spans measuring less than 20 m or cut and lift of spans measuring more than 20 m. Subject to the outcome of future surveys, additional rock cover required for remediation activities will be covered by relevant environmental permits. OPRED will be informed of the outcome of these surveys in advance of decommissioning activities commencing. The permanent direct and indirect disturbance areas associated with these proposed operations are summarised in Table 6-3 and shown in Figure 6-1 and Figure 6-2. Again, the indirect disturbance is conservatively estimated to be twice that of the direct area and this is also shown in Table 6-3.

Structural degradation of the pipelines *in situ* will be a long-term process caused by corrosion, and eventual collapse of the pipelines under their own weight and that of the overlying sediment. During this process, degradation products derived from the exterior and interior of the pipelines will breakdown and potentially become bioavailable to benthic fauna in the immediate vicinity. Pathways from the pipelines to the receptors would be via interstitial spaces in seabed sediments.

6.3.2.4 Summary of Disturbance to the Seabed

The seabed disturbance from all decommissioning activities is summarised in Table 6-3 and within Figure 6-1 and Figure 6-2. 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)	Permanent disturbance (km^2)	Temporary Indirect disturbance area (km^2)
Removal	Pelican manifold area (Figure 6-1)	Temporary	0.014	-	0.028
Removal	Pelican start (Figure 6-1)	Temporary	0.012	-	0.024
Rock placement on pipeline ends	Pelican start (Figure 6-1)	Permanent	-	0.0002	0.0004
Removal	Cormorant Alpha end (Figure 6-1)	Temporary	0.014	-	0.028
Rock placement on pipeline ends	Cormorant Alpha end (Figure 6-1)	Permanent	-	0.0002	0.0004
Wet storage of Pelican Riser Caisson	Cormorant Alpha end	Temporary	0.0012	-	0.0024
Rock placement on pipeline ends	Midline (Figure 6-2)	Permanent	-	0.0002	0.0004
Removal	Sections of midline lengths (Figure 6-2)	Temporary	0.0009	-	0.002
Contingency estimate for remediation of future formation of mid-line spans / exposures[1]	Midline	Permanent	-	0.0008	0.0016
		Total (km^2)	**0.042**	**0.0014**	**0.087**

1. Rock cover represents an indicative worst-case scenario. The remediation approach will be assessed on a case-by-case basis. Subject to future surveys, additional rock cover required for remediation activities will be covered by relevant environmental permits.

*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

Decommissioning activities are expected to lead to two types of direct physical disturbance. The first is temporary disturbance, which will result from the removal of pipelines and infrastructure from the seabed. Sediment will be disturbed during the retrieval of equipment from the seabed and rock placement, but once decommissioning is complete, this disturbance will cease.

In the case of rock placement, temporary disturbance will only apply to the wider area impacted by suspended sediments, not the area covered by rock. Temporary 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.

The second type of direct disturbance will be permanent disturbance caused by the deposition of additional rock armour on the seabed to protect infrastructure decommissioned *in situ*. This type of disturbance will effectively change the seabed type in the affected areas from the naturally occurring silty sand to a hard substrate. These materials will be permanently decommissioned on the seabed and potentially become fully buried by the deposition of new natural sediment. While the seabed will eventually recover and the substrate will return to pre-disturbance conditions, the

time frame over which this occurs is so long-term that the disturbance is considered permanent. The temporary and permanent seabed effects associated with direct disturbance are discussed in the subsections below.

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. Past surveys of the Pelican Area consistently report infauna to be prolific and consist of polychaetes and bivalve molluscs (Benthic Solutions, 2024). 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 cushion stars.

The primary features of conservation and environmental concern in the wider Pelican Decommissioning Area include:

- Submarine structures made by leaking gases' Annex I Habitat
- Ocean quahog *Arctica islandica* – OSPAR list of threatened and/or declining species and habitats (Region II – Greater North Sea)
- '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'
- Blue Carbon sequestration

Pockmarks

Numerous seabed depressions that resembled pockmarks were also observed throughout the Pelican Area. However, none were thought to be associated with MDAC. The lack of MDAC present in pockmarks identified across the Pelican Area indicates that Annex I 'Submarine structures caused by leaking gases' are not present (Benthic Solutions, 2024).

Ocean Quahog

Ocean quahogs 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 ocean quahog has been shown to occur in the Pelican Area surveys, there is 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

'Seapen and burrowing megafauna communities' also have the potential to be found within the Pelican Area. Benthic Solutions (2019) estimated the density of burrow openings at the seabed using representative video transects from sampling stations (CA_EBS_08 and CA_EBS_10) located between 250-500 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. Further, sea-pens 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 (Benthic Solutions, 2024). Similarly, burrowing megafauna communities were present through the Benthic Solutions (2020) Pelican survey area

in low densities with small and large burrows (3-15cm) falling mostly into the 'occasional' and 'rare' SACFOR category. Only one station at P_EBS_05 with a density of 17.3 burrows per 100 m^2 was identified as 'frequent' and this station could be considered as the 'Seapen and Burrowing Megafauna Communities' habitat (Benthic Solutions, 2020). P_EBS_05 is located 100 m NNE of the Pelican manifold.

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% (NMPI, 2023) which is above average compared to the UKCS more generally (UKCS average value is 10.1%; Burrows *et al*., 2014; NMPI, 2024). 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 Pelican Area 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 0.042 km^2 of seabed would 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, such as commercial trawling. 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).

6.3.3.1.2 Permanent Direct Disturbance

Permanent direct disturbance will occur due to placing further rock cover on the seabed in perpetuity. Approximately 0.0014 km^2 of seabed will be subject to permanent direct disturbance due to the introduction of rock placement on pipeline ends and the conservative estimate of future contingency rock placement on mid-line spans/exposures, as detailed in Table 6-3. TAQA is committed to undertaking a pre-decommissioning pipe-tracker (depth of burial) survey along the Pelican pipelines to inform the requirement for remediation activities. It is likely that natural backfill will have increased burial depth over time, and remediation can therefore be more targeted.

The immediate effect of the introduction of new rock cover will be mortality and injury of immotile benthic and epibenthic fauna, as well as disturbance of motile fauna. Following the introduction of the rock cover, the ongoing effect will be the change of an area of softer habitat to a hard substrate, and a related change in the types of organisms that can use the habitat. Organisms such as sea pens and burrowing bivalves, anemones and crustaceans will no longer be able to use the area affected, while new habitat will be created for other groups such as encrusting sponges and anemones.

The 'Seapens and burrowing megafauna in circalittoral fine mud' habitat has no resistance to physical loss or change of substrate – where the soft sediment is no longer available, the community ceases to exist. Seapens themselves show poor recovery when physically damaged (Hill, Tyler-Walters and Garrard, 2020). While the habitat could be affected by the remediation activities, this represents a localised impact within the existing trenches. Furthermore, the prevalence of the habitat in the Pelican Area would ultimately promote quick recovery of seapens.

While the introduction of rock cover clearly results in a change in the habitat type and associated fauna present, the scale of the impact is negligible considering that approximately 50% of the seabed available in the NNS is of a similar composition (NMPi, 2025).

6.3.3.2 Temporary Indirect Disturbance

Indirect disturbance (being twice the area of direct disturbance) is projected to have an area of temporary impact of 0.087 km^2 with no permanent impacts anticipated in the wider disturbance area. 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. The lack of movement at the seabed in this area can be corroborated by the lack of natural backfill in the midline trenches (Section 3.2.2).

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 'Sea pen 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 of the Pelican Area.

6.3.3.3 Impact of Pipelines Decommissioned in situ

The decommissioning of items *in situ* has associated legacy impacts. This arises from the gradual breakdown of materials left *in situ*. In this instance, the pipelines and umbilicals will undergo long-term structural degradation caused by corrosion, leading to the eventual collapse of the pipelines under their own weight and that of overlying pipeline coating material, scale and sediment. During this process, degradation products derived from the exterior and interior of the pipe will breakdown and potentially become bioavailable to benthic fauna in the immediate vicinity.

The primary degradation products will originate from the following pipeline components:

- Pipeline scale
- Steel, and
- Plastic coating.

As the Pelican Area pipelines will have already been flushed prior to decommissioning activities, the pipeline and umbilical contents will be limited to treated seawater. Therefore, the impact of the contents of the pipelines and umbilicals decommissioned *in situ* is not considered further in this EA.

6.3.3.3.1 Heavy Metals

Metals with a relatively high density or a high relative atomic mass are referred to as heavy metals. It is expected that these metals will be released into the sediments and water column during the breakdown of the components of the pipeline scale, steel and sacrificial anodes.

The toxicity of a given metal varies between marine organisms for several reasons, including their ability to take up, store, remove or detoxify these metals (Kennish, 1997). Concentrations of the metals are not expected to exceed acute toxicity levels at any time owing to the decommissioning. However, chronic toxicity levels may be reached for short periods within the interstitial spaces of the sediments or near the pipelines. At these levels, heavy metals act as enzyme inhibitors, adversely affect cell membranes, and can damage reproductive and nervous systems. Changes in feeding behaviour, digestive efficiency and respiratory metabolism can also occur. Growth inhibition may also occur in crustaceans, molluscs, echinoderms, hydroids, protozoans and algae (Kennish, 1997). It is expected that any toxic impacts will be short lived (DEFRA, 2010) and localised with minimal potential to impact populations of marine species. The potential for uptake and concentration of metals would also be limited to the local fauna and due to the slow release of these chemicals not likely to result in a significant transfer of metals into the food chain.

The slow release of the metals associated with the pipeline steel is expected to have a negligible impact on the local environment. However, it is anticipated that both degradation and resultant failure of the pipelines would be an exceedingly slow process, with failure only estimated to occur after many years (up to 400 years) (HSE, 1997).

Along buried pipeline corridors heavy metals may accumulate in the sediments as the pipelines degrade. The finer fraction of these sediments (silts and clays) is likely to form bonds with these metals, making them less bioavailable to marine organisms. The sandy (coarser fraction) of the sediments surrounding the pipelines are less likely to retain metals (MPE, 1999). The seabed within the Pelican Area is largely composed of muddy sand and is therefore likely to retain any metals, prolonging their release to the surrounding seawater.

Degradation is unlikely to occur at a constant rate and across the entire length of the pipeline. Therefore, due to the highly localised nature of any degradation products and the low concentrations of contaminants being released over an elongated period it is highly unlikely that these products will be detectable above current background conditions (UKOOA, 2001).

6.3.3.3.2 Plastics

There are plastic components within the composition of the pipelines within the Pelican Area. However, as no micro-organisms have evolved to utilise chemically resistant polymer chains as a carbon source, these plastics can be expected to persist in the environment for centuries (OGUK, 2013). As the rate of biodegradability in the marine environment is also low, it can be assumed that the environmental effect of leaving these plastics in place is insignificant (MPE, 1999). Recent studies indicate that plastic coatings on pipelines located on the seabed may take 100s of years to fully degrade (Oluwoye *et al*., 2023; Testoff *et al*., 2022). The rate of degradation is influenced by a range of environmental factors, including temperature, solar irradiance, salinity, pH, microbial activity and abrasive erosion. These variables can significantly alter the physical and chemical breakdown of plastic materials. Furthermore, plastics buried beneath the seabed are likely to degrade at an even slower rate due to reduced exposure to oxygen, light, and microbial communities (Oluwoye *et al*., 2023; Cetiner *et al*., 2000).

Opportunity also exists for microplastics to enter the food chain. Adverse effects of microplastics on marine organisms can potentially arise from the physical obstruction or damage of feeding appendages or digestive tract or other physical harm. In addition, microplastics can act as vectors for chemical transport into marine organisms causing chemical toxicity (Hylland and Erikson, 2013). Zooplankton, for example, have been shown to ingest microplastics, raising concerns about the

broader ecological impacts of plastic pollution in marine environments. Adverse effects have been reported on key biological functions including feeding behaviour, growth and development, reproduction, and lifespan. These disruptions can impair energy intake and reduce their reproductive capability, ultimately threatening population dynamics and the stability of marine food webs (Botterell *et al*., 2019). However, the pipeline degradation process which facilitates the availability of plastics to marine organisms will occur very gradually over a highly protracted timeframe. Studies have concluded that, even under conservative assumptions, degradation of subsea plastic-containing flowlines does not pose a significant risk to local marine communities (e.g. Testoff *et al*., 2022).

Due to the highly localised nature of any degradation products, the burial status of the pipelines and the low concentrations of contaminants being released over an elongated period it is highly unlikely that these products will show concentrations beyond the existing background levels (Bakir *et al*., 2023) in the North Sea.

6.3.4 Cumulative and Transboundary Impacts

Most of the 11 surrounding oil and gas assets within 40 km of the Pelican Area (Table 4-7) 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 (0.13 km^2, Table 6-3) of the Pelican Area decommissioning operations amounts to less than 0.0026% 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:

- Submarine structures made by leaking gases' Annex I Habitat;
- Ocean quahog *Arctica 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 effect on the viability of the local populations.

As far as practicable, mitigation of the anchoring activities will be focussed on placement of anchors and their mooring lines in locations where features of conservation importance are minimal. Mooring layouts will be designed in cognisance of data collected in the rig site survey and anchors and mooring lines will be in areas of no (or very little) drill cuttings contamination.

The Pelican Area is located approximately 39 km from the UK/Norway median line (closest point). Given this distance, and the area of indirect temporary disturbance being 0.085 km^2, there is no 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 as low as reasonably practicable:

- Pre-decommissioning status surveys will be carried out to enable planning for the decommissioning activities;

- TAQA will undertake a pre-decommissioning pipe-tracker (depth of burial) survey along the Pelican pipelines to assess the extent of natural backfill and inform the requirement for remediation activities. OPRED will be informed of the results prior to decommissioning activities commencing.
- All activities which may lead to seabed disturbance will be planned, managed and implemented in such a way that disturbance is minimised;
- 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;
- Careful planning, selection of equipment, management and implementation of activities;
- 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;
- Rock armour will be placed by a fall pipe vessel equipped with an underwater camera on the fall pipe or the positioning of rock bags monitored by ROV. This will ensure accurate placement of the rock armour and reduce unnecessary spreading of the rock armour footprint beyond the boundaries of the existing trenches, where relevant, and ensuring that minimum safe quantity or rock is used; and
- 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-decom 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

Pelican Area subsea decommissioning activities will result in temporary direct and indirect disturbance to the seabed. Temporary direct disturbance has the potential to impact approximately 0.042 km^2 of seabed. Temporary indirect disturbance has the potential to impact approximately 0.087 km^2. There will be a maximum 0.0014 km^2 area of permanent disturbance as a result of new rock placement (for pipeline ends and potential contingency rock on mid-lines). The seabed disturbance area associated with rock remediation represents an absolute worse-case scenario. TAQA is committed to undertaking a pre-decommissioning pipe-tracker (depth of burial) survey along the Pelican pipelines to inform the requirement for remediation activities. It is likely that inadequate burial identified in surveys will have decreased due to additional backfill over time, and remediation can therefore be more targeted.

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.

Surveys of the Pelican Area indicated the presence of several potentially sensitive habitats and species, including the Annex I protected habitat ‘Submarine structures made by leaking gases’ (pockmarks), the OSPAR and UKBAP protected habitat ‘Seapen and burrowing megafauna communities' and the OSPAR protected species, Ocean quahog.

The lack of MDAC present in pockmarks identified across the Pelican Area indicates that Annex I ‘Submarine structures caused by leaking gases’ are not present.

The OSPAR ‘Seapen and burrowing megafauna communities' habitat were recorded as ‘rare’ and ‘occasional’ with one location recorded as ‘frequent’ on the SACFOR scale. The general benthos and the species associated with the OSPAR ‘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.

Very low abundances of ocean quahog were observed in the survey areas however, 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.

Given the area of permanent direct and temporary indirect impact of rock placement predicted to be generated by the proposed decommissioning activity in the wider area and along the pipeline corridor, the vulnerability of the seabed receptors is considered to be medium. However, the placement of rock within an existing trench and the potential for the recolonisation of such areas of hard substrate should also be considered.

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

Consequence	Significance
Low	Not significant

6.4 Disturbance to Drill Cuttings Piles

6.4.1 Approach

As previously detailed in Section 4.1.5, cuttings piles are located at the base of the Pelican manifold and on top of the Cormorant Alpha CGBS cell top which overspill onto the seabed next to the Cormorant Alpha CGBS (Benthic Solutions, 2020; 2024). Cuttings pile disturbance at the Cormorant Alpha CGBS may be minimised as limited sections of surface laid pipelines and umbilicals in close proximity (75 m) to the CGBS may be left in place, should derogation be granted.

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 infrastructure:

- Removal of piled structures and other infrastructure in the Pelican Area (Figure 6-1), including Pelican manifold, extension manifold, SSVS, SDUs, skids and adjoining spools jumpers and protection materials (Section 6.3.2.1).
- Removal of Pelican Riser Caisson on top of the Cormorant Alpha CGBS cell top. There are three parts to the Pelican Riser Caisson: the “Cell Wall Caisson” which runs vertically from the seabed to the top of the cell wall where it connects to the “Cell Top Caisson”. The “Cell Top Caisson” runs horizontally across the cell tops to the bottom of the “Guide Caisson”, which runs vertically from the cell top to the platform topsides in Conductor Slot 32.
- Removal of pipelines at Cormorant Alpha end, removal of pipeline ends (pipeline spools and jumpers), associated protection / stabilisation materials at the Cormorant Alpha and Pelican pipeline ends (Figure 6-1; Section 6.3.2.2).

6.4.3 Effects on Sensitive Receptors

The Pelican manifold cuttings pile is estimated to cover an area of 25,450 m^2 and has an approximate volume of 10,883 m^3, which is categorised as a “medium cuttings pile” (5,000-20,000 m^3). The chemical footprint of the pile (where THC was above the OSPAR (2006) 50 mg kg^{-1} threshold) extends approximately 120 m from the physical edge of the Pelican cutting pile, covering an area of approximately 122,700 m^2 or 0.123 km^2. The Benthic Solutions (2020) survey did note however that cuttings pile volume may be slightly overestimated due to difficulty quantifying and accounting for the volume of subsea infrastructure as well as the naturally hilly seabed morphology present across both sites and therefore should be acknowledged.

The decommissioning activities planned, namely the removal of the Pelican manifold, wellheads and associated spools will very likely interact with, and disturb, the associated cutting pile. There could also be some interaction if fishing trawlers pass over the area once the 500 m safety exclusion zone is removed from the Pelican manifold area, however, trawling is not expected to spread contaminants in amounts or at rates that would pose serious wider contamination or toxicological threats to the marine environment. The location of the infrastructure within the cuttings pile and in proximity to the Benthic Solutions (2020) survey stations is shown in Figure 4-5. All the infrastructure associated with the Pelican manifold is located within the physical and chemical footprint of the cuttings pile. The worst-case direct temporary seabed disturbance within the cuttings pile is estimated to be 0.014 km^2 at the Cormorant Alpha end, 0.014 km^2 at the Pelican manifold area and 0.012 km^2 at the Pelican start (Figure 6-1), falling within the extent of both the physical and chemical extent of the cuttings pile.

As indicated in Sections 4.1.5.1.2 and 4.1.5.2.2, the core sub-layers were distinctly layered with ‘dark silty sand’ of ‘dark greyish olive’ colour and muddy cuttings reflecting the accumulation of historical drilling muds beneath the pile surface and a level of hydrocarbon saturation. Overall, the

environmental data obtained from the Pelican cutting pile indicated that the sediments are modified compared to the wider field but could generally be ascribed as typical for cuttings piles at oil and gas installations, with the pile's THC levels falling within the OSPAR guidelines (Benthic Solutions, 2020). Elevated heavy and trace metal concentrations were recorded at stations sampled northwest of the Pelican manifold and 60 m east of the 211/26a-P11a wellhead. Six metals: (Ba, Cr, Cu, Ni, Pb and Zn) exceeded their corresponding OSPAR ERL reference values, above which a significant environmental impact might be expected. However, proportions of each metal's contamination differed, predominantly influenced by the different well's vicinity along with their years and methods of drilling and were mostly observed in the middle layers.

Removal activities in the Pelican Area are likely to disturb the drill cuttings pile and lead to the subsequent release of contaminants into the lower water column. Given the very low hydrodynamic forcing at the depth of the Pelican 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. If disturbed cuttings settle onto the adjacent seabed, this will result in the smothering of organisms which have recolonised the pile sediments and the release of contaminants into the water column and over surrounding sediments. Leachate analysis indicated that the yearly oil loss based on the physical extent of the cuttings pile would be low ranging between 0.11 Te/yr (24- hour leachate rate) to 0.10 Te/yr (48-hour leaching rate) for the manifold cutting piles leachate rates fell significantly below the OSPAR oil loss threshold (10 Te/yr). The impact of these chemicals on the benthic marine environment and the water column (including fish) is discussed below.

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 4-3). 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 4-3).

As indicated in Sections 4.1.5.1.1 and 4.1.5.2.1, 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 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 coarse gravelly sand; showing similarity to the sediment analysed throughout the baseline survey conducted around the Cormorant Alpha platform (Section 4.1.4.1). All other eleven stations 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).

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, 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. 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). 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 cutting pile also falls well below the respective OSPAR leaching threshold (500 km^2 /yr). As mentioned for the Pelican cutting piles, removal activities in the Cormorant Alpha Area 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.

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.

Benthic fauna

The macrofaunal community of the Pelican and Cormorant Alpha 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. *Galathowenia oculat*a and *Eclysippe 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, 2020). Studies have shown that recolonisation of cuttings pile sediments may commence one to two years after the cessation of cuttings discharges (UKOOA, 1999).

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. Hydrocarbon contamination was evident at most stations around the Pelican Area, with THC at 84% of stations above the UKOOA 95th percentile for the NNS. Peak THC was recorded at stations sampled northwest of the manifold and in line with the predominant current direction where levels ranged between 10,036 mg kg^{-1} to 63,523 mg kg^{-1}. However, disturbance and loss of the surficial sediments at P_CP_DC_05_A had occurred, and as such, the high concentration most likely reflects the hydrocarbon-based contamination from drilling fluids within sub-layers of the CP. The Cormorant Alpha cuttings piles showed significantly higher THC levels which ranged between 63,800 mg kg^{-1} to 427,000 mg kg^{-1}. Leachate analysis for the cutting piles in both areas 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 Pelican and Cormorant Alpha survey stations are below the OSPAR ERL threshold (11.50 µg kg^{-1}) and are therefore unlikely to have had a detrimental impact on the benthic community (Benthic Solutions, 2020).

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, 2009).

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.

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 Pelican infrastructure 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 Pelican infrastructure 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. Herring are benthic spawners but are not reported to spawn within Block 211/26 where the Pelican infrastructure is located and would be unlikely to spawn in a contaminated area of seabed (Coull *et al.,* 1998; Ellis *et al.,* 2012). It unlikely that pelagic eggs and larvae would be affected by the re-suspended material from the drill cuttings pile.

The Pelican infrastructure is also located in an area where blue whiting, European hake, haddock, herring, ling, mackerel, Norway pout, spurdog and whiting have their nursery grounds. Blue whiting is the only species with a high intensity nursery ground in the Pelican Area (Section 4.2.5; Coull *et al.*, 1998 and Ellis *et al.,* 2010), however fish are highly mobile organisms and are likely to avoid areas of contamination, re-suspended sediments and turbulence.

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 Pelican and Cormorant Alpha drill cuttings piles do 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 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.

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. The Benthic Solutions survey (2020) indicates toxic components are still present at concentrations exceeding ERL. Since the majority of the drilling fluid disturbed by the proposed activities is expected to remain bound to the drill cuttings particles, which are expected to re-settle close to the original cuttings accumulation, marine mammals in the area will experience minimal exposure.

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 Pelican 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 Pelican 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 that the potential spatial extent of any disturbance will be so limited, it is considered unlikely that the cumulative impacts of UKCS cuttings piles disturbance will 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:

- TAQA will select one or more appropriate subsea contactors in line with its commitments to management and minimisation of environmental impact. As part of this, TAQA will require the subcontractor(s) to ensure that interaction with drill cuttings occurs in a controlled manner. For example:
    - Localised dredging undertaken to enable recovery of infrastructure located within the footprint of drill cuttings will be highly targeted and controlled by ROV / diver.
    - Rock will be placed using a vessel with flexible fall pipe, assisting with positional accuracy and controlling the spread of material.
- Disturbance of the cuttings pile during decommissioning operations is expected to occur during the removal of infrastructure but also from future fishing activity. TAQA will ensure that data is made available to enable the cuttings pile to be marked on Kingfisher 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 Piles Disturbance Residual Impact

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

Pelican Area subsea decommissioning activities will result in direct and indirect disturbance to the seabed which in turn could also disturb the associated drill cutting piles. At the Cormorant Alpha end, temporary disturbance due to removal of pipelines has the potential to impact 0.014 km^2 of seabed. In the Pelican Area, temporary disturbance also due to pipeline removal has the potential to impact 0.026 km^2 of seabed. Drill cuttings can be found in the vicinity of these pipeline removal activities.

THC concentrations in the cuttings piles are 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 Pelican and Cormorant Alpha drill cuttings piles during removal and remediation activities at the Pelican manifold, surrounding infrastructure, at the Cormorant Alpha pipelines end and upon removal of the Pelican Riser Caisson. The vast majority of the Cell Top Pelican Riser Caisson lies on top of the drill cuttings pile atop the Cormorant Alpha CGBS. Consequently, there is limited interaction between the caisson and the cuttings pile. This is mainly at the end of the Cell Top Caisson below slot 32 and, to an even lesser extent, at the foot of the Cell Wall Caisson on the seabed. This will limit the spread of drill cuttings 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 both the Cormorant Alpha and Pelican cuttings piles disturbance. While THC concentrations are higher in the Cormorant Alpha drilling cuttings pile compared to the Pelican 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

6.5 Physical Presence of Infrastructure Decommissioned *in situ* in Relation to Other Sea Users

6.5.1 Approach

The proposed Pelican decommissioning activities have the potential to impact upon other users of the sea, namely commercial fisheries. This may happen during the decommissioning activities themselves of after, should any infrastructure decommissioned *in situ* interact with fishing gear. Sea users, other than commercial fisheries are unlikely to be affected by the proposed decommissioning.

6.5.2 Sources of Potential Impacts

The long-term presence of subsea infrastructure decommissioned *in situ* has the potential to interfere with other sea users. The greatest identified risk to commercial fisheries is the potential snagging of fishing gear on exposures or free spans associated with infrastructure decommissioned *in situ*, as well as any clay mounds or depressions generated by the removal of infrastructure. These potential snagging risks may arise during initial decommissioning and/ or over the longer-term. In addition to the physical presence of the flowlines decommissioned *in situ*, local pipeline remediation (i.e., rock placement) could also present a snagging risk. The length of rock placement being decommissioning *in situ* was calculated based on the pipeline surveys data. Total weight of existing rock placement along the pipelines is 30,876 Te (Table 3-5) and the seabed footprint amounts to 0.031 km^2. This value is determined by multiplying the length of rock cover by 10 m to represent the maximum rock cover scenario. This approach likely represents an overestimation.

The presence of the Pelican drill cuttings pile may increase the potential for interaction with and tainting of fishing gear. Demersal fishing gears which interact with the seabed are most vulnerable to snagging. Snagging may lead to loss or damage of catch or fishing gear and may result in vessel loss in extreme circumstances. Generally, interactions between oil and gas infrastructure and fishing gear are most prevalent in the NNS where demersal fishing effort is relatively high (Rouse, Hayes and Wilding, 2018).

6.5.3 Effects on Sensitive Receptors

Annual fishing effort in the Pelican Area (ICES rectangle 51F1) is primarily targeted for demersal species and is deemed to be of low contribution to the total UK landings values and weights. Fishing effort in 2023 amounted to 270 days in ICES rectangle 51F1 (Table 4-6).

In ICES rectangle 51F1, demersal fish accounted for between 95% to 100% of the total landed value and between 84% to 100% of the total landed weight between 2019 and 2023. In 2021 and 2019, there was a higher proportion of landed weight attributed to pelagic fish, which accounted for 16% and 13% of the total landed weight respectively. Value landed was still relatively low at <1% and 3% for 2021 and 2019 respectively. There are very little shellfish fisheries in ICES rectangle 51F1 therefore shellfish represented <1% of the landed weight and value between 2019 – 2023 (Marine Directorate, 2024). Trawls were the dominant gear type used in ICES rectangle 51F1 (accounting for approximately 237 days in 2023). It is likely that most of the trawl effort in ICES rectangle 51F1 is attributed to demersal fish, due to the higher proportion of demersal catch, however, some pelagic fishing effort is likely to occur.

Fishing activity in ICES rectangle 51F1 is broadly comparable to other high-performing rectangles in the UKCS. The moderate level of demersal fishing is concentrated in specific areas of ICES rectangle 51F1, which are located away from the Pelican decommissioning area.

Data shows that the average annual density of vessels in 2023 is variable across the Pelican Area, ranging from 0.001-1 to between 10-50 vessels hrs/km^2/month. There are two regions of increased vessel density at the Cormorant Alpha and at the Pelican manifold. This increase in vessel density can be attributed to the presence of operational and maintenance vessels around these installations (Figure 6-3). Overall, the region experiences low fishing effort with corresponding low fish landings from the area in terms of both tonnage and value.

The preferred decommissioning option for the rigid pipelines is to remove areas of spans, exposures and shallow burial. All rock associated with midline sections which are within a trench will be placed within the footprint of the existing trench and at pipeline ends and will be designed to be fully overtrawlable to minimise any residual risk to commercial fishers. Should any clay berms be apparent following infrastructure removal these will be remediated in an appropriate manner.

To corroborate the existing depth of burial data, TAQA will undertake a pre-decommissioning pipe-tracker survey along the Pelican to Cormorant Alpha pipelines to assess the extent of natural backfill in advance of decommissioning and inform the requirement for remediation activities. In the instance that additional backfill has occurred, TAQA will ensure that areas showing evidence of spanning, exposure or <0.6 m burial are appropriately remediated. Post decommissioning surveys will be run along all pipelines decommissioned *in situ*, and areas where clay berms may have formed, in agreement with OPRED and following completion of the project activities.

The seabed in the surrounding area is relatively stable, which further reduces the risk of exposure over time. Any potential changes in burial status of the pipelines resulting in legacy impacts to commercial fisheries due to degradation over time will be managed through continued monitoring and communication with relevant users of the sea, as detailed in Section 6.5.4.

The presence of the Pelican drill cuttings pile (as it will be decommissioned *in situ*) cannot be avoided and tainting of fishing nets may be an issue if its trawled over once the Pelican 500 m zone is opened up. The marking of the presence and chemical extent of the drill cuttings will be provided to the relevant stakeholders so this information is readily available to any fishers undertaking trawling activity in the area.

Considering the mitigation strategies to be put in place and the low fishing effort observed within the Pelican Area, the risks to the fishing industry associated are considered to be low.

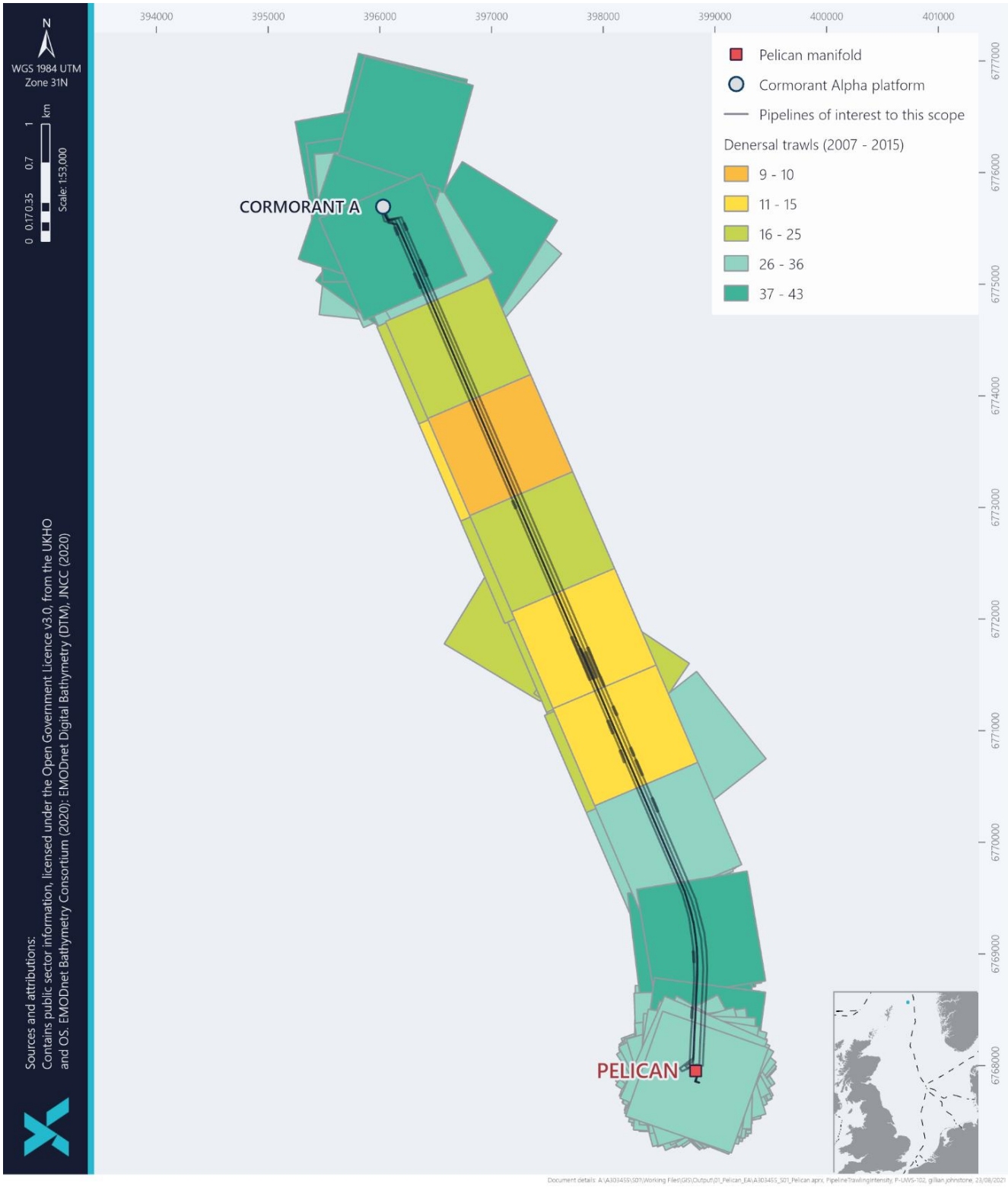


Figure 6-3 Trawling Intensity Across the Pelican Area Pipelines

6.5.4 Cumulative and Transboundary Impacts

The Pelican infrastructure is located approximately 47 km from the UK / Norway border. The most recent vessel density data shows the density of vessels in 2023 was generally low across the pipelines. Following the decommissioning activities, pipeline exposures will be remediated and the seabed will be left in an overtrawlable condition, so no impacts to any UK and / or foreign fishing fleets are expected to result from the proposed activities. Given the distance from the UK / Norway median line and the mitigation of any snagging risks (which could potentially affect foreign fishing fleets), transboundary impacts are also deemed negligible.

There is the potential for cumulative impacts to occur with other activities occurring nearby to the Pelican Area which could also interfere with commercial fishing activity. The decommissioning activities taking place for the surrounding TAQA, EnQuest, CNRI and Shell NNS oil and gas assets (Figure 4-12) will be subject to decommissioning in the coming years. The anticipated schedule for most activities is currently unknown. Any concurrent TAQA decommissioning activities for other decommissioning programmes will be confined within their designated 500 m safety zones. To reduce field congestion, resources will be coordinated and shared across projects, thereby minimizing the number of vessels present at any given time. Furthermore, the spatial separation between the assets is sufficient to prevent any cumulative environmental impacts.

It is expected that adequate mitigations will be in place at these fields to minimise snagging risk as far as possible. In addition, snagging risk or interference with commercial fisheries may arise due the decommissioning of wells within the Pelican Area and the removal of other infrastructure, however, these will be remediated/ mitigated prior to the removal of any 500 m safety zones. Overall, considering the low potential for snagging risk within the project area and the fact that any rock placement will be designed to be overtrawlable, no cumulative impacts are expected to arise.

6.5.5 Mitigation Measures

The following measures will be adopted to ensure that snagging risks to commercial fisheries as a result of the Pelican Area pipelines being decommissioned *in situ* are reduced to ALARP:

- The Pelican Area pipelines are currently shown on Admiralty Charts, the FishSafe system and the NSTA Infrastructure data systems (NSTA Open Data). Once decommissioning activities are complete, updated information (i.e. which infrastructure remains *in situ* and which has been removed) will be made available to allow Admiralty charts and the FishSafe system to be updated;
- Cut pipeline ends and fishing critical spans will be rock covered to ensure they are overtrawlable by fishing vessels;
- Rock cover will be minimised following confirmation of the current burial status of the midlines sections of the pipelines during pre-decommissioning surveys;
- Any clay berms identified during post decommissioning surveys will be remediated to ensure there are no potential snagging hazards;
- Identification of the location of the Pelican drill cuttings pile on navigational maps via Notices to Mariners;
- Any objects dropped during decommissioning activities will be removed from the seabed where appropriate;
- 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, but if deemed necessary, seabed clearance may require conventional overtrawl survey methods. Where there is evidence of residual snagging hazards (e.g. any spans,

berms, dropped objects, etc.), then intervention in the form of overtrawling to re-level the seabed or the addition of rock placement will be discussed with OPRED, and implemented as appropriate; and

- Ongoing consultation with fisheries representatives.

TAQA recognises its obligation to monitor any infrastructure decommissioned *in situ* and therefore intends to set up arrangements to undertake post-decommissioning monitoring. The frequency of the monitoring that will be required will be agreed with OPRED and future monitoring will be determined through a risk-based approach established from the findings of each survey in turn. During the period over which monitoring is required, the burial status of the infrastructure decommissioned *in situ* would be reviewed and any necessary remedial action undertaken to ensure it does not pose a risk to other sea users.

6.5.6 Physical Presence of Material Decommissioned *in situ:* Residual Impact

Receptor	Magnitude	Sensitivity	Vulnerability	Value
Physical Presence of Material Decommissioned *in situ*	Moderate	Moderate	Low	Low

While the impact magnitude may be considered major owing to the potential severity of a snagging events, the frequency of such an event is relatively unlikely and is therefore considered to be moderate.

The Pelican Area pipelines are being decommissioned *in situ* and pipeline ends which are removed will be remediated with rock. The removal of the infrastructure at the Pelican manifold may also require some remediation if clay berms are formed. Overall, this impact occurs over a local to medium scale/spatial extent and/or has a prolonged duration it can be defined as Moderate in magnitude.

These impacts will be restricted to commercial fisheries that make active contact with the seabed, such as bottom trawls and dredging gears. Commercial fisheries as a receptor are considered to be of moderate sensitivity as the industry has low capacity to accommodate change. The vulnerability of the receptor is also considered low as the presence of the pipelines are not likely to influence fishing activity in the area beyond current natural variation. The value of commercial fisheries in the Pelican Area is also considered moderate to low financial value when taken in the context of the wider regional area and effort within the ICES Rectangle is focussed in areas away from the project area.

Following decommissioning, surveys of the project area will identify, remediate and confirm there are no areas of potential snagging risk. Furthermore, a monitoring schedule, in agreement with OPRED, will be produced for any pipeline decommissioned *in situ*.

Coupled with mitigation measures which include pre-decommissioning depth of burial surveys, pipeline remediation, and marking of the drill cuttings pile on navigational maps, impacts to commercial fisheries from snagging risks from the decommissioning of the Pelican Area infrastructure are deemed low and not significant.

Consequence	Significance
Low	Not significant

7 CONCLUSIONS

Following detailed review of the proposed decommissioning activities, the environmental sensitivities characteristic of the area surrounding the Pelican Area subsea infrastructure, 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 Pelican Area infrastructure is located approximately 105 km offshore in the NNS, remote from coastal sensitivities. There are no NCMPAs, SACs or SPAs within 40 km of the Pelican Area. The closest protected site is the Pobie Bank Reef SAC, approximately 63 km southwest of the Pelican Area.

Decommissioning activities within the Pelican Area will result in temporary direct and indirect disturbance to the seabed (Section 6.3). Temporary direct disturbance has the potential to impact approximately 0.042 km^2 of seabed. Temporary indirect disturbance has the potential to impact approximately 0.087 km^2 of seabed. Rock remediation activities will permanently impact an area of approximately 0.0014 km^2 but this represents a worst-case scenario and should be considered in context with rock placement being decommissioning *in situ* (seabed footprint of 0.031 km^2). An estimated 750 Te of rock will be added during rock remediation activities to remediate pipeline ends. An additional 1,100 Te has been estimated as a contingency for remediation of future spans and exposures on mid-lines. When added to the existing rock placement (30,876 Te) this bears a total weight of 32,726 Te across four pipelines. Pre-decommissioning pipe tracker surveys will confirm the extent of backfill and therefore remediation is likely to be targeted to localised exposures and the footprint will be significantly lower. These activities have the potential to cause moderate discernible change to the baseline of existing benthic receptors. Considering the temporary and/ or localised nature of the activities, the footprint of existing rock placement 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 Pelican Area subsea infrastructure will have a low impact on seabed receptors.

Activities with the potential to impact upon commercial fisheries were limited to the possible legacy impacts from the pipelines and associated rock protection and the Pelican drill cuttings pile decommissioned *in situ* (Section 6.5). Such impacts are restricted to commercial fisheries which make active contact with the seabed, such as those which operate bottom trawl or dredging gears. All pipelines will be adequately buried and all exposures, free spans and seabed depressions will be removed or remediated. In the wider regional context, fishing activity in ICES rectangle 51F1 is broadly comparable to other high-performing rectangles in the UKCS. Based on these observations, coupled with mitigation measures which include focussed surveys and ongoing monitoring for exposures, impacts to commercial fisheries from snagging risk from the decommissioning of the Pelican Area subsea infrastructure are deemed negligible.

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 Pelican Area subsea infrastructure decommissioning activities do not pose any significant threat of impact to environmental or societal receptors within the UKCS.

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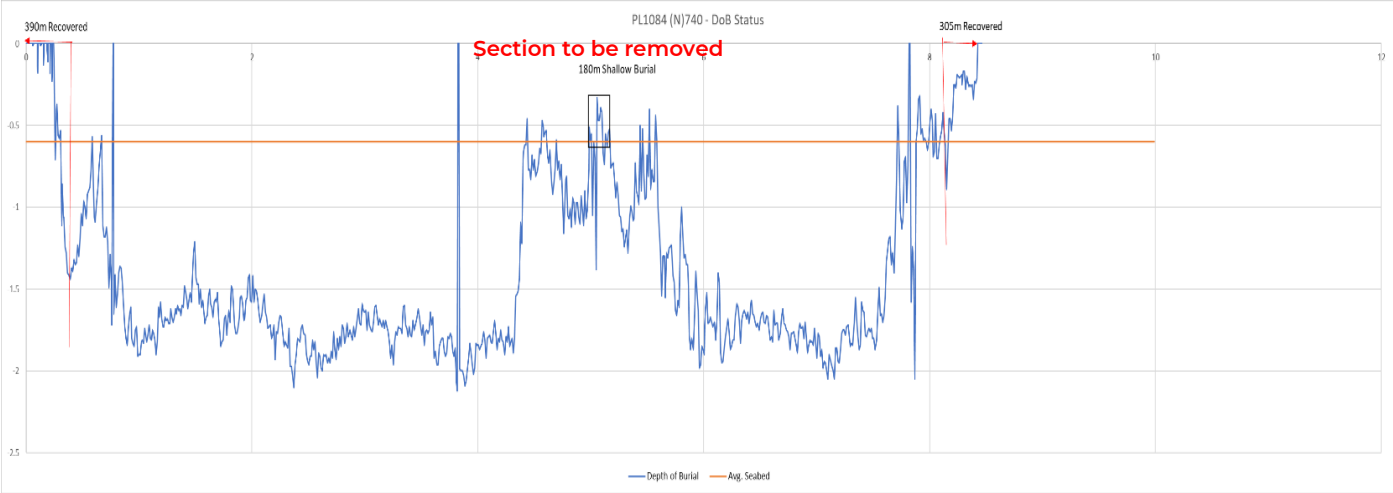
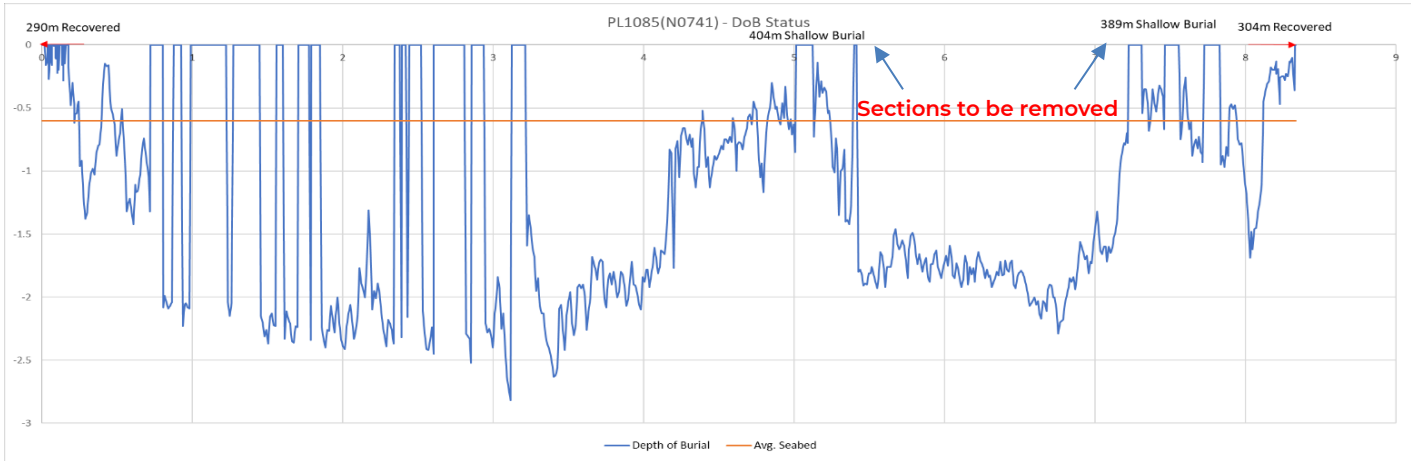
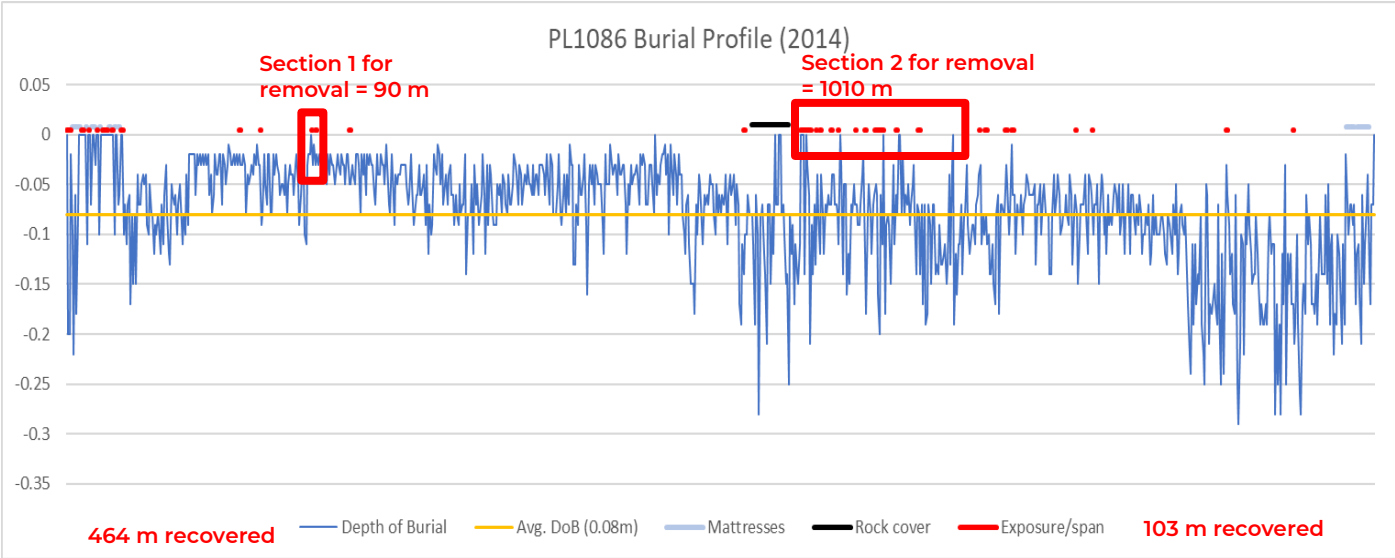
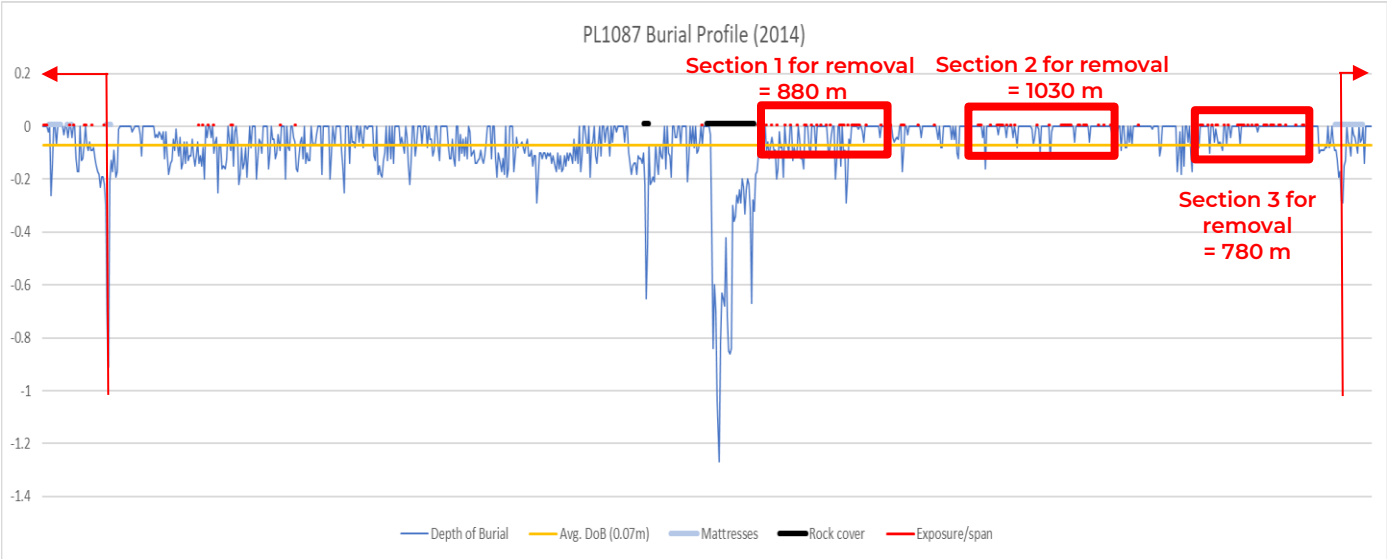
APPENDIX A - PELICAN PIPELINE DEPTH OF BURIAL






PL1086 Burial Profile (2014)
Section 1 for removal = 90 m
Section 2 for removal = 1010 m
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
464 m recovered
Depth of Burial
Avg. DoB (0.08m)
Mattresses
Rock cover
Exposure/span
103 m recovered


PL1087 Burial Profile (2014)
Section 1 for removal = 880 m
Section 2 for removal = 1030 m
Section 3 for removal = 780 m
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
Depth of Burial
Avg. DoB (0.07m)
Mattresses
Rock cover
Exposure/span

APPENDIX B - PIPELINE EXPOSURES AND FREE SPANS SUMMARY

Location	Pipeline Status	Easting	Northing	Length (m)
1084	Exposures	557878.57	6774774.67	11.6
		557887.02	6774760.54	1.2
		557888.90	6774757.70	3.1
		557891.60	6774753.42	2.6
		557895.38	6774747.46	9.4
		557904.63	6774745.93	16.1
		557931.41	6774751.48	14.9
		557956.62	6774757.35	0.8
		557959.25	6774758.06	13.2
		557984.87	6774762.65	20.3
		558014.82	6774768.72	14.2
		558026.35	6774755.52	12.9
		558035.06	6774735.47	10.9
		558041.33	6774723.27	1.9
	Spans	557917.09	6774749.87	
		557935.47	6774752.67	
		558015.78	6774768.96	
		558036.54	6774733.29	
1085	Exposures	557855.57	6774805.44	4.9
		557877.79	6774768.45	8.6
		557884.68	6774755.98	2.0
		557886.80	6774751.99	1.9
		557889.19	6774748.25	1.4
		557893.07	6774741.98	8.2
		557899.13	6774729.90	7.2
		557910.65	6774728.19	5.4
		557918.57	6774728.79	6.2
		557935.38	6774729.53	15.1
		557945.27	6774714.55	5.3
		557948.89	6774708.22	3.5
		557954.66	6774696.05	14.3
	Spans	557893.25	6774741.43	
		557901.64	6774727.74	
1086	Exposures	557860.20	6774804.16	3.9
		557879.28	6774770.78	10.1
		557895.60	6774743.25	11.9
		557907.52	6774738.57	20.5
		557932.97	6774743.85	11.3
		557946.34	6774746.76	7.6
		557958.92	6774749.06	23.4
		557986.86	6774755.38	17.5
		558000.62	6774743.18	21.1
		558013.45	6774715.27	17.5
		558024.68	6774689.61	22.5

Location	Pipeline Status	Easting	Northing	Length (m)
		558357.89	6774003.61	3.8
		558386.66	6773943.62	5.4
		558575.61	6773556.69	4.9
		558584.38	6773539.09	4.0
		558688.02	6773326.88	2.7
		558691.16	6773321.70	1.0
		559824.44	6770993.39	1.4
		559983.64	6770662.32	16.9
		559993.77	6770642.50	6.7
		560000.31	6770630.30	9.9
		560005.15	6770619.75	3.3
		560013.35	6770601.84	2.7
		560025.44	6770579.65	4.0
		560032.67	6770564.65	1.1
		560039.44	6770550.86	4.4
		560071.78	6770484.71	1.7
		560075.36	6770477.59	2.0
		560098.53	6770431.22	3.1
		560101.09	6770426.16	2.7
		560153.19	6770318.62	0.7
		560155.19	6770314.44	0.7
		560183.68	6770259.00	1.4
		560208.73	6770206.23	2.6
		560218.05	6770187.76	0.5
		560219.03	6770185.65	0.4
		560226.88	6770169.87	6.8
		560237.83	6770147.37	10.2
		560246.31	6770129.92	2.9
		560292.10	6770035.96	3.4
		560361.79	6769890.35	1.9
		560369.69	6769873.17	2.4
		560555.01	6769491.81	2.8
		560566.45	6769467.00	2.4
		560573.46	6769451.01	1.2
		560625.37	6769343.26	0.7
		560628.04	6769336.37	3.6
		560644.47	6769302.37	5.9
		560650.87	6769288.93	4.3
		560824.20	6768932.49	1.4
		560865.15	6768850.27	2.7
		561031.86	6768046.71	3.1
		561031.63	6768037.58	4.9
		561030.37	6767690.55	3.0
	Spans	557896.24	6774742.14	
		557991.02	6774756.30	
		557995.93	6774752.33	
1087	Exposures	557856.50	6774806.30	9.4
		557878.19	6774769.31	9.4
		557885.14	6774756.04	1.9

Location	Pipeline Status	Easting	Northing	Length (m)
		557887.18	6774752.31	2.1
		557888.91	6774748.30	1.6
		557894.38	6774742.91	17.6
		557910.32	6774734.21	3.1
		557915.48	6774735.18	15.8
		557936.37	6774738.70	17.2
		557958.52	6774742.19	15.8
		557970.62	6774727.73	4.0
		557977.63	6774714.02	2.1
		557978.94	6774712.22	16.8
		557990.95	6774687.79	10.3
		558028.89	6774612.04	4.5
		558032.38	6774606.21	2.2
		558037.70	6774595.23	2.1
		558051.75	6774568.58	1.8
		558302.59	6774044.90	1.1
		558309.40	6774031.65	4.4
		558334.02	6773980.05	8.3
		558346.96	6773954.17	2.1
		558408.20	6773830.94	2.4
		558411.97	6773822.95	3.0
		558414.53	6773817.01	1.2
		558542.22	6773554.81	3.2
		558590.22	6773455.61	0.5
		559782.05	6771009.31	4.8
		559921.52	6770726.34	1.3
		559925.14	6770718.66	20.4
		559934.49	6770698.70	4.8
		559947.72	6770671.39	3.9
		559965.17	6770634.65	2.2
		559978.26	6770607.66	2.3
		560000.12	6770560.83	1.6
		560016.75	6770527.07	4.4
		560019.46	6770520.52	4.2
		560033.97	6770490.37	4.2
		560039.55	6770478.23	3.1
		560057.83	6770439.20	3.1
		560064.16	6770426.29	4.0
		560077.65	6770396.04	3.3
		560087.16	6770377.14	4.8
		560094.07	6770363.35	5.8
		560101.18	6770346.95	3.6
		560109.79	6770331.32	2.0
		560117.27	6770314.16	0.7
		560120.59	6770307.66	1.7
		560129.76	6770288.37	2.2
		560153.91	6770238.53	3.1
		560159.83	6770225.97	2.2
		560165.45	6770214.82	3.0

Location	Pipeline Status	Easting	Northing	Length (m)
		560168.82	6770208.05	0.7
		560172.47	6770200.63	3.5
		560186.01	6770171.76	1.8
		560201.23	6770141.78	5.6
		560216.55	6770111.37	6.4
		560220.59	6770103.29	2.4
		560224.09	6770096.52	11.5
		560229.83	6770084.50	6.3
		560233.50	6770077.37	3.3
		560238.96	6770064.96	11.2
		560246.84	6770049.83	12.2
		560254.45	6770034.46	1.3
		560257.60	6770028.27	5.0
		560288.33	6769965.43	9.8
		560298.41	6769945.58	1.0
		560334.94	6769870.69	1.8
		560382.15	6769773.87	4.9
		560384.87	6769768.57	2.9
		560496.98	6769540.38	6.2
		560501.55	6769531.03	5.4
		560505.46	6769523.21	8.2
		560510.34	6769513.47	5.4
		560533.91	6769466.59	2.1
		560553.24	6769427.50	8.4
		560560.61	6769413.08	13.5
		560569.43	6769394.70	4.2
		560584.22	6769364.72	5.1
		560592.73	6769347.34	10.1
		560598.13	6769336.33	1.0
		560650.51	6769228.15	1.7
		560686.40	6769155.86	5.1
		560689.86	6769149.25	1.0
		560718.05	6769090.26	2.6
		560721.90	6769083.29	12.5
		560727.79	6769070.37	3.6
		560730.94	6769063.75	1.2
		560731.89	6769061.60	1.1
		560734.87	6769055.39	8.1
		560740.64	6769044.02	7.5
		560750.31	6769024.36	2.7
		560762.87	6768997.23	3.3
		560765.27	6768993.09	20.2
		560776.81	6768968.93	4.4
		560783.78	6768955.19	5.8
		560788.17	6768945.68	5.1
		560819.53	6768876.15	5.5
		560830.57	6768849.80	1.5
		560831.92	6768846.76	1.9
		560833.92	6768842.00	0.6

Location	Pipeline Status	Easting	Northing	Length (m)
		560852.91	6768793.65	2.6
		560906.12	6768634.75	4.8
		560907.88	6768628.47	0.5
		560970.07	6768268.69	5.5
		560972.19	6768245.88	0.8
		560972.56	6768238.55	3.5
		560973.02	6768229.60	4.2
		560973.47	6768218.05	3.5
		560974.42	6768199.73	7.7
		560974.82	6768180.48	7.7
		560975.08	6768167.48	1.0
		560975.20	6768165.48	2.9
		560975.37	6768155.13	1.4
		560975.30	6768150.15	10.1
		560975.85	6768138.71	2.3
		560976.06	6768134.87	3.0
		560977.05	6768097.21	4.5
		560976.56	6768077.74	7.1
		560976.54	6768014.62	1.0
		560976.53	6768012.10	1.3
		560976.59	6768000.16	2.8
		560976.72	6767996.75	1.6
		560976.34	6767985.50	15.3
		560976.26	6767952.43	8.3
		560976.23	6767924.61	5.8
		560975.97	6767893.11	7.3
		560975.85	6767882.94	2.9
		560975.07	6767847.41	5.5
		560974.96	6767836.68	1.1
		560975.14	6767827.64	6.1
		560975.23	6767814.65	1.6
		560975.04	6767798.90	3.2
		560974.77	6767790.14	1.3
		560974.74	6767784.78	5.0
		560974.93	6767773.05	4.7
		560974.78	6767747.23	21.6
		560974.85	6767696.88	1.9
		560975.42	6767637.97	1.0
		560975.64	6767604.29	2.1
		560976.30	6767594.79	3.0
		560976.20	6767583.36	2.7
	Spans	557894.51	6774742.64	
		557989.85	6774690.44	

Note: The “spans” identified are all below the FishSAFE limit and that any future requirement for remediation and or notification will be determined as a result of Post Decommissioning Surveys conducted in agreement with OPRED requirements.

APPENDIX C - 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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